

Université de Montréal

Health Outcomes among Children of Immigrant Mothers in the Quebec Birth Cohort

par
Andraea van Hulst

Département de médecine sociale et préventive
Faculté de Médecine

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Université de Montréal
Faculté des études supérieures

Ce mémoire intitulé :
Health Outcomes among Children of Immigrant Mothers in the Quebec Birth Cohort

présenté par :
Andraea van Hulst

a été évalué par un jury composé des personnes suivantes :

Jean-Marc Brodeur
président-rapporteur

Louise Séguin
directrice de recherche

Maria-Victoria Zunzunegui
codirectrice de recherche

Sylvie Gravel
membre du jury

SUMMARY

Objective: To examine differences in health between 17-month-old children born to immigrant mothers and children born to Canadian and European-born mothers while accounting for exposure to different factors.

Methods: Data from the first two rounds of the Quebec Longitudinal Study of Child Development (QLSCD) were analysed. Mothers were classified according to their origin: Canadian or European (n=1878) and non-European (n=165). Health outcomes included maternal perception of child's health and frequency of infections in the last three months. Stratified and multivariate analyses using multiple logistic regressions were used.

Results: Poverty and limited social support were common among non-European immigrant mothers. Children born to non-European immigrant mothers were perceived in worse health only when mothers reported being poor and having low social support (OR 6.29; 95% CI: 1.68-23.50). When not poor and with high social support, these children were perceived in better health (OR 0.42; 95% CI: 0.20-0.92) as compared with similar children of Canadian and European mothers. Additionally, children of non-European immigrant mothers had a lower prevalence of infections irrespective of their main type of childcare when compared to children of Canadian and European mothers who were cared for at home (OR 0.61, 95% CI 0.40-0.92).

Discussion: Poverty and limited social support appear to have a greater impact on the appraisal of their child's health for non-European immigrant mothers than for Canadian and European-born mothers. Children of non-European immigrant mothers have fewer infections regardless the type of childcare used compared to children of Canadian and European mothers.

Key words: immigration, child health, poverty, social support, cohort study, Quebec Longitudinal Study of Child Development.

RÉSUMÉ

Objectif : Comparer la santé des enfants d'environ 17 mois nés de mères immigrantes à celle des enfants nés de mères canadiennes et européennes tout en tenant compte de l'exposition à différents facteurs.

Méthodes : Les données des deux premiers volets de l'Étude longitudinale du développement des enfants du Québec (ÉLDEQ) ont été analysées. Les mères ont été classées selon leur origine : soit canadienne ou européenne (n=1878), soit non européenne (n=165). La santé de l'enfant perçue par la mère et la fréquence d'infection au cours des trois derniers mois constituent les variables dépendantes de l'étude. Des analyses stratifiées et multivariées à partir de régressions logistiques ont été utilisées.

Résultats : La pauvreté et le manque de soutien social étaient fréquents chez les mères immigrantes non européennes. Les enfants de ces dernières étaient perçus en moins bonne santé seulement lorsque leur mère était pauvre et avait un soutien social faible (RC 6.29; 95% IC: 1.68-23.50). Au contraire, les mères qui avaient un revenu suffisant et un soutien social élevé percevaient chez leur enfant une meilleure santé comparativement aux mères ayant des conditions semblables, mais d'origines canadienne et européenne (RC 0.42; 95% IC: 0.20-0.92). De plus, les enfants de mères immigrantes non européennes avaient moins d'infection, peu importe leur mode de garde comparativement aux enfants canadiens et européens gardés à la maison (RC 0.61, 95% IC 0.40-0.92).

Discussion : La pauvreté et le manque de soutien social ont des effets plus néfastes sur la perception qu'ont les mères immigrantes de la santé de leurs enfants en comparaison aux mères canadiennes et européennes. Les enfants de mères immigrantes ont moins d'infections, peu importe leur mode de garde, comparativement aux enfants de mères canadiennes et européennes.

Mots clés : immigration, santé des enfants, pauvreté, soutien social, étude de cohorte,
Étude Longitudinal du Développement des Enfants du Québec.

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ABBREVIATIONS

CES-D	Center for Epidemiological Studies Depression Scale
CI	Confidence interval
ÉLDEQ	Étude longitudinale du développement des enfants du Québec
ICQC	Interviewer Completed Computerized Questionnaire
HIV	Human Immunodeficiency Virus
LBW	Low Birth Weight
LICO	Low Income Cut-Off
NCCYS	New Canadian Children and Youth Study
NHANES	National Health and Nutrition Examination Survey
NLSCY	National Longitudinal Study of Child and Youth
NPHS	National Population Health Survey
OR	Odds ratio
PQCI	Paper Questionnaire Completed by the Interviewer
PTSD	Post-Traumatic Stress Disorder
QLSCD	Quebec Longitudinal Study of Child Development
SAQF	Self Administered Questionnaire for the Father
SD	Standard deviation
SPSS	Statistical Package for the Social Sciences
TB	Tuberculosis
US	United States

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CHAPTER 1 - INTRODUCTION

Migration is an increasingly common phenomenon worldwide such that, in 2003, approximately 175 million people lived in a country other than the one in which they were born (Mailloux, 2005). For many westernized countries, promoting immigration is seen as a partial solution to the declining rates of population growth, a much needed drive that maintains the sustainability of social and economic growth. In Canada, according to recently published data from the 2006 population census, the increase in international immigration over the past five years was primarily responsible for the country's increased population growth rate (Statistics Canada, 2006). Whereas migrating to Canada may offer many foreign-born individuals the opportunity to attain better economic, political and social situations, this journey is not without obstacles and hence may be highly stressful. Not surprisingly, the experience of migration and its relation to health and illness has been of increasing interest to health and social scientists in the past years, especially in countries where immigrants represent an increasing proportion of the population.

Along with the arrival of immigrants, Canada also opens the door to the children born within the country but to immigrant parents, a group often labelled as second-generation immigrants. The 2001 Canadian census counted a total of 337,700 children aged less than 5 years who were born to immigrant mothers, accounting for 22% of all children in this age group (Statistics Canada, 2003). Children of immigrants represent a growing component of the Canadian youth population largely due to the increase in migration and to higher fertility rates among immigrant women compared to Canadian-born women.

Although immigrants and their children vary greatly in terms of ethnicity, migratory experiences and socioeconomic status, they generally enjoy better health than comparable Canadian-born individuals, at least in the first years after resettlement and

on certain measures of health (Ali, 2002; Beiser, Hou, Hyman et al, 1998; Chen, Ng & Wilkins, 1996; Dunn & Dyck, 2000; Hyman & Dussault, 1996). However, upon arrival, immigrant families are also more likely to be poor compared with their Canadian-born counterpart, an important determinant of both physical and mental health for all family members, and particularly for children (Aber, Bennett, Conley et al, 1997; Séguin, Xu, Gauvin et al, 2005; Séguin, Xu, Potvin et al, 2003). Aside from poverty, immigrant families are also likely to be exposed to a number of other risk factors including social isolation (Matuk, 1996; Sword, Watt & Kruger, 2006), language barriers (Cohen & Christakis, 2006), and discrimination (Wiking, Johansson & Sudquist, 2004).

Few Canadian studies have examined the relationship between parental immigrant status and offspring's health outcomes while accounting for exposure to different risk factors albeit a call for more research on healthy childhood development among immigrant families (Gold, DesMeules, Manuel et al, 2004). The majority of studies on immigration and health focus on adults. Among the studies that address child health, few address child health after the early postnatal period and the majority were conducted in the United States (US). Therefore, in the following study we wish to further investigate the relationship between maternal immigrant status (immigrant versus non-immigrant) and health outcomes in young children of a Quebec birth cohort.

As stated by Carballo and colleagues (Carballo, Divino & Zeric 1998), "migration is rarely simple or easy and the growing pace of migration will bring with it new health and social challenges" (p.941). These new challenges must be addressed through more research on migration, and particularly on children of immigrants, so as to better understand the complex web of factors that have positive and negative impacts on their health. More specifically, this study aimed at evaluating the health of 17-month-old children born to immigrant mothers of non-European origin compared to similar children born to Canadian and European-born mothers in the Quebec Longitudinal Study of Child Development (QLSCD) while taking into consideration exposure to different risk and protective factors.

CHAPTER 2 - LITERATURE REVIEW

2.1 Immigration in Quebec and Canada

Immigrants represent an increasingly large proportion of Canada's population such that, in 2001, approximately 18% of its population was composed of immigrants (Statistics Canada, 2001). In the province of Quebec, the proportion of immigrants in the same year was lower but nevertheless important with immigrants comprising 10% of the province's population. Similar findings were observed among children, one out of every five children in Canada is an immigrant or a child of at least one immigrant parent (Statistic Canada, 2003). Although detailed data about immigrants to Canada according to the 2006 census are yet to be published, numbers are expected to have increased even more over the past years thereby demonstrating the importance of immigration in today's Canadian context.

During the last century, countries of origin as well as conditions and reasons for immigration changed considerably. Indeed, during most of the 20th century, the majority of newcomers were from the United States and European countries whereas, since the 1980's, immigrants to Canada increasingly originate from developing countries (Beiser, 2005). As a consequence, immigrants and their children are more likely to belong to visible minority groups. They are also more likely to have been exposed to unstable economical, political and social situations in their country of origin.

The vast majority of immigrants to Canada concentrate in the country's three major metropolitan areas: Toronto, Vancouver and Montreal (Citizenship and Immigration Canada, 2002). In recent years, several immigration host countries, including Canada, have encouraged geographical dispersal of immigrants with the idea that it would speed-up their integration into mainstream society (Hou, 2004). However,

this practice has been criticized for the potential risk of isolation which, in turn, may adversely affect immigrants' health and social integration (Carballo et al, 1998).

Immigrants to Canada and Quebec originate from highly diverse sources. Only in the province of Quebec, more than 125 cultural communities are represented with the five most common non-European countries of origin in 2004 being China, Morocco, Algeria, Colombia and Haiti (Ministère de l'immigration et des communautés culturelles, 2005). Immigrants not only vary in terms of origins, they also vary with respect to immigration class. Whereas the majority of immigrants belong to the so-called economic class which includes skilled workers and business immigrants, other classes of immigrants in order of their importance include family members for reunification efforts as well as refugees (Citizenship and Immigration Canada, 2002). Yet another group of immigrants, one that is often forgotten, is composed of "non-status migrants" and asylum-seekers, individuals who do not have the legally-required residency documents or who are in the process of applying for such documents. Although it is difficult to estimate how many non-status migrants are in Canada, immigrants belonging to this category are known to be at increased risk for social and economic exclusion (Caritas Europa, 2006).

Although this study focuses on immigrants in general, one must distinguish between refugees and those who decide to migrate voluntarily often for economical reasons. Refugees, who usually migrate because of political and social conflicts forcing them to leave their country, represent approximately 16% of all immigrants in Montreal (Citizenship and Immigration Canada, 2002). In comparison to immigrants belonging to other classes, refugees are at increased risk of exposure to a number of determinants of poor health including poor nutritional status, reduced social support as well as histories of abuse and violence (Gagnon, Tuck & Barkun, 2004). Because of these important differences, research on immigrant populations should distinguish between specific classes of immigrants. However, this might not always be feasible, especially in large population-based studies where individual country of birth, and not immigration class, is primarily used as a measure of immigrant status.

With the increasing importance of migration to Canada, there are without doubt growing numbers of Canadian-born children to immigrant parents, or second-generation immigrants. While children in immigrant families grow up with cultural values of both their parents' country of origin and their own country of birth, they are more likely to identify themselves to the values and cultures of the Canadian context (Kobayashi, Moore & Rosenberg, 1998). Furthermore, because children are strongly dependent on their parents, the factors affecting the wellbeing of immigrant parents will have at least some repercussions on their children's health especially during the first years of their lives. We will therefore start with a review of current knowledge on the health of immigrants in general for which the majority of studies have been done on adult populations, and will then focus on the health of children born to immigrant parents.

2.2 Immigration and Health

In the last decades, several studies have investigated migration and health in adults which has allowed for some understanding of the health and illness processes that are characteristic of immigrant populations. Yet, in his review of the literature on immigrants and health in Canada, Beiser (2005) described available research as being scattered, diverse and sometimes contradictory. Moreover, literature on social determinants of immigrant health is sparse and research results often remain ambiguous (Dunn & Dyck, 2000). Part of this might be explained by the fact that there exist few large data sources with information specific to immigrants that also include data on pre- and post-migratory experiences.

2.2.1 The Healthy Migrant Effect

In the literature available to us, there is some evidence that, for the most part, immigrants are generally healthier at the time of arrival in their host country compared

to native-born individuals (Chen et al, 1996; Dunn & Dyck, 2000). This phenomenon has been recognized as the “healthy migrant effect” and is particularly apparent when looking at the prevalence of chronic diseases. Indeed, those who voluntarily choose to immigrate to Canada represent a selective group of individuals who have the economic and social resources to migrate. Additionally, they must undergo severe medical screening prior to being admitted. Immigrants are therefore usually not representative of their country of origin’s population and also generally differ in terms of health status from the overall population in their new host country.

As time in their new country increases, the healthy migrant effect is said to slowly revert such that immigrants experience a decline in health status which ultimately converges to similar levels as seen in the host country. About 10 years after resettlement, immigrants’ health behaviours and use of health care services approximate that of the Canadian-born population (Beiser et al, 1998). Studies that address the length of time since migration have therefore used the period of 10 years or more of residence in Canada as cut-off for longer length of stay. Newbold and Danforth (2003) found a more or less continuous decline in overall self-reported health with increasing duration of residence in Canada. More specifically, another study found that the prevalence of chronic conditions and disabilities increased over time (Chen et al, 1996). Different explanations could lead to this phenomenon including that of a combination of social, economic, and cultural factors of the host country, all of which may contribute to the described decline in health over time. In particular, changes in dietary habits, higher levels of stress accompanied with limited social support, poverty and racial discrimination have been mentioned as playing an important role in the declining health seen over time (Beiser, 2005; Chen et al, 1996; Dunn & Dyck, 2000; Hyman, 2004).

2.2.2 Migration and Adaptation

Migrating to a new country usually means having to adapt to new social and cultural environments, which in turn, may affect one’s health. In a pioneering study done in the 1970’s, it was noted that the incidence of coronary heart disease was higher

in Japanese people who immigrated to Hawaii than in those living in Japan, and even higher in Japanese people who immigrated to California compared to those living in Hawaii (Marmot, Syme, Kagan et al, 1975). The authors concluded that in addition to certain environmental factors, rapid cultural changes and loss of important sources of social support played an important role in the development of chronic diseases among immigrants. These factors remain important in determining immigrants' state of health even nowadays.

A term frequently used in the literature on immigration and cultural adaptation is that of "acculturation" which is known as the process by which individuals incorporate characteristic ways of living from a new culture into their own ways of doing. In his work on acculturation, Berry (2002) describes four different reactions that characterise this process: integration, separation, assimilation and marginalization. Briefly, these reactions are based on the individual's capacity to maintain cultural heritage and identity as well as on the individual's pursuit of relationships with other cultural groups. The ability to maintain one's own cultural identity while also building relationships with other groups amounts to the optimal individual reaction of integration which corresponds to the notion of multiculturalism in the wider context of society. The opposite occurs when individuals retain neither their own cultural background nor attempt at making connections with their new cultural environment, a reaction characterised by marginalization.

In the past decades, several studies have been interested in the association between level of acculturation and negative health outcomes among immigrants (Hyman & Dussault, 1996; Kaplan, Chang, Newsom, et al, 2002). Although there is a vast literature on acculturation in the field of epidemiology, Hunt and colleagues (Hunt, Schneider & Comer, 2004) argue that fundamental conceptual and methodological problems related to the construct of this concept are omnipresent in the research on acculturation. They argue that acculturation is often conceptualized as a linear scale between mainstream and ethnic cultures that fails to recognize the multidirectional nature of the process. Another critique is that to be able to measure acculturation, a

distinction must be made between groups who share either mainstream or ethnic cultures (i.e. Hispanic, African American), a distinction that relies more on historical and social circumstances than on real differences. Authors further criticize researchers for combining foreign-born immigrants as well as second and following generation immigrants in the same study sample, and subsequently attributing differences to cultural aspects that change across generation rather than to factors related to immigration itself. Finally, imbedded into the concept of acculturation is the idea that individuals move from traditional or “primitive” values to mainstream or modern values, in which the notions of traditional values are not necessarily a pure reflection of the values historically associated to specific cultures. To demonstrate how these issues are apparent in previous research on acculturation and health, Hunt and colleagues review different studies on health among Hispanic populations that included some measure of acculturation.

In most studies, level of acculturation has been measured through proxy variables such as length of time since immigration, language spoken at home and country of birth (Hyman & Dussault, 1996; Kaplan et al, 2002; Wiking et al, 2004). Because numerous studies found an association between increased level of acculturation and negative health outcomes, acculturation has often been used as an explanation to the decrease in previously good health noted from the reversal of the “healthy migrant effect”.

2.2.3. Limits of the “Healthy Migrant Effect”

Although most studies agree that immigrants are in better health compared to Canadian-born individuals upon arrival to Canada, others caution the generalisation of the “healthy migrant effect” to all immigrants and instead, recognize that the manner in which health is experienced is much more complex. One example resides in the assessment of self-reported health, a measure that has been used in many studies and that was found to be a good indicator of general health (Idler & Benyamini, 1997). When health is measured through self-reported health, immigrants have a greater tendency to rate their health as “fair” and are less likely to rate their health as “very good” or

“excellent” compared to non-immigrants, regardless of time since immigration and after adjustment for demographic and socioeconomic factors (Iglesias, Robertson, Johansson, et al, 2003; Newbold & Danforth, 2003; Sword et al, 2003). Thus, even though certain objective measures indicate better health among recent immigrants, subjective measures reveal worse self-perceived health.

Additionally, recent immigrants have been found to be at increased risk of contracting tuberculosis (Tb), a disease that is often highly prevalent in immigration source countries. In Europe, several countries have seen increases in their rates of tuberculosis among their immigrant population partly due to the substandard housing and social conditions in which many immigrants find themselves (Carballo et al, 1998). In Canada immigrants comprised more than half of all Tb cases in 1994 despite the fact that immigrants are screened for communicable diseases prior to their admission (Ali, McDermott & Gravel, 2004). Again, poor living conditions such as overcrowding are thought to play a role in the enhanced spread of Tb among immigrants once in Canada (Wanyeki, Olson, Brassard, et al, 2006).

With regards to mental health, findings diverge on whether immigrants fare better or worse than those who do not have a history of migration. In one study, Ali (2002) reported lower rates of depression among immigrants, particularly in the first years after resettlement. Only for immigrants who had been in Canada for more than 30 years, rates of depression were found to be higher than in comparable Canadian-born individuals. However, because of the cross-sectional nature of the data analysed and because of the potential cohort effect resulting from the fact that individuals who immigrated to Canada 30 years ago differ from those who immigrated in more recent years, inferring causality may lead to erroneous conclusions.

Instead, it is more likely that the stresses of migration, including unemployment, poverty and loss of social support upon arrival to a new country, may be related to increased psychological stress and eventually lead to depression or other mental health problems. In a study that examined the health of immigrant mothers as well as health

related needs and access to health services during the postpartum period, immigrant mothers were more likely than Canadian-born mothers to score high on the Edinburgh Postnatal Depression Scale (Sword et al, 2003). Similar findings of increased risk for higher levels of depressive symptoms were found among non-European immigrant women in a Quebec sample (Mechakra-Tahiri, Zunzunegui & Séguin, 2007). In line with these findings, a Swedish population-based study reported higher rates of psychiatric hospital admissions among foreign-born and second-generation non-European refugee women of childbearing ages (Robertson, Malmström, Sudquist, et al, 2003). Therefore, depending on pre- and post-migratory experiences as well as on immigration class, immigrants may suffer from post-traumatic stress disorder (PTSD) or other psychiatric disorders upon arrival to, or after a certain time in their new country. The risk of developing depressive disorders after resettlement is further augmented by the lack of sufficient social support often reported by immigrants, both men and women (Sword et al, 2003; Zelkowitz, Schinazi, Katofsky, et al, 2004).

Because of the challenges unique to the experience of migration, it is increasingly recognised that being an immigrant is a determinant of one's health (Kinnon, 1999). Kinnon argues that, in addition to the pre-migratory experiences and the stresses of resettlement, the way in which immigrants are welcomed and accepted into their host country may have long term impacts on their ability to integrate into their new society which, in turn, may lead to positive or negative health outcomes. Unfortunately, immigrants, especially those belonging to visible minority groups, are too often subjected to discrimination and racism which in itself have negative impacts on immigrants' wellbeing (Caritas Europa, 2006). Discrimination in the market place may also prevent some immigrants from enjoying quality employments and push them into even more socio-economically disadvantaged situations. Before further addressing poverty among immigrants, we will examine how different circumstance and conditions associated with migration may affect immigrant's health.

2.3 Migratory Circumstances

While immigrants all share the experience of resettling into a new country, the circumstances surrounding migration vary greatly between immigrants. Migratory circumstances, or pre- and post-migratory experiences, include all conditions and experiences immigrants undergo, from the moment the decision to migrate is made until the resettlement into a receiving country. For some immigrants, migration is prepared well ahead of time whereas for others, the decision to migrate may be sudden and necessary, leaving little time for preparations. Similarly, resettling into a host country is accompanied by its load of adaptation which is experienced differently from one immigrant to another.

An explorative study was done in Montreal to investigate factors related to migratory experiences that make immigrant mothers and their newborns more vulnerable to health problems during the perinatal period (Battaglini, Gravel, Boucheron et al, 2000). Interviews were done with 91 immigrant mothers who had a baby aged between 3 and 12 months. Mothers who presented a high risk for adverse outcomes were mainly refugees and asylum-seekers, they had experienced conditions such as wars and persecutions prior to their arrival as well as separation from family members. In addition, they had a lower level of education, were generally older and spoke neither English nor French. The least vulnerable group was composed of women who had planned their migration, were younger, had a higher level of education and could communicate in English or French. In addition, the authors of this study described a third group that was made-up of women who had an average level of vulnerability to adverse perinatal health. Included in this group were women who generally had a high level of education but who experienced important downgrades in their professional status where they moved from high status jobs in their country of origin to manual and unskilled jobs in their new country of residence. Results of this study not only point to a number of important factors that are related to the circumstances of migration and that put mothers and their babies at risk for increased health problems during the perinatal

period. In addition, the study reveals important disparities in health outcomes in relation to specific migratory experiences.

Although Battaglini and colleagues' study revealed disparities in risk factors for adverse perinatal health among immigrant women, striking resemblances between all study participants were also found. Indeed, immigrant mothers shared certain risk factors including poverty, social isolation and emotional problems. Poverty has been described by others as being a risk factor shared by many immigrants in Canada (Beiser et al, 1998; Dunn & Dyck, 2000). Because poverty is an undeniable reality for many immigrants to Canada, in the following section we will provide an overview of the extent and impact of poverty among immigrant families and their children.

2.4 Immigration and Poverty

Poverty is a well known determinant of poor health among all populations and more than 30% of immigrants live below the officially defined poverty line during their first 10 years in Canada (Beiser et al, 1998). Unemployment and underemployment are key causes of poverty, especially among the immigrant population. The majority of immigrants to Canada are selected for their productivity in the country's economy, yet they often find themselves without work or in low-wage jobs upon arrival. This may, in part, be due to policies related to the non-recognition of foreign credentials which makes it difficult for immigrants to find a job that is consistent with their qualifications (Beiser, 2005; Caritas Europa, 2006). Immigrants, both men and women, generally tend to have similar or higher levels of education compared to the Canadian-born population, whether pursued in their country of origin or in their new country (Dunn & Dyck, 2000). However, for immigrants, educational attainment may not necessarily be associated with the improved socio-economic conditions generally observed.

Although unemployment has negative impacts on everyone's wellbeing, a study done in Montreal found that living in an area of high unemployment was associated with

worse reports of physical and mental health for immigrants when compared to Canadian-born individuals (Zunzunegui, Foster, Gauvin, et al, 2006). Among other explanations, the authors suggested that feeling discriminated against and being socially isolated could heighten the stress of unemployment and render immigrants more vulnerable to poor health. Similarly, according to Beiser (2005), discrimination in the work place and in other social settings may exacerbate the consequences of unemployment and poverty among immigrants belonging to visible minorities.

Nevertheless, even though over-represented among the socio-economically disadvantaged, immigrants to Canada generally take advantage of better health on certain measures as mentioned earlier. Aside from the “healthy migrant effect”, this paradoxical finding between increased risk of poverty and better health may be explained, in part, by protective factors that attenuate the relationship between poverty, immigrant status and health. An example of this is seen in the lower prevalence of smoking and excessive alcohol consumption among immigrants, particularly for those of non-European origin, compared to Canadian-born individuals (Ali et al, 2002; Chen et al, 1996).

In another explanation to this paradox it has been suggested that the meaning of poverty may be different for immigrants compared to those who were born in Canada (Beiser et al, 1998). Indeed, approximately ten years after resettlement, immigrant income and employment levels resemble that of the Canadian-born population thereby suggesting that, for the majority of immigrants, poverty is transient in nature. Yet, even when temporary, poverty may jeopardize immigrants’ health. Since poverty during childhood has long term negative effects on health, the risk of severely impacting the health and future of children born to immigrant parents is not negligible. The next section proposes a brief overview of childhood poverty, its consequences on child health and more specifically on the health of immigrant children.

2.4.1 Immigration and Child Poverty

As mentioned earlier, poverty is a well established determinant of poor health and studies consistently find strong correlations between childhood poverty and adverse health on multiple measures (Aber et al, 1997; Newacheck, Jameson & Halfon, 1994; Séguin et al, 2003, 2005). Scholars differentiate between the transitory and the persistently poor to distinguish those who come into contact with poverty in a more sporadic manner from those who remain poor for extended periods of time (Aber et al, 1997). Although both types of poverty are associated with poor health, chronic poverty appears to have more deleterious effects on child health. Aber and colleagues therefore encourage the use of longitudinal data, as opposed to cross-sectional data, to seize the dynamic nature of poverty and its effects on child wellbeing.

There is a vast body of literature explaining the relation between exposure to poverty early in life and latter adverse effects on health. In their conceptual paper, Hertzman and Power (2003) review the three main mechanisms through which poverty and other adverse circumstances are thought to influence health over the life-course: the latency, the pathways and the cumulative effects. The “latency” effect proposes the existence of developmental windows taking place at specific times during fetal and early childhood when adverse circumstances lead to long term changes in biological systems that translate into health problems only much latter in life. The “pathways” effect suggests that early life circumstances influence one’s trajectory over the life-course. For example, poverty in early childhood influences readiness to start school which in turn influences school performance and educational attainment, and eventually may lead to lower socioeconomic status during adulthood. Finally, the “cumulative” mechanism proposes that adverse life circumstances, such as those resulting from poverty, build on to one another or interact with one another and it is this accumulation over time that eventually leads to health problems latter in life. These mechanisms are not independent from one another and it is most likely a combination of these three effects that best explains the relation between early adverse circumstance such as poverty and health outcomes. Nevertheless, what stands out from Hertzman and Power’s review is the

importance of addressing poverty and its related circumstances during the early childhood period because its adverse effects are known to have long term consequences.

Since immigrants to Canada are overrepresented in the low income strata, especially for those originating from non-European countries and in the initial years after immigration, it is essential to understand the consequences of economical hardship on children born in immigrant families. Unfortunately, few Canadian studies have investigated the effects of poverty on healthy childhood development. In one study that examined the differential effects of poverty and familial factors on the mental health of children according to immigrant status, most differences in exposure to risk factors were found between immigrant children and Canadian-born children of both immigrant and non-immigrant parents (Beiser, Hou, Hyman, et al, 2002). For example, poverty was found to be associated with ineffective parenting, measured by a subscale of the Parenting Practice Scale, among Canadian-born children to both immigrant and non-immigrant parents but not among children who immigrated to Canada with their parents. These findings suggest that poverty might affect children differently depending on their own and parents' immigrant status.

In data coming from the US, variations in poverty rates are seen according to generation of immigrant children (Hernandez & Charney, 1998). First-generation immigrant children have higher rates of poverty (33%) compared to second-generation immigrant children (19%) yet, both groups were more likely to be poor compared to children born to US-born parents (17%). These findings suggest that, for most immigrants, poverty is transient and tends to decrease from one generation to the next. However, poverty may also be passed on from generation to generation. This can be examined in studies on social mobility in which the ability of immigrants to move from a lower socioeconomic status to a higher one, with time and across generation, is conveyed.

Finally, studies coming from the US often use categories of "race"/ethnicity to examine differences in health between immigrant and non-immigrant groups as well as

within immigrant groups (Acevedo-Garcia, Soobader & Berkman, 2005; Crain, Weiss, Bijur, et al, 1994; Singh, Kogan & Dee, 2007; Yu, Huang & Singh, 2004). Because “race” and ethnicity are strongly associated to socioeconomic status in the US, this type of measure in the study of immigrants makes it difficult to disentangle the effects of poverty from those of the historical and social context of marginalisation surrounding the concept of “race”.

Thus, although it is clear that being poor has deleterious effects on healthy childhood development, being poor may have a different meaning for immigrants as compared to non-immigrants. It is therefore valuable to determine whether the independent effects of one’s status as immigrant and poverty are different from their joint effect on child health. The next section will review recent literature on the health of immigrant children and children of immigrants.

2.5 Children of Immigrants: characteristics and health

2.5.1 The Epidemiologic Paradox

While some attention has been given to the health of adult immigrants, less is known about healthy childhood development among immigrant families (Gold et al, 2004). The “epidemiologic paradox”, a well illustrated phenomenon in the American literature, describes how the newborns of immigrant mothers have a lower prevalence of adverse birth outcomes, including lower rates of prematurity, low birth weight (LBW) and infant mortality, when compared to infants of “white” native-born mothers (Cervantes, Keith & Wyshak, 1999). The paradox is found in the fact that immigrant children in the US, whether of first or second-generation, are more likely to be exposed to poverty and its associated risk factors when compared to children of native-born mothers yet, they still benefit from a lower prevalence of adverse birth outcomes (Shields & Behrman, 2004). In addition, the lower prevalence of adverse neonatal

health outcomes appears to affect distinct ethnic groups differently regardless of risk factors thus suggesting a “dual-paradox”. Indeed, in their study, Gould and colleagues (Gould, Madan, Quin, et al, 2003) found that, whereas foreign-born Mexican mothers had more risk factors associated with adverse birth outcomes compared to foreign-born Asian Indian mothers, the former had lower rates of LBW and infant mortality compared to the latter.

In the same way, a study done in Montreal found that immigrant women were at lower risk for term LBW when compared to Canadian-born women (Hyman & Dussault, 1996). However, this health advantage among immigrants disappeared with increased level of acculturation which was measured in three levels according to maternal country of birth (Canada vs. other country) and language spoken at home (French/English vs. other language). Authors suggest that acculturation may have an indirect impact on immigrant maternal and newborn health through the adoption of new health behaviours such as dietary changes and increased rates of smoking. Moreover, the association between level of integration and risk for term low birth weight has been found to vary according to maternal parity such that a higher risk was seen only in the second birth cohort. Yet, what is usually found corresponds to the opposite with better perinatal health outcomes for the second compared to the first baby (Barkketeig, Hoffman & Titmussoakley, 1984) thus, again suggesting that factors associated with perinatal health outcomes differ between immigrants and Canadian-born mothers.

Similar findings of health advantages in newborns have also been found in older infants and children although fewer studies have addressed them in these age groups. For instance, in a study examining the factors associated with the hospitalisation of children aged less than two years in Canada, the only factor that was associated with a lower risk of hospitalisation is to have either parent who immigrated to Canada in the last 10 years (Guttmann, Dick & To, 2004). Factors associated with higher rates of hospitalisation for all children included maternal perception of child’s health as less than very good, maternal depression, low income and single parenthood. However, differences in rates of hospitalisation according to immigrant status do not necessarily

equate with better health among children born to immigrant parents. Instead, it could simply indicate differences in the patterns of utilisation of health care services. Health advantages among young children of immigrant parents have also been described in the US with respect to the incidence of asthma, infectious diseases and injuries (Shields & Behrman, 2004).

2.5.2 Immigrant Children and Health Outcomes

Childhood respiratory problems, for which asthma is the most important chronic respiratory condition, affect approximately 8.2% of six to eight-year-old children in Quebec (Lavallée & Stan, 2004). Although the prevalence of asthma varies across ethnic groups, American data of the National Health and Nutrition Examination Survey (NHANES) show that parental reports of childhood asthma increase between first, second, and third and latter generations of immigrant children (Hernandez & Charney, 1998). However, instead of concluding that rates of asthma increase across generations of immigrants, authors suggest the possibility that the disease could simply be better diagnosed among latter generations because of increased access to health care.

Although childhood asthma is known as a condition with multiple etiologies, childhood poverty has been associated with earlier onset and increased severity of the disease (Aber et al, 1997; Crain et al, 1994). An American study compared reports of, and emergency department visits for, acute attacks of asthma among low income infants aged less than two years in Hispanic families (Klinnert, Price, Liu et al, 2003). The authors reported that infants of foreign-born Hispanic parents had a greater number of emergency department visits for wheezing illnesses compared to those of US-born Hispanic parents even though they reported less illness severity in their child. Thus, although overall children in immigrant families have been reported to have lower rates of asthma than children in native-born families, rates may be higher for specific groups of immigrant children including among those who are poor and who belong to certain minority group.

Another measure of health among young children is the occurrence of infections including respiratory, gastrointestinal and ear infections. As seen with asthma in other studies, children living in severe poverty were found to have a higher risk of experiencing such acute health problems (Séguin et al, 2005). Similar findings of associations between socioeconomic status and prevalence of lower respiratory illnesses as well as otitis media in children were reported (Margolis, Greenberg, Keyes, et al, 1992; Paradise, Rockette, Colborn et al, 1997). Although authors also report higher rates of infections for children of black compared to those of white “race”/ethnicity, these studies do not make a distinction between immigrants of different generations making it impossible to assess the presence of an association between immigrant status and infections. Instead, studies that examine the occurrence of infections in immigrant children focus more on the communicable diseases that are usually contracted in countries of origin such as tuberculosis, malaria, hepatitis and HIV (Schwarzwald, 2005). Therefore, little is known on the occurrence of common childhood infections in children of immigrants.

Developmental disorders are yet another aspect that influences childhood wellbeing. Psychosocial factors associated with poor developmental attainment among children aged one to five years were examined in a Canadian study (To, Guttman, Dick et al, 2004). Among other factors, having a mother who is an immigrant was associated with poor developmental attainment in all age groups. Authors highlighted the need for provinces with high immigration rates to develop more effective childhood developmental strategies that target the specific needs of immigrant populations.

Finally, with regards to mental health, a Canadian study found that regardless of the higher prevalence of poverty among immigrant children, a risk factor for poor mental health, immigrant children aged between of 4 and 11 years enjoyed mental health advantages compared to Canadian-born children (Beiser et al, 1998). The authors argue that it is the context of poverty, an important determinant of mental health, which matters in that Canadian-born children are more affected by the array of socio-environmental disadvantages associated with chronic poverty whereas immigrant

children are affected more directly by the material deprivation resulting from poverty. As stated earlier, the way poverty is perceived by immigrant and non-immigrant families may partially explain this difference. For many new immigrants, poverty is seen as a transient state which is part of the process of migrating and that most will overcome this state with time and increased integration in host country. Resulting optimism may lead to greater parental investment and value towards their children thereby contributing to mental health resiliency. On the other hand, poverty among non-immigrant families may be more closely related to a cycle of social disadvantages, family break-down, and individual despair (Beiser et al, 1998).

2.5.3 Immigrant Children and Health Protection Factors

Even when poorer than children of Canadian-born parents, immigrant children are generally at least as healthy as, and sometimes healthier than, children in non-immigrant families on most measures. In an attempt to explain these paradoxical findings different studies have investigated the presence of factors that could account for these health advantages through their protective effects immigrant children's health. Described previously, the "epidemiologic paradox" shows how infants born to immigrant parents have less neonatal health problems. These initial health advantages at birth may lead to further health advantages later on during childhood. Another protective factor resides in the fact that children born to immigrant parents were more likely to be raised by two parents, have stronger community cohesion and have more family support to succeed in school (Shields & Behrman, 2004). Indeed, the structure of immigrant households is unique. According to data from the US, children born in immigrant families are more likely to grow-up in two parent families and to be living with extended family members compared to native-born families (Pérez, 1994). Although a source of social and material support, households with extended family members may also suffer from overcrowding.

Another example resides in the rate of initiation and the duration of breastfeeding among infants born to immigrant mothers. In the QLSCD, immigrant mothers of non-

European origin have been found to initiate and maintain breastfeeding for a longer duration compared to Canadian-born mothers (Dubois, Bédard, Girard et al, 2000). Similar findings were reported in the US. Immigrant and US-born children to immigrant mothers were more likely to have been breastfed and breastfed for a longer duration compared to children born to US-born parents after taking into account different demographic and socioeconomic characteristics (Singh et al, 2007). These higher rates of breastfeeding among immigrant mothers may be explained by the fact that breastfeeding is generally more common in traditional societies that characterise many immigration source countries. However, when immigrating to industrialised countries, work and societal pressures may negatively influence immigrant women's desire to breastfeed their children (Carballo et al, 1998). In their paper on migration in the European Union, these authors criticize health care workers for assuming that immigrants from traditional societies would maintain high rates of breastfeeding despite the influences of their new country.

These examples suggest that immigrant families have with them several strengths that may, to a certain point, buffer the negative effects of poverty, social isolation and discrimination described earlier. As a consequence, children in immigrant families may be protected, at least temporarily, from certain adverse health outcomes.

2.6 Critique of methodological aspects of reviewed articles

Previous studies on immigration and child health vary in terms of health measures and study samples. However, the majority used cross-sectional study designs and Canadian population-based studies were limited to the analysis of data coming from a few larger national studies.

More specifically, among Canadian research on children of immigrants, several studies analysed data of the National Longitudinal Study of Child and Youth (NLSCY) (Beiser et al, 2002, 1998; Kobayashi et al, 1998). This database has several advantages

with respect to research on immigration, childhood and health. First, the large sample size of children throughout Canada, including immigrant children and Canadian-born children to immigrant and non-immigrant parents, makes it possible to compare the health of children across these groups with greater statistical precision. Further, this database contains information on a large number of factors for which the relation with health and immigrant status can be tested. However, studies on data of the NLSCY are limited because they cannot examine factors specific to immigration, such as pre or post-migratory experiences, which as seen earlier, may better explain differences in health status. Finally, although longitudinal data is available with the NLSCY, these studies did not use longitudinal analyses nor did they include longitudinal measures on important study variables to capture the dynamic nature of certain important factors as they change over time. Several factors important to immigration, in particular socioeconomic conditions, are known to change with increased length of stay and integration in host countries. Therefore, the consideration of longitudinal measures on key variables emerges as essential.

In response to the limitations of the NLSCY with regards to research on immigrant children, a newer study is currently underway: the New Canadian Children and Youth Study (NCCYS) (Metropolis, 2007). Among other objectives, this longitudinal study aims at comparing the physical and mental health of immigrant and refugee children with that of majority culture children who already participate in the NLSCY. The first wave of the study, initiated in 2005, included 900 children in Quebec and 4500 children from across other Canadian provinces and belonging to two different age cohorts (4-6 and 11-13 years). Although results are still to be published, findings from this study will certainly add important information to our current knowledge on child health in the Canadian context of migration. More specifically, potential differences in health status as well as exposure to risk factors among immigrant, refugee and Canadian-born children may be uncovered.

Population-based studies on adult immigrants and health in Canada were mainly done with data from the Canada's National Population Health Survey (NPHS) to

compare determinants of health and health outcomes according to immigrant status (Chen et al, 1996; Dunn & Dyck, 2000; Newbold & Danforth, 2003). These studies again benefit from large sample sizes but are also restricted with regards to variables related to pre- and post-migratory experiences and, these studies only present cross-sectional analyses. A limitation to the use of population based data in studies on immigration is that most questionnaires were tested and validated with individuals belonging to majority cultures and are generally not translated to languages other than English and French. This may lead to both, selection and information biases.

When looking at studies on immigration and child health that were conducted in the US, a great number were found to focus on the “epidemiologic paradox” and on reproducing findings consistent with this paradox (Acevedo-Gracia et al, 2005; Cervantes et al, 1999; Gould et al, 2003). However, fewer studies look at health outcomes beyond the neonatal period. Another vast body of research focuses on accessibility to health care services among children of immigrants belonging to various ethnic groups as well as on insurance status of these children compared to children of US-born parents (Cohen & Christakis, 2006; Huang, Yu & Ledsky, 2006; Yu et al, 2004). Although an important issue in the US, the universal health care in Canada should ensure, theoretically at least, that all children born in Canada to foreign-born parents have access to health care. Finally, American studies in general tend to compare health outcomes of children born to parents of different “racial”/ethnic groups instead of examining differences in health between children of foreign-born parents, all origin confounded, and children of native-born parents.

2.7 Conclusion of the literature review

In summary, our review of the literature revealed that study findings on immigration and health are at times contradictory and that few studies compare the health of children of immigrants to that of children of Canadian-born populations. Whereas some studies found health advantages among infants and children born to

immigrant families other studies found them to be in worse health depending on health measures used. Additionally, research has shown that children differ in terms of exposure to risk and protective factors depending on parental immigrant status. For instance, immigrant mothers of non-European origin are more likely to breastfeed their children (Dubois et al, 2000), they are less likely to smoke (Chen et al, 1996) or to consume alcohol on a regular basis (Ali et al, 2004), and they generally have equal to superior levels of educational attainment when compared to Canadian-born individuals (Dunn & Dyck, 2000). However, in other research, immigrant women were found to be more likely to report worse self-reported health and higher levels of post-partum depression (Sword, 2006) as well as higher levels of hospital admissions for psychiatric disorders (Robertson et al, 2003), and linguistic barriers preventing access to health care (Cohen & Christakis, 2006). Additionally, children born and raised in immigrant families are more likely to be poor (Beiser et al, 1998) and to have a mother who reports being socially isolated (Dunn & Dyck, 2000). These factors could be involved in explaining potential differences in health between children born to immigrant and Canadian-born families.

The aim of this study was to evaluate health outcomes among approximately 17-month-old children born to immigrant mothers of non-European origin compared to children of Canadian and European-born mothers in the Quebec Longitudinal Study of Child Development (QLSCD) while taking into consideration different risk and protective factors. The study had the following research objectives: (1) To describe the differences in health status among children born to immigrant mothers and those born to non-immigrant mothers; (2) To determine whether children of non-European immigrant mothers and those of Canadian and European-born mothers are exposed to different risk/protective factors; (3) To determine and describe the presence of specific exposures that are effect modifiers in the relation between maternal immigrant status and child health as measured at the age of 17 months.

CHAPTER 3 - CONCEPTUAL MODEL

3.1 Conceptual Model

In order to attain our research objectives we relied on a conceptual model suggested by Denton and colleagues (Denton, Prus & Walters, 2004). In this model, authors proposed two hypotheses that could account for observed differences in health between two groups: the differential exposure hypothesis and the differential vulnerability hypothesis. Although the authors used this model to explain gender-based inequalities in health, a modified version may account for differences in health based on immigrant status. According to the initial model, the differential exposure hypothesis suggests that women report worse health compared to men because they are exposed to fewer conditions that foster health. On the other hand, the differential vulnerability hypothesis suggests that these worse reports of health come from the fact that women react differently than men to the conditions that foster health.

A modified version of this model allowed us to frame the research questions for the current study. Accordingly, the differential exposure hypothesis proposes that differences in health between children born to immigrant mothers and those born to Canadian and European-born mothers are explained through differences in their exposure to health damaging and health protective factors. Consequently, if children born to immigrant mothers are indeed found to have better health outcomes, the hypothesis suggests that this particular group of children is exposed to fewer risk factors and to more protective factors. The opposite is also possible in which worse health outcomes among children born to immigrant mothers could be explained by their exposure to more risk factors and fewer protective factors. According to the differential exposure hypothesis, the inclusion of different risk and protective factors in multivariate models should account for most of the differences in health outcomes between children born to immigrant and non-immigrant mothers.

On the other hand, if the exposure to the identified risk and protective factors does not account for differences in health among immigrant and non-immigrant born children, the differential vulnerability hypothesis may instead be supported. In this case, differences in health outcomes between the two groups under study are attributed to differences in their reactions following the exposure to various risk and protective factors. Factors would then affect children born to immigrant and non-immigrant mothers differently depending on their level of exposure to identified factors. Thus, under this hypothesis results from multivariate analyses are expected to show that the effect of maternal immigrant status on child health differs depending on whether other effect modifiers are present.

3.2 Research Questions

Based on current knowledge about the health of children born to immigrant mothers as well as on the conceptual model presented by Denton and colleagues, this study examined the three following questions:

- (1) Do differences in health, measured in terms of maternal perception of child's health and frequency of infections, exist between children born to immigrant mothers of non-European origin and those born to Canadian and European-born mothers in Quebec?
- (2) Can these differences in health be explained through a differential exposure to risk factors and protective factors between these two groups?
- (3) Do the associations between mothers' immigrant status and children's health outcomes vary according to levels of specific exposures? In other words, are children more vulnerable to specific exposures and therefore react differently to them depending on their mothers' immigrant status?

3.3 Relevance of the Study

Due to the declining rate of population growth in Canada, it is becoming increasingly clear that immigration is one of the major and unavoidable drives for population growth in this country. Further, with the increase in foreign-born individuals, there is a growing cohort of Canadian-born children to immigrant parents. In the coming years, concerns and needs specific to immigrants and to their offspring will take on more and more importance in research as well as in public debates and discussions.

Our review of the literature demonstrated that studies are starting to address health related issues of migrant populations. However, the findings discussed earlier are often conflicting and inconsistent. Moreover, in a constantly evolving society it can only be expected that factors influencing migrant health as well as their health related needs change over time, thereby necessitating continued research. Although certain immigrant subgroups appear to be healthier than Canadian-born individuals in early years after resettlement, this health advantage is seen mainly with chronic conditions and disabilities. On the other hand, immigrants appear to fare worse on the perception of their health and possibly on rates of depression. Immigration, including pre- and post-migratory experiences, appears to bring about very complex situations that may have important impacts on the health of migrants. The wellbeing of children is clearly influenced by the health of their mothers and thus, a better understanding of the determinants of immigrants' health is needed to provide scientific grounds for policies that will allow immigrants and their children to maintain a good health over time.

Questions remain unanswered with respect to the differences in health between children of foreign and Canadian-born mothers. Much of what is known to date about the health and the factors affecting second-generation immigrant children comes from American studies, which although being an important immigration country, remains different from the Canadian context in terms of its immigration policies and accessibility to health care. Although the earlier described NCCYS addresses an important gap in our

knowledge on migration and child health, research using existing databases continues to be relevant for the additional evidence that may be found.

Children of immigrants often grow up in the context of poverty, circumstances known to negatively affect child health. Few Canadian studies examined the effect of poverty on the health of children of immigrants. Despite the fact that some protective and risk factors are known to affect children of immigrants differently, it is not clear which factors explain the greatest variance in health among children born to immigrant and those born to Canadian-born parents. Although studies have examined differences in mental health, child development and health care utilisation, little is known about physical health problems that occur during early childhood but after the initial postnatal period among children of immigrant and Canadian-born populations.

Finally, immigrants arrive to Canada with many strengths but they are also exposed to a number of risk factors. These risk factors may render immigrants and their future generations vulnerable to a number of health problems. Knowing how these factors affect the health of immigrant mothers and their children is essential in order to protect their wellbeing and to help them adapt and thrive in their new country.

The QLSCD, a birth cohort of children followed annually in the province of Quebec, provided an excellent opportunity to investigate the health of children born to immigrant mothers of non-European origin and to compare their health outcomes to those of similar children of Canadian and European-born mothers. Although this study was not initiated with the purpose of doing research specifically on immigration, information about parental country of birth is available to researchers. As a result, data on certain risk factors that are specific to immigrant children and their families are not available leading to some limitations with respect to factors that can be analysed. Importantly though, the QLSCD contains data on an extensive number of factors that are thought to play a role in the health and development of all young children. Because of the longitudinal nature of the data, the temporal aspect of certain variables can also be taken into account. This data may therefore be used to compare the distribution of

different health factors among children born to immigrant and non-immigrant mothers as well as measure their impact on the children's health. Previous studies that used data from the QLSCD often treated the mother's immigrant status as a control variable however, to this date, no study has used this information as the main explanatory variable in relation to health in early childhood. Therefore, it was thought that comparing the health outcomes of children of non-European immigrant mothers and children of Canadian and European-born mothers in this database would add valuable information to our current knowledge on immigration and child health in Quebec at the start of the 21st century.

CHAPTER 4 - STUDY METHODOLOGY

4.1 Study Design and Sample

In this study, secondary analyses were done with data of the Quebec Longitudinal Study of Child Development (QLSCD), an initiative of the *Direction Santé Québec* of the *Institut de la statistique du Québec*. Initiated in 1998, the primary aim of the QLSCD was to gain a better understanding of the factors that influence childhood development and readiness to start school among young Quebecers. With its initial round done when children were approximately 5 months old, children and their families have been followed in subsequent rounds on an annual basis. In the present study, data primarily from the second round of the QLSCD, collected when children were approximately 17 months old, as well as data of hospital birth files, were analysed. In addition, three longitudinal variables were created with data collected during both the first and second rounds of the QLSCD. The current study uses a population-based cross-sectional design for the analyses of data.

To sample this closed birth cohort information present in the Master Registry of Live Births, compiled by the Ministry of Health and Social Services, which contains data on all births in the province of Quebec was used. The study's target population included all singleton births during the 1997-1998 period to mothers residing in the province of Quebec with the exclusion of those living in any of the following regions: Northern Quebec, Cree or Inuit territories and Indian reserves (2.1%). Also excluded from the eligible population were babies for whom the duration of their mother's pregnancy was not specified (1.3%) as well as those who had a gestation period of less than 24 or greater than 42 weeks (0.1%). Following the above mentioned exclusions, children eligible to participate in the study represented approximately 94.5% of all single births in the province of Quebec (Jetté & Des Groseilliers, 2000).

Within the target population, a random sample of 2940 newborns were initially selected among which 265 children were either not found (172) or excluded from the study because of foreign language (81), business addresses (6) or prolonged absence (6). Among the 2675 families that were contacted, 2223 families agreed to participate in the study (response rate 83.1%). Information on non-responders' immigrant status was not available however, it is known that baseline non-responders were more likely to speak a language other than French or English at home and to have a lower level of education. From the 2223 families who agreed to participate in the first round of the study, only 2120 were kept for the annual longitudinal follow-up due to budget considerations. In the second round of the QLSCD, when children were approximately 17 months in age, the sample included 2045 families, however response rate was lower among non-European immigrant mothers (86.4%) than among Canadian and European mothers (97.5%).

4.2 Instruments and Data Collection Tools

A variety of measurement instruments were used during the different rounds of the QLSCD which aimed at collecting information about the child and family's characteristics, including socio-demographic characteristics, health practices as well as measures of health. After each round's data collection and data entry processes, basic as well as logical validation tests were conducted thereby ensuring accuracy and validity of the data. In addition, for every round of the study, a pre-test was conducted with a different cohort of similar children in order to detect problems related to questionnaires and data collection procedures.

The primary source of information for the QLSCD and for the current study was a computerized questionnaire completed by an interviewer (Interviewer Completed Computerized Questionnaire, ICCQ). Administered to the person who knows the child best, in more than 99% of cases this has been the child's biological mother (Desrosiers, Boivin & Des Groseilliers, 2001). The ICCQ was largely based on the questionnaires

used in the first cycle of the NLSCY although some questions were added and others were adapted.

A second source of information was the Paper Questionnaire Completed by the Interviewer (PQCI), a shorter questionnaire aimed at completing the ICCQ. For the present study, the information retrieved from this questionnaire included a question about the number of episodes of infections the child had in the last 3 months as well as a question related to the duration of breastfeeding. Although data about the child's father are available through the Self Administered Questionnaire for the Father (SAQF), characteristics of the fathers, such as immigrant status, were not considered in this study due to the much lower overall response rate to this questionnaire. Data from the ICCQ and PQCI were obtained through face to face home interviews.

Finally, information specific to the child's health conditions at birth were obtained from hospital birth files of each child and mother after consent was obtained from the child's biological mother. For the current study, information about neonatal health problems was retained.

4.3 Study Variables

4.3.1. Main independent variable

Although all children participating in the study were born in Quebec, maternal country of birth varied across participants. The study's main independent variable was the mother's immigrant status, defined in terms of foreign country of birth of the child's mother, regardless of the length of time since maternal residence in Canada. This information was collected in interview based questionnaires in the first round of the QLSCD and subsequently validated for accuracy in the following rounds.

In the present study, the independent variable was dichotomized. The “non-immigrant group” included all children born to Canadian-born mothers ($n = 1825$) as well as children born to immigrant mothers from westernized countries ($n = 53$), including all European countries, the United States (US), Australia and New-Zealand. For purposes of simplification, mothers born in westernized countries but who immigrated to Canada will be labelled as “European-born”. This way of labelling has also been used in previous reports published by Statistics Canada (Chen et al, 1996). On the other hand, the “immigrant group” included all children born to mothers who immigrated to Canada from any non-European country ($n = 165$). European-born mothers were not included in the “immigrant” category because of previously reported differences in terms of socio-demographic characteristics (Chen et al, 1996; Dunn & Dyck, 2000). For example, in Canada, European immigrants were more likely to be in the highest income quintile and to be older compared to non-European immigrants. They are also expected to have cultural backgrounds and lifestyles similar to that of the Canadian-born population. Furthermore, in the QLSCD Canadian and European-born mothers were categorized together because of the small number of mothers in the latter group making it difficult to study them as separate categories.

In the total study sample, two individuals had missing values on the maternal immigrant status variable and were therefore excluded from the analyses. In addition, while immigrants and refugees vary in terms of socio-demographic characteristics, it was not possible to distinguish refugees from immigrants in the QLSCD. Therefore, all foreign born-mothers originating from non-European countries, whether they initially arrived as landed immigrants, refugees or asylum-seekers, were classified in the broad category of immigrants. Finally, immigrant status will not be analysed in terms of country of origin due to the large variability in country of origin and the small sample size of immigrant mothers originating from each country or continent.

4.3.2. Dependent variables:

The study's main outcome variables related to the child's physical health at approximately 17 months of age. Two health indicators were analysed: maternal perception of child's health and frequency of infections during the three months preceding the interview.

- Maternal perception of child's health: In the QLSCD, mothers were asked to rate their child's health: "In general, would you say your child's health is: excellent, very good, good, fair, poor, or don't know". Perception of child's health by the mother is an indicator of the child's global health that has been used in several studies (Bruijnzeels, Foets, van der Wouden et al, 1998; Huang et al, 2006; McGauhey, Starfield, Alexander et al, 1991; Séguin et al, 2003). In a validation study using data of the QLSCD, maternal perception of child's health was found to be a valid measure of different health problems for both immigrant and Canadian-born mothers. Indeed, while accounting for the mother's level of education and her self-rated health, a strong correlation between the perception of the child's health and other measures of health was apparent (Monette, Séguin, Gauvin et al, 2007). For the analyses in the present study, perceived health of the child was categorized in two levels comparing excellent to less than excellent health. Although the cut-off for this variable has usually been at the level "less than very good", studies based on data of the QLSCD have primarily used the cut-off at the level "less than excellent" because of the low number of children perceived as having good, fair or poor health (Séguin et al, 2003).
- Acute infections: In the second round of the QLSCD, mothers were asked to report the number of infections their child had during the three months preceding the interview through the following question: "In the last three months, how many times did your child have the following health problems : gastroenteritis, otitis, respiratory infections, other infections?". The variable was categorized in two levels according to number of episodes of infections without specifying the type of infection: none or one infection, and two or more infections during the

past three months. Since infections are fairly common among young children, it was deemed reasonable to consider the occurrence of one infection or less as reference group.

4.3.3. Other variables:

Following a review of the literature, two broad categories of control variables were included in our analyses. They consist of characteristics of the children and characteristics of the mothers.

Characteristics of the children:

- Child's sex as either female or male was retrieved from birth files.
- Child's exact age in months at the time of the interview (2nd round of QLSCD). This variable was treated as a continuous variable and ranges from 16 to 19 months.
- Child's birth rank represents the order in which the child was born in relation to his/her siblings. This variable was categorized in three levels comparing those who were born first, second and third or more, with the group "third or more" as reference group. This measure was available from the first round of the QLSCD.
- Three measures of the child's health status at birth were considered. These include prematurity (born at less than 37 weeks of gestation), low birth weight (less than 2500 grams), and the presence of at least one congenital malformation. Information on these three variables came from the medical birth files and variables were dichotomized to compare the presence to the absence of each condition.
- Duration of breastfeeding was measured as reported by the mother. The variable was categorized in three levels comparing children who were never breastfed,

those who were breastfed for less than 3 months and those who were breastfed for 3 months or more (reference group). Here, the measurement of breastfeeding includes both exclusive and mixed breastfeeding.

- Type of child care at 17 months referred to the type of arrangement used most frequently for child care. Also measured as reported by the mother, this variable was categorized in three levels: care in child's home by the mother or another person (reference group), care in someone else's home by a relative or non-relative which includes home based daycare, and care in a daycare center.

Characteristics of the mothers:

- Maternal age at the birth of the index child was available from the first round of the QLSCD and was categorized in three levels: less than 20 years, 20 to 34 years (reference group), and greater or equal to 35 years.
- Language spoken at home by the mother was measured in the second round of the QLSCD. Mothers were asked to report the language(s) they used most often at home. The variable was categorized in two levels to compare those who speak English and/or French (reference group) to those who speak any other language most of the time at home.
- Maternal level of education was measured as reported by the mother in the first round of the QLSCD and referred to the highest level of education pursued by the mother, regardless of whether a diploma or degree was actually received. The variable was categorized in three levels: less than high school, high school or vocational or trade school, and finally, as reference group, partial or completed college or university studies.
- Longitudinal measure of poverty: Poverty was defined in terms of insufficient household income, that is, having an income during the past 12 months below the

Canadian low-income cut-off (LICO) as estimated by Statistic Canada (2005). A family is said to be under the LICO if they attribute 20% more than the average Canadian family to food, shelter and clothing. There are different cut-offs according to the number of persons in a household and whether it is situated in a rural area or a small or large urban area. In the present study, a longitudinal variable with three possible levels was constructed with data from the first and second rounds of the QLSCD to take into account the dynamic nature of poverty over time. Therefore, if mothers reported not being poor in the first and second rounds they were categorized as “never poor”. On the other hand, if mothers reported being poor in either the first or the second round, they were categorized as “sometimes poor”. Finally, mothers who reported being poor in both the first and second rounds were categorized as “always poor”.

- The presence of a partner was measured as reported by the mother in the second round of the QLSCD. This variable was dichotomized to compare mothers who live with a partner to those who do not live with a partner, regardless of the type of relation for those who report having a partner (i.e.: married, common law, cohabitating).
- Two variables were related to maternal smoking behaviours, both being reported by the mother. First, the use of tobacco during pregnancy and second, the use of tobacco when the index child was approximately 17 months in age. Since both variables were found to be highly correlated, only the mother’s smoking status when the child was 17 months old was kept for multivariate analyses in which it was dichotomized: non-smoker or occasional smoker, and current smoker.
- Maternal level of social support was measured in the second round of the QLSCD through three questions drawn from Cutrona and Russell’s (1987) Social Provision Scale. Questions included the following statements which mothers had to rate on a four point scale from strongly agree to strongly disagree: “I have family and friends who help me feel safe, secure and happy”, “there is someone I

trust whom I would turn to for advice if I were having problems”, and “there are people I can count on in an emergency”. Individuals who answered either “disagree” or “strongly disagree” on at least one of the three statements were classified as having a low level of social support compared to others who were classified as having a high level of social support. Although the measurement of social support was based on questions from the Social Provision Scale, the results in this study are not necessarily comparable to those of other studies based on the Social Provision Scale since this is a unique way, specific to this study, to measure social support.

- Longitudinal measure of depression: Maternal depressive symptoms were measured with the Center for Epidemiological Studies Depression (CES-D) scale, a commonly used measure of depressive symptomatology in the general population (Radloff, 1977). The CES-D scale focuses on symptoms of depression, it is not intended to provide clinical diagnoses of depression but rather to inform on the depressive symptomatology and the risk of clinical depression. Although the original questionnaire contains 20 items, shorter versions have been developed, including a 12-item questionnaire developed for the NLSCY and subsequently used in the QLSCD. A validation study of the 12-item questionnaire was done by Poulin and colleagues (Poulin, Hand & Boudreau, 2005) with a population of high school students which found an acceptable validity and reliability for the scale (Cronbach’s alpha of 0.85). Moreover, with multiethnic populations, such as encountered in the study of immigrants, it is important to use a measure of depressive symptoms that is comparable from one group to the other. To our knowledge no validation studies of the 12-item CES-D scale in multiethnic populations have been published, however studies using other version of the scale are available. For example, two studies published in the US, one with Mexican immigrant women using different short versions of the CES-D scale with number of items varying from 9 to 11 (Grzywacz, Hovey, Seligman et al, 2006), the other with adolescent girls of black “race”/ethnicity using the original 20-item scale (Hales, Dishman, Motl et

al, 2006), found that these versions of the CES-D could be used as a valid measure of depressive symptoms in each population. In Grzywacz and colleagues' validation study, the different short versions were found to be reliable and to account for most of the variance in scores of the original CES-D scale. On the other hand, Hales and colleagues reported that scores on the original version of the CES-D are comparable between black and white adolescent girls.

In the QLSCD, the total scores on the 12-item scale varied from 0 to 36, where scores from 0 to 11 indicate minimal depressive symptoms and a score of 12 or more indicate a moderate to high level of depressive symptoms (Poulin et al, 2005). Maternal symptoms of depression were measured in the first and second rounds of the QLSCD such that data from both rounds were used to construct a longitudinal measure of depressive symptomatology in similar ways as has been described earlier for other longitudinal measures. Consequently, the variable was categorized into three levels: "never depressed" (reference group), "sometimes depressed" and "always depressed".

- Longitudinal measure of maternal self-reported health: This subjective measure of health in the population has been used in many studies over the past years. Self-reported health is a good indicator of general physical health and has been associated with morbidity, mortality, subsequent disability and utilisation of health care services (Idler & Benyamini, 1997). This indicator of health has been used in numerous studies with immigrant populations (Dunn & Dyck, 2000; Iglesias et al, 2003; Newbold & Danforth, 2003; Zunzunegui et al, 2006). Further, in a study comparing foreign-born and US-born Asian Americans, Erosheva and colleagues (Erosheva, Walton & Takeuchi, 2007) confirmed that, contrary to common beliefs among researchers, foreign-born American Asians perceived extreme categories in self-rated health in similar ways as US-born American Asians. In the QLSCD, maternal health was measured as reported by the mother through the following question in both rounds one and two: "In general, would you say your health is: excellent, very good, good, fair, or poor?"

Subsequently, the variable was dichotomized into those who reported their health as excellent or very good and those who reported their health as less than very good. Again, to grasp the severity of less than very good self-reported health, data from the first and second rounds were combined to get a longitudinal measure of self-reported health. Thus, the variable was separated to compare its three levels: always excellent or very good (reference group), sometimes less than very good, and always less than very good.

4.4 Statistical Analyses

All analyses were conducted using SPSS software, version 10.0. For descriptive analyses, chi-square tests were used to compare proportions for the different characteristics of the children and mothers stratified according to maternal immigrant status. Variables that were associated with a p-value of 0.25 or less were included in further multivariate analyses. Similar analyses were done to compare the distribution of child health outcomes according to maternal immigrant status.

Further descriptive analyses were carried out on the participants lost between rounds one and two of the QLSCD so as to describe potential differences between study participants and non-participants. These analyses were used for the assessment of potential selection biases as well as their impact on measures of association.

Finally, multivariate models using logistical regressions were constructed for both maternal perception of child's health as less than excellent and for the occurrence of two or more infections in the last three months. Cases with missing values on the variables included in the models were excluded (n=66). The majority of cases were excluded because they had missing values on the longitudinal measure of poverty or on the measure of social support (n=56). Among all missing cases, 9 were non-European immigrant mothers and the remaining were Canadian and European-born mothers.

The presence of confounding variables was examined by looking at changes of at least 10% in the regression coefficients of immigrant status following its inclusion into the model. Other control variables were selected through backwards stepwise logistical regressions. Selected variables were carefully examined for clinical plausibility and unselected variables thought to play an important role in relation to the main independent (immigrant status) and/or dependent variables (perception of child's health by the mother and frequency of infections in the last three months) were added to the model. Odds ratios and their 95% confidence intervals were calculated at each step.

Multiplicative interactions in the association between immigrant status and perceived health of child were assessed using cross-product terms for exposure to the following factors: poverty at 5 and 17 months, level of social support, smoking, symptoms of depression at 5 and 17 months and maternal self-rated health at 5 and 17 months. Similarly, interactions between immigrant status and frequency of infections were assessed for both duration of breastfeeding and type of child care. Interactions were tested one at a time and all significant interactions were included in the final models.

This study has received ethical approbations from both the Institut de la statistique du Québec and the Faculté de Médecine de l'Université de Montréal.

CHAPTER 5 - SCIENTIFIC ARTICLE

Health Outcomes among Children of Immigrant Mothers in the Quebec Birth Cohort

Andraea van Hulst^{1,2}, Louise Séguin^{1,2,3}, Maria Victoria Zunzunegui^{1,2,3},
Béatrice Nikiéma^{1,2}

1- Département de médecine sociale et préventive

2- Groupe de recherche interdisciplinaire en santé (GRIS), Université de Montréal

3- Centre de recherche Léa-Roback sur les inégalités sociales et de santé

Correspondence: Louise Séguin, Département de médecine sociale et préventive,
Université de Montréal, C.P.6128, Succursale Centre-Ville, Montréal, Québec, Canada
H3C 3J7

Email 

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5.1 Abstract

Objective: To examine differences in health between 17-month-old children born to non-European immigrant mothers and children born to Canadian and European-born mothers while accounting for exposure to different factors.

Methods: Data from the first two rounds of the Quebec Longitudinal Study of Child Development (QLSCD) were analysed. The sample included 2045 children. Mothers were classified according to their origin: Canadian and European compared to non-European. Health outcomes included maternal perception of child's health and frequency of infections in the last 3 months. Stratified and multivariate analyses using multiple logistic regressions were used.

Results: Poverty and limited social support were common among non-European immigrant mothers. Children born to these mothers (n=165) were perceived in worse health only when mothers reported being poor and having low social support (OR 6.29; 95% CI: 1.68-23.50). When not poor and with high social support, these children were perceived in better health (OR 0.42; 95% CI: 0.20-0.92) when compared with similar children of Canadian and European mothers. Additionally, children of non-European immigrant mothers had a lower prevalence of infections irrespective of their main type of childcare compared to children born to Canadian and European mothers cared for at home (OR 0.61, 95% CI 0.40-0.92).

Discussion: Poverty and limited social support appear to have a greater impact on the appraisal of their child's health for non-European immigrant mothers than for Canadian and European-born mothers. Children of non-European immigrant mothers have fewer infections regardless the type of childcare used compared to children of Canadian and European mothers.

Key words: immigration, child health, poverty, social support, birth cohort, Quebec Longitudinal Study of Child Development.

5.2 Introduction

With the increasing importance of immigration to Canada, there are growing numbers of Canadian-born children to immigrant parents, or second-generation immigrant children. In 2001, immigrants represented approximately 18% of the Canadian population and 10% of the population in Quebec (Statistics Canada, 2001). Among all Canadian children aged less than five years, 22% of were immigrants of either first or second-generation (Statistics Canada, 2003).

Although most studies agree that upon arrival to Canada, immigrants are in better health than Canadian-born individuals (Chen et al, 1996; Dunn & Dyck, 2000, Newbold & Danforth, 2003), others caution the generalization of the “healthy migrant effect”. Studies found that immigrants report lower self-rated health compared to non-immigrants, regardless of time since migration and after adjustment for demographic and socioeconomic factors (Iglesias et al, 2003; Newbold & Danforth, 2003; Sword et al, 2003). Whereas some studies found lower rates of depression among immigrants, particularly in the first years after resettlement (Ali, 2002; Smith et al, 2007), others found higher rates of depression among women with young children (Mechakra-Tahiri et al, 2007; Sword et al, 2003).

Several Canadian studies reported the importance of poverty and limited social support as determinants of health among immigrants (Beiser, 2005; Dunn & Dyck, 2000; Hyman, 2004; Matuk, 1996; Sword et al, 2003). Differential exposure to these factors may also affect the health of second-generation immigrant children. Whereas some studies found better health among children of immigrant parents (Beiser et al, 1998; Klinnert et al, 2003; Hernandez & Charney, 1998), others found them to be in worse health (To et al, 2004). The aim of this study was to examine differences in health between 17-month-old children born to non-European immigrant mothers and children born to Canadian and European mothers while taking into consideration exposure to different risk and protective factors.

5.3 Methods

We analysed data from the Quebec Longitudinal Study of Child Development (QLSCD), a birth cohort of children followed annually since the age of 5 months. The current study used mainly data collected from the second round when participants were approximately 17 months old. Data from the province's Master Registry of Live Births was used to sample the cohort. The target population was representative of 95% of all single births in the province during the 1997-1998 period. Detailed sampling procedures are described elsewhere (Jetté & Des Groseilliers, 2000). Baseline non-responders were more likely to speak a language other than French or English at home and to have a lower level of education. In the second round of the QLSCD, the sample included 2045 families. The participation rate was lower among non-European immigrant families (86.4%) than for Canadian and European families (97.5%). Participants lost to follow-up were more likely to be poor, to have lower educational attainments and to report less good health. Data collection was done through home interviews.

The study's main independent variable was the mother's status as immigrant versus not immigrant defined in terms of country of origin. Two participants with missing values on this variable were excluded from analyses. The variable was dichotomized such that the "non-immigrant group" included all children born to Canadian-born ($n=1825$) as well as European-born mothers ($n=53$). The latter includes mothers who immigrated to Canada from westernized countries, including all European countries, the United States, Australia and New-Zealand. Statistics Canada has used similar labels (Chen et al, 1996). The "immigrant group" included children born to mothers originating from any other country ($n=165$). European-born mothers were not included in the immigrant category because of previously reported differences in socio-demographic characteristics (Dunn & Dyck, 2000; Chen et al, 1996).

Child health was measured at 17 months with the mother's perception of her child's health (excellent versus less than excellent) as well as reported frequency of

infections during the three months preceding the interview (less than two infections versus 2 or more infections).

Control variables were selected on the basis of available literature. The characteristics of the children were: sex, age in months, birth rank, neonatal health, duration of breastfeeding in months as reported by the mother and type of child care. The characteristics of the mothers were: age at birth of index child, language spoken at home, level of education, longitudinal measure of poverty according to Canada's low income cut-offs (LICO) (Statistics Canada, 2005), presence of a partner, maternal smoking during pregnancy and at 17 months, level of social support measured with three questions from the Social Provision Scale (Cutrona & Russell, 1987), longitudinal measures of depressive symptoms according to the CES-D 12-item scale (Poulin et al, 2005) and of self-reported health. The three longitudinal measures were constructed similarly based on data from the first and second phases of the QLSCD, when children were 5 and 17 months old, respectively. For example, mothers who reported being poor in the first and second rounds were categorized as "always poor", mothers who reported being poor in either rounds were categorized as "sometimes poor", and those who reported not being poor in both rounds were categorized as "never poor".

For stratified analyses according to immigrant status, chi-square tests were used to compare proportions for characteristics of the children and mothers as well as for child health outcomes. Multivariate models using logistical regressions were constructed. Cases with missing values on any of the variables included in the models were excluded (n=66). Of these, 55 cases had missing values on the longitudinal measure of poverty among which 9 were immigrants of non-European origin. A risk factor was considered to be a confounder if its inclusion in the equation produced a change over 10% in the regression coefficients of immigrant status. Other control variables were selected through backwards stepwise logistic regression. Selected variables were carefully examined for clinical plausibility and unselected variables thought to play an important role in relation to the main independent variable and/or

health outcomes were included in the models. Odds ratios and their 95% confidence intervals were calculated at each step.

Multiplicative interactions in the association between immigrant status and perceived health of the child were assessed using cross-product terms for exposure to the following factors: poverty, level of social support, smoking, symptoms of depression and maternal self-rated health. Interactions between immigrant status and frequency of infections were assessed for both duration of breastfeeding and type of child care. Interactions were tested one at a time and significant interactions were included in the final models.

Analyses were conducted using SPSS software, version 10.0. This study received ethics approvals from the Institut de la statistique du Québec and the University of Montreal's Faculty of Medicine.

5.4 Results

The distribution of characteristics of the children and their mothers are presented in Tables 1 and 2. Children born to non-European immigrant mothers were more likely to be older, to be third or more in birth rank, to have been breastfed for more than three months and to attend a daycare centre. No significant differences were found in terms of child's sex and neonatal health. Non-European immigrant mothers were more likely to be older at the birth of the index child, to speak a language other than French or English at home, to be poor, to live without a partner, to refrain from smoking, to report lower levels of social support, as well as to report more symptoms of depression and poorer health. No differences in level of education were found.

Table 3 presents the differences between study participants in the second round of the QLSCD and those lost during follow-up between rounds 1 and 2 according to characteristics of mothers and children when the latter were approximately 5 months old. It was not possible to assess differences on all variables since questionnaires varied slightly between rounds 1 and 2. A total of 75 cases (3.5%) were lost during follow-up among which one third ($n = 49$) were immigrants of non-European origin. More than half of lost participants were poor and one quarter had no high school diploma. Finally, mothers who were lost to follow up were more likely to report living without a partner and being in less than very good health.

Table 4 presents health outcomes stratified by immigrant status. Non-European immigrant mothers were more likely to perceive the health of their child as less than excellent compared with Canadian and European-born mothers. However, children born to non-European immigrant mothers were less likely to have had two or more infections in the past three months.

Results from multivariate analyses are shown in Tables 5 and 6. For the perception of the child's health, a significant interaction was found between poverty, social support and immigrant status. Odds ratios (OR) presented in Table 5 are therefore

stratified for these variables with, as reference group, children of Canadian and European-born mothers who were never poor and had high social support. The most favourable subgroup of mothers who were never poor and had good social support was composed of 74% of Canadian and European-born mothers compared to 28% of non-European immigrant mothers. On the other hand, the least favourable subgroup of poor and isolated mothers was composed of 1% of Canadian and European-born mothers compared to 10% of non-European immigrant mothers (results not shown).

For Canadian and European-born mothers, perception of child health did not vary by poverty and social support, except for those who reported being always poor and having low social support where a better perception of health was found. For non-European immigrant mothers, perception of child health varied according to poverty and to social support. Those who had a high level of social support and were never poor perceived their children in better health than comparable Canadian and European-born mothers. However, those who had limited social support and were always poor perceived their children in worse health when compared to Canadian and European-born mothers who had adequate incomes and social support.

For the frequency of infections, an interaction was found between the main type of childcare and immigrant status but only for children of Canadian and European-born mothers. Table 6 presents odds ratios stratified by type of childcare for Canadian and European mothers whereas average odds ratios are presented for non-European immigrant mothers. Among children of Canadian and European-born mothers, those taken care of in someone else's home had fewer infections and those attending a daycare centre had more infections compared with those taken care of in their own home. Among children born to non-European immigrant mothers, the frequency of infections did not vary according to type of child care, instead they had fewer infections regardless of their main type of childcare when compared to children of Canadian and European-born mothers taken care of in their own home.

Table 1 – Distribution of approximately 17-month-old children in the QLSCD according to their characteristics and maternal immigrant status

	Immigrant mothers of non- European origin N=165	Canadian and European-born mothers N=1878	Total N=2043	Chi-2 p value
	%	%	%	
Child's sex				
Female	46.1	49.7	49.4	
Male	53.9	50.3	50.6	0.373
Child's mean age in months (standard deviation)	16.65 (0.56)	16.55 (0.56)	16.56 (0.56)	0.030*
Birth rank				
1 st	41.2	44.8	44.5	
2 nd	33.3	40.1	39.6	
3 rd or more	25.5	15.0	15.9	0.002
Premature birth (<37 weeks)				
No	95.8	95.0	96.7	
Yes	4.2	5.0	4.9	0.666
Low birth weight (<2500g)				
No	95.8	96.8	96.7	
Yes	4.2	3.2	3.3	0.485
Congenital malformation				
No	94.5	92.0	92.2	
Yes	5.5	8.0	7.8	0.240
Duration of Breastfeeding				
Never breastfeed	10.9	31.5	29.9	
<3 months	20.0	22.4	22.2	
≥3 months	69.1	46.1	47.9	<0.001
Type of child care				
In child's home	72.7	80.4	79.7	
In a home other than child's home	11.5	10.2	10.3	
In a daycare center	15.8	9.4	9.9	0.024

Source: Direction santé Québec de l'Institut de la statistique du Québec

*t-test p-value

Table 2 – Distribution of approximately 17-month-old children in the QLSCD according to the characteristics of their mother and maternal immigrant status

	Immigrant mothers of non-European origin N=165	Canadian and European-born mothers N=1878	Total N=2043	Chi-2 p value
	%	%	%	
Age of mother at birth of child				
Under 20	1.2	3.0	2.9	
20 to 34	75.2	84.4	83.7	
35 or more	23.6	12.6	13.5	<0.001
Language spoken at home by mother				
French and/or English	38.8	97.9	93.1	
Other	61.2	2.1	6.9	<0.001
Maternal level of education				
Partial or completed college or university studies	56.4	64.2	63.6	
High school or vocational or trade school diploma	25.5	20.3	20.8	
No high school diploma	18.2	15.4	15.7	0.128
Poverty at 5 and 17 months				
Never poor	30.1	77.1	73.4	
Sometimes poor	17.3	9.3	10.0	
Always poor	52.6	13.6	16.6	<0.001
Presence of a partner at 17 months				
Lives with a partner	85.5	91.0	90.6	
Lives without a partner	14.5	9.0	9.4	0.018
Maternal smoking during pregnancy				
No	94.5	72.8	74.6	
Yes	5.5	27.2	25.4	<0.001
Maternal smoking at 17 months				
No or occasionally	93.9	72.7	74.4	
Yes	6.1	27.3	25.6	<0.001
Maternal level of social support				
High social support	87.9	96.3	95.6	
Low social support	12.1	3.7	4.4	<0.001
Maternal depression at 5 and 17 months				
Never depressed	69.9	83.8	82.6	
Sometimes depressed	19.6	13.0	13.6	
Always depressed	10.4	3.2	3.8	<0.001
Maternal self-reported health at 5 and 17 months				
Always very good or excellent	56.4	69.3	68.3	
Sometimes less than very good	24.2	19.9	20.3	
Always less than very good	19.4	10.8	11.4	0.001

Source: Direction santé Québec de l'Institut de la statistique du Québec

Table 3 – Distribution of children lost during follow-up between the first and second rounds of the QLSCD compared with children present in the second round of the QLSCD according to study variables measured at 5 months

Variables measured at 5 months (round 1 of the QLSCD)	Children lost during follow-up between rounds 1 and 2 N=75	Children followed during both round 1 and round 2 N=2045	Total N=2120	Chi-2 p value
	%	%	%	
Mean age of children in months (standard deviation)	4.60 (0.52)	4.49 (0.55)	4.50 (0.55)	0.100*
Duration of breastfeeding at 5 months				
Never	29.3	28.3	28.3	
< 3 months	21.3	25.3	25.2	
≥ 3 months	49.3	46.4	46.5	0.731
Type of child care at 5 months				
In child's home	89.3	90.3	90.3	
In a home other than child's home	6.7	8.1	8.0	
In a daycare center	4.0	1.6	1.7	0.276
Maternal perception of child's health at 5 months				
Excellent	70.7	76.6	74.4	
Less than excellent	29.3	23.4	23.6	0.232
Maternal immigrant status				
Canadian or European-born mothers	65.3	91.9	91.0	
Non-European Immigrant mothers	34.7	8.1	9.0	<0.001
Level of income according to LICO at 5 months				
≥ 100%	42.6	76.6	75.5	
< 100%	57.4	23.4	24.5	<0.001
Maternal level of education at birth of child				
Partial or completed college or university studies	47.3	63.6	63	
High school or vocational or trade school diploma	27.0	20.8	21.0	
No high school diploma	25.7	15.7	16.0	0.012
Maternal smoking at 5 months				
No or occasionally	81.3	75.8	76.0	
Yes	18.7	24.2	24.0	0.272
Presence of a partner at 5 months				
Lives with a partner	84.9	92.7	92.4	
Lives without a partner	15.1	7.3	7.6	0.014
Maternal depression at 5 months				
Low depressive symptoms	86.1	88.8	88.7	
High depressive symptoms	13.9	11.2	11.3	0.487
Maternal self-reported health at 5 months				
Excellent or very good	60.0	78.9	78.2	
Less than very good	40.0	21.1	21.8	<0.001

Source: Direction santé Québec de l'Institut de la statistique du Québec

*t-test p value

Table 4 – Distribution of approximately 17-months-old children in the QLSCD according to health outcomes and maternal immigrant status

Health outcomes	Immigrant mothers of non-European origin N=165	Canadian and European-born mothers N=1878	Total N=2043	Chi-2 p value
	%	%	%	
Perceived health of child by mother as less than excellent	44.8	35.4	36.1	0.015
Two or more infections in the last 3 months	21.8	31.3	30.5	0.011

Source: Direction santé Québec de l'Institut de la statistique du Québec

Table 5 – Crude and adjusted odds ratios (OR) for mother's perception of child's health as less than excellent of approximately 17-month-old children in the QLSCD, stratified by maternal immigrant status, level of social support and poverty

Immigrant status	Social support	Poverty	Child's health perceived as less than excellent	
			Crude OR (95% CI)	Adjusted OR* (95% CI)
Canadian and European-born mothers	High level	Never poor	1	1
		Sometimes poor	1.21 (0.87-1.69)	1.09 (0.77-1.55)
		Always poor	1.49† (1.12-1.97)	1.31 (0.96-1.78)
	Low level	Never poor	1.21 (0.65-2.22)	1.05 (0.55-1.99)
		Sometimes poor	1.99 (0.28-14.13)	1.28 (0.17-9.47)
		Always poor	0.35 (0.10-1.20)	0.24† (0.07-0.85)
Non-European immigrant mothers	High level	Never poor	0.51 (0.24-1.07)	0.42† (0.20-0.92)
		Sometimes poor	2.15 (0.97-4.75)	1.68 (0.74-3.81)
		Always poor	1.93† (1.17-3.17)	1.56 (0.92-2.65)
	Low level	Never poor	0.99 (0.09-10.97)	0.68 (0.55-8.51)
		Sometimes poor	1.99 (0.12-31.80)	1.36 (0.08-22.18)
		Always poor	7.94‡ (2.23-28.27)	6.29† (1.68-23.50)

Source: Direction santé Québec de l'Institut de la statistique du Québec

*adjusted for birth order, maternal age, type of child care, maternal self reported health and maternal depression.

†Statistically significant at $p \leq 0.05$

‡Statistically significant at $p \leq 0.001$

Table 6 – Crude and adjusted odds ratios (OR) for the presence of two or more episodes of infections in the three months preceding the interview among approximately 17-month-old children in the QLSCD, stratified by maternal immigrant status and type of child care

Immigrant status	Type of child care	Presence of 2 or more episodes of infections	
		Crude OR (95% CI)	Adjusted OR* (95% CI)
Canadian and European-born mothers	In child's home	1	1
	Outside child's home	0.67† (0.47-0.96)	0.68† (0.47-0.97)
	In daycare	1.86‡ (1.36-2.56)	1.89‡ (1.37-2.60)
Non-European immigrants mothers	Regardless of type of care	0.65† (0.44-0.96)	0.61† (0.40-0.92)

Source: Direction santé Québec de l'Institut de la statistique du Québec

*adjusted for birth order, child's age, duration of breastfeeding, maternal smoking, poverty and level of social support.

†Statistically significant at $p \leq 0.05$

‡Statistically significant at $p \leq 0.001$

5.5 Discussion

This study examined differences in health between 17-month-old children of non-European immigrant mothers and children of Canadian and European-born mothers. We found that, on average, children of non-European immigrant mothers were more often perceived in less than excellent health but had a lower frequency of infections compared to children of Canadian and European-born mothers. Exposure to certain risk factors, in particular poverty, limited social support and not having a partner, as well as exposure to protective factors, including not smoking and prolonged breastfeeding, were more frequent among non-European immigrant mothers than among Canadian and European mothers. Differences in exposure to these factors did not explain differences in health outcomes. However, we found significant differences according to immigrant status in the associations of poverty and social support with child's health status, as reported by the mother, and in the associations of the type of childcare and frequency of infections.

Whereas poverty and limited social support negatively affect both immigrant and non-immigrant women and their children, our study reveals that, in Quebec, these risk factors are concentrated among immigrant families. Similar findings were reported by others (Battaglini et al, 2000). Moreover, exposure to poverty and limited social support has more negative impacts on the way immigrant mothers perceive their children's health.

In the same cohort, perception of child's health by the mother was found to be a valid indicator of the child's global health for both immigrant and Canadian-born mothers (Monette et al, 2007). In our data, the lower odds of less than excellent perceived health among poor and socially isolated Canadian and European-born mothers contradicts previous findings (Monette et al, 2007; Séguin et al, 2003), but since our estimate was obtained from a small subgroup of only 20 children it must be interpreted with caution.

While children of non-European immigrant mothers are more likely to attend a daycare center, the frequency of infections among these children remains lower, no matter what type of childcare, compared to Canadian and European-born children taken care of at home. Few studies examined the occurrence of childhood infections in relation to parental immigrant status. More research is needed to understand the differences in rates of infections.

Disproportionate exposures to adverse circumstances among non-European immigrant mothers may have detrimental effects on the overall perception of their child, even after controlling for the mother's perception of her own health and her depressive symptoms. Population studies on immigrant and minority groups have consistently shown that immigrants' reports of their health are more strongly correlated with their socioeconomic position than for non-immigrant or white populations (Franzini et al, 2004). Alternatively, it is possible that poor and isolated immigrant mothers perceive their children in worse health because they actually are in poorer health on other measures not accounted for in this study such as reported previously with developmental disorders (To et al, 2004).

This study has some limitations including the lack of data specific to migration history and the limited sample size of non-European immigrants in the QLSCD. Additionally, baseline response rates varied according to language spoken at home. Since the response rate of families who did not speak English or French at home was 45.9% (Jetté & Des Groseilliers, 2000) and since about 44% of immigrant families in Quebec speak neither English nor French at home (Statistics Canada, 2001), immigrants who did not participate in the QLSCD were more likely to speak a foreign language at home, and consequently to be more isolated and poor. Differential losses to follow-up between the study's first two rounds resulted in differences between participants and non-participants particularly with respect to immigrant status. However, these biases are expected to result in underestimations of measures of association.

The study does have several strengths. Data of the QLSCD were collected prospectively and most measurement instruments were based on validated questionnaires used previously in the National Longitudinal Study of Children and Youth. Further, the initial sample was representative of the province's singleton life births and the first two rounds of the QLSCD had high response rates. Finally, the inclusion of important longitudinal measures in the current study allowed us to measure the impact of different levels of severity of these factors.

Difficult economic and social circumstances are common among non-European immigrant families with young children residing in Quebec, Canada. Our findings reveal the importance of addressing poverty and social isolation particularly among immigrant families with young children. More research is however needed on other factors that could account for their lower frequency of infections compared to children of non-immigrant mothers.

5.7 References

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CHAPTER 6 - DISCUSSION

6.1 Main Results

Although studies on immigration and health are increasing in number, relatively few Canadian studies have examined the relationship between maternal immigrant status and physical health outcomes in young children after the postnatal period. The purpose of this study was to examine differences in health outcomes between 17-month-old children of non-European immigrant mothers and comparable children of Canadian and European-born mothers as well as to explore different factors that are associated with adverse health outcomes in each group.

Our first objective was to describe the differences in health status among children born to immigrant mothers of non-European origin and those of Canadian and European-born mothers. Whereas, on average, children born to non-European immigrant mothers were more often perceived in less than excellent health, they had fewer infections when compared with children of the “non-immigrant” group.

Our second objective was to determine whether children are exposed to different risk and protective factors according to maternal immigrant status. Our results showed that children of non-European immigrant mothers were breastfed for a longer duration and were less likely to be exposed to tobacco either during gestation or during early childhood. However, they were more likely to attend a daycare center, to be poor and to have a mother who reports the following circumstances: limited social support, more symptoms of depression, worse self-reported health as well as living without a partner. Although these differences were significant, their inclusion in multivariate models did not completely attenuate the measures of association between immigrant status and child health measures of interest. For the mother’s perception of her child’s health, only the mother’s self-reported health contributed significantly in reducing the measures of

association and, for the occurrence of two or more infections, none of the variable included could explain the differences in health. These findings therefore do not support the differential exposure hypothesis proposed by Denton and colleagues (2004).

Our last objective was to determine whether the association between maternal immigrant status and child health varied according to level of exposure to specific risk factors. We found significant differences according to immigrant status in the associations of poverty and social support with child's health status, as reported by the mother, and in the associations of type of childcare and frequency of infections (see Appendix 1, Figure 1 and 2).

For the mother's perception of her child's health, the effects of poverty and social isolation were more important for children born to non-European immigrant mothers than for children born to Canadian and European mothers. Poverty at 5 and 17 months coupled with low social support had negative effects only for children born to non-European immigrant mothers. However, among children with sufficient income and good social support, children born to non-European mothers were perceived in better health than children of Canadian and European mothers. To interpret the significance of these findings is it important to note that a minority of the immigrant children fall in the favourable category of being never poor and benefiting from high levels of social support while the majority of children born to Canadian and European mothers fall in this category. Similarly, when concentrating on the proportion of children in the most unfavourable category of poverty and limited social support as reported by the mother, the majority of children born to non-European immigrant mothers fall in this category compared to a minority of the children born to Canadian and European mothers. The concentration of unfavourable conditions characterised by poverty and social isolation among immigrant families has been found elsewhere (Battaglini et al, 2000; Dunn & Dyck, 2000; Kinnon, 1999).

In the case of children born to Canadian and European mothers, the mother's perception of child's health did not vary according to levels of social support and

poverty, with the exception of those who report lacking social support and being always poor. Yet, previous studies of this same birth cohort found poverty to be associated with worse perceptions of child health while controlling for maternal immigrant status (Monette et al, 2007; Séguin et al, 2003). Our estimate is however difficult to interpret because it was obtained from a small subgroup of only 20 children that may not necessarily represent the baseline population group of children living in deprivation. Indeed, it could have been caused by random error or unexplained confounding in this particular subgroup of children. Nevertheless, our results suggest that children of non-European immigrant mothers who are poor and socially isolated are more vulnerable to being perceived in less good health when compared to similar children of Canadian and European-born mothers.

For the frequency of infections, the effect of different types of childcare was only important for children born to Canadian and European mothers. In this group, the known pattern of increased prevalence of infections among children who attend a daycare center compared with those taken care of at home was found. However, children born to immigrant mothers reported fewer infections, regardless of the main type of childcare, when compared to Canadian and European children taken care of at home and even more so than children who attend a regular daycare center. Children attending a daycare center are exposed to more infectious agents and are therefore expected to have a higher frequency of infections. Despite the fact that children of non-European immigrant mothers were more likely to attend a daycare center, they still had fewer infections than children of Canadian and European mothers. This health advantage supports the differential vulnerability hypothesis in differences related to the frequency of infections. Indeed, our results suggest that children of Canadian and European-born mothers appear more vulnerable to childhood infections.

Results with regards to differences in the prevalence of infections are difficult to compare to previous findings since few studies have examined the occurrence of childhood infections according to immigrant status. A Swiss population-based study looked at the distribution of hospitalisations for gastroenteritis caused by rotaviruses in

children aged less than 5 years and found a higher incidence of hospitalisation among children born to parents who had immigrated to Switzerland (Bucher & Aebi, 2006). Authors however suggest that their findings could be indicative of differences in patterns of health care utilisation rather than health status among children of Swiss and non-Swiss origins.

In our study, the adjustment for different variables had little impact on the measures of association and none of the variables included could explain the differences in health between the groups examined. Even the higher percentages of initiation and duration of breastfeeding seen among non-European immigrant mothers, an important transmitter of immunity from mother to child, did not explain the distribution of infections according to immigrant status. More research is needed to identify factors that could account for noted differences in the frequency of infections.

Thus, despite the lower frequency for infections, children born to immigrant mothers of non-European origin were more likely to be perceived in less than excellent health when poor and socially isolated. Immigrant mothers living in poverty and with limited social support may perceive their children as less healthy because they actually are in poorer health on other measures not accounted for in this study. For example, in a Canadian population based study, To and colleagues (2004) found that immigrant children aged less than five years are at increased risk for developmental disorders. It is also possible that disproportionate exposures to adverse circumstances among non-European immigrant mothers have a detrimental effect on the overall perception of their child, even after controlling for the mother's perception of her own health and her depressive symptoms.

Migration is often associated with important losses in social networks as well as poverty that may last up to 10 years after resettlement (Beiser, 2005). Yet, motherhood is a time during which support from family and significant others is crucial (Surkan, Peterson, Hughes et al, 2006). This may be particularly true for immigrant women who must deal with the challenges of raising their children in a new culture while

simultaneously having to adapt to it. Limited social support puts immigrant women at increased risk for anxiety and depression both of which may have a negative impact on children's health. In their study, Sword and colleagues (2006) found that immigrant mothers reported lower levels of social support as well as a higher risk of depression and worse self-reported health compared to Canadian-born mothers at 4 weeks postpartum. Even after controlling for maternal depressive symptoms and self-reported health, our study reveals that limited social support coupled with poverty remain important risks factors, among non-European immigrant mothers. Additionally, our study goes further by revealing that the exposure to these factors is associated with worse health among 17-month-old children, as perceived by their mother.

Importantly, the stress of migration including financial difficulties and limited social support puts immigrant mothers of non-European origin in a disadvantaged position in terms of perception of their children's health even though these children have a lower prevalence of infections. Moreover, these unfavourable situations are experienced more often among non-European immigrant mothers than among Canadian and European mothers.

6.2 Limitations and Strengths of the Study

This study presented cross-sectional analyses even though three explanatory variables were constructed on longitudinal data. Although useful for descriptive studies, this type of study design may limit inference about causality. In addition, the study is limited with regards to the sample size of children born to immigrant mothers of non-European origin leading to a lack of statistical power.

The most important limitation of this study is that of a potential selection bias concerning immigrant mothers which could affect the internal validity of the current study. During the initial recruitment of participants for the QLSCD, non-random differences between the families who participated and those who did not participate in

the study, particularly among immigrant families, could have been introduced. First, one of the inclusion criteria was that at least one of the child's parents needed to understand and speak either English or French since interviews were not translated to other languages. Of all the families that were contacted to participate in the QLSCD, 81 families (2.8%) were excluded because of language barriers. Therefore, our results can only be generalized to immigrant families where at least one parent is fluent in either official language. Immigrant families who do not master English or French are most likely to be those who immigrated more recently, who are less integrated into majority cultures and thus, more likely to be poor and unemployed as well as lack social support.

Second, although information related to baseline response rates of mothers according to their immigrant status was not available, data related to the main language spoken at home can be used as an indicator of the family's immigrant status. The response rate for families who did not speak English or French at home was 45.9% (Jetté & Des Groseilliers, 2000). Therefore, the probability of recruiting immigrant families who speak English or French at home was higher than the probability of recruiting immigrant families who speak a native language other than French or English. In Quebec, about 44% of immigrant families speak neither English nor French at home (Statistics Canada, 2001). If, as it could be expected, those who did not participate in the study are less integrated in their new country, more socially isolated and more culturally distant, the differences between study participants and non-participants at baseline would have led to an underestimation of associations examined in this study.

A selection bias from differential losses to follow-up between rounds one and two of the QLSCD is also possible. Our results showed that participants differed from non-participants on a number of variables. Since immigrants of non-European origin were lost to a greater extent, a differential selection bias is likely which, in this case, leads to further underestimation of measures of association. Therefore, measures of association presented in this study are more likely to be conservative.

An information bias is possible depending on the validity and reliability of the questionnaires that were used by the QLSCD and on the quality of the interviews. First, values, beliefs and norms that are culturally defined might have influenced the way in which mothers responded to the questionnaires. In addition, the majority of questions were based on self-reported answers. However, the measurement instruments of variables used in this study were based on validated questionnaires most of which have been used in the NLSCY, an ongoing population based Canadian study since 1994.

Finally, the fact that secondary data were analysed in this study entails certain limits. The QLSCD was not intended to examine the health of children born to immigrant parents in the province of Quebec. Consequently, questions about the parents' experiences of migration and class of migration (i.e. labour migrant, family reunification, refugee, non-status migrant) were not assessed. It is therefore not possible to examine how the health of children of immigrant mothers is influenced by factors specific to migration. Fortunately, the NCCYS described earlier, will allow for the inclusion of migration history and other immigrant specific factors into analyses. In addition, no supplementary efforts were made to recruit children born to immigrant families either by translating questionnaires to other languages or by the use of special techniques to minimize non-response among immigrant families.

This study does have several strengths. First, data of the QLSCD were collected prospectively which decreases the potential for a recall bias. The study was based on an initial sample representative of the province's singleton live births and since response rates for the first two rounds of the study have been fairly high, it is more likely that the sample used for current analyses resembles the target population on most measures. In addition, the QLSCD includes data on a large number of variables that influence the health and development of young children thereby providing a unique opportunity to examine differences between children born to foreign and Canadian-born parents. The longitudinal aspect of the QLSCD offers the possibility to explore the impact of certain factors occurring early in life on latter health outcomes. In the present study, the inclusion of longitudinal measures on important factors related to immigration allowed

us to measure the impact of different levels of severity of exposure to these variables. Finally, it is possible that the variability within the province of Quebec's immigrant population partially attenuated some of the differences in health outcomes among children born to immigrant mothers of non-European origin compared to those born to Canadian and European mothers. However, because this study is interested in the health of children born to immigrant mothers in general and not to specific ethnic and cultural groups, this aspect should not interfere with the interpretation of our results. Instead, these results may be generalized to children born to immigrant mothers residing in Quebec irrespective of ethnic group or immigration class.

CHAPTER 7 - CONCLUSION

7.1 Implications for Public Health and Policies

Although children born to non-European immigrant mothers are less vulnerable to infections, they are more vulnerable to less than excellent health, as perceived by their mother, only when the latter reports being poor during the first two years of their child's life and having limited social support. Children born to non-European immigrant mothers share these unfavourable circumstances disproportionately compared to children born to Canadian and European mothers. Results from this study therefore suggest the need to implement policies and programs on two main risk factors that have an impact on immigrant children's wellbeing. First, efforts are needed to decrease the risk of poverty among immigrant families, especially among those who have young children because of the well known adverse effects of poverty on healthy childhood development early in life. In the literature on immigration and poverty, high levels of unemployment and underemployment emerged as important causes of poverty among recent immigrants. Therefore, immigrants to Canada could benefit from better recognition of skills and qualifications gained in foreign countries. Making the transfer of foreign diplomas easier would allow immigrants to find more qualified jobs for which remunerations are usually better.

The second area in which public health programs should concentrate their efforts relates to the lack of social support reported by many non-European immigrant mothers. Policies and programs need to be developed to help these mothers integrate socially both in their new society and with groups of similar ethnic and cultural background. Such programs could include better informing new immigrants on available support groups, developing more community based support groups for immigrant mothers and their children, as well as developing innovative strategies to promote cultural exchanges between immigrant and non-immigrant mothers. Also, in an attempt to decrease social

isolation, making French and/or English courses more accessible to immigrants could help them integrate with more ease into their new society. Improved language abilities will further make it easier for immigrants to find work and ultimately better incomes. Finally, facilitating the use of translators in health care and social services could help immigrants get their needs addressed when consulting professionals from health and social services.

7.2 Future Research Directions

Although research on immigration and health in general has increased, certain questions remain to be addressed. First, there continues to be a gap in the knowledge related to the health of second-generation immigrants in Canada from early childhood to adolescence. Children of immigrant mothers appear to be less vulnerable to poor health on certain measures but not on others. In addition, it has been suggested that immigrant children become more vulnerable to deteriorating health as they become older (Shields & Behrman, 2004). Knowing in which areas they fare worse and what factors lead to a decline in health over the long term deserves more attention so as to better protect the health of children born to immigrant parents as they become older.

Attention also needs to be placed on the strengths of immigrants and their children and on the protective factors that foster their health. For instance, research on the buffer-like effect of resilience on health among children of immigrant mothers may explain some of their health advantages. Similarly, findings from our study warrant more research on other factors that could explain the lower prevalence of childhood infections among immigrant families. Most importantly, it is essential to gain a better understanding about how to best help immigrant families maintain these strengths and protective factors over time as children grow and become adults.

Because immigration and resettlement involve many stressors, it is of primary importance to better understand how these strains influence health, both during early and

latter years after migration, as well as how they affect subgroups of immigrants differently. Indeed, more research on potentially vulnerable groups is needed. Immigrants for whom poverty and social isolation are undeniable realities, those living in inner city neighbourhoods, those belonging to certain ethnic minority groups and those belonging to refugee, asylum seeking or non-status immigrant subgroups are likely to be more susceptible to poor health. A comprehensive understanding of the determinants of health as well as health outcomes among these subgroups is still lacking.

Many of the above areas of research can only be addressed provided that databases with information specific to immigrants and their health are available. An important limitation in the possibility to answer these research questions relates to the limited number of comprehensive national datasets about immigrants. At the national and provincial levels, the NLSCY and QLSCD although different in their sampling design, provide a good start for research on the health of children born to immigrant parents, they however fall short with regards to certain aspects. Researchers interested in immigration have already called for strategies to improve existing databases and efforts to create new ones (Hyman, 2004). The NCCYS was initiated to address some of these needs and results of its longitudinal follow-up of two age cohorts of immigrant and refugee children in Canada are highly awaited. Importantly, future national studies should include information not only on immigrants of all age groups but also on children of immigrants, or second-generation immigrants. Longitudinal follow-ups should be made possible so as to address changes over time in health as well as factors that bring about these changes. Furthermore, national studies on immigration should include efforts to recruit, and retain in follow-up surveys, immigrants belonging to different classes to allow for comparisons to be made between different classes of migrants. Finally, because of the large heterogeneity between immigrants to Canada, it will be important to include a large sample of participants belonging to different ethnic groups and social circumstances so as to examine with greater detail the differences between subgroups of interest.

7.3 Conclusion

Our findings suggest that 17-month-old children born to immigrant mothers of non-European origin are more often exposed to unfavourable situations of poverty and social isolation. In fact, fewer immigrant mothers (28%) report having adequate incomes and a high level of social support whereas the majority of Canadian and European-born mothers (74%) are in this favourable group. On the other hand, it is very unlikely for a Canadian or European mother to be exposed to both poverty and low social support: only 1% report being in this unfavourable situation compared to 10% of non-European immigrant mothers. Exposure to poverty and social isolation make children of immigrant mothers more vulnerable to poorer health as perceived by their mother. However, children of immigrant mothers are less vulnerable to having two or more infections in the last three months, regardless of the childcare arrangement used, compared to children of Canadian and European origin.

Difficult economic and social circumstances are common among immigrant families with young children residing in Quebec, Canada. We demonstrated that these circumstances have negative impacts on the children's health, as perceived by their mother. More research is however needed so as to describe differences in health on other measures as well as changes in health status over time among children born to immigrant families. Finally, more research is needed to better understand how other determinants of health, specific to migrant populations, influence the health of their children. Immigration is a major driving force in Canada's population growth. The children born and raised in immigrant families are part of tomorrow's society and workforce. It is therefore crucial to address the factors that will ensure their healthy development thereby enabling a future healthy multicultural Canadian society.

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APPENDICES

Appendix A – Figures

Figure 1 – Adjusted odds ratios for mother’s perception of child’s health as less than excellent among approximately 17-month-old children in the QLSCD by immigrant status, poverty and social support

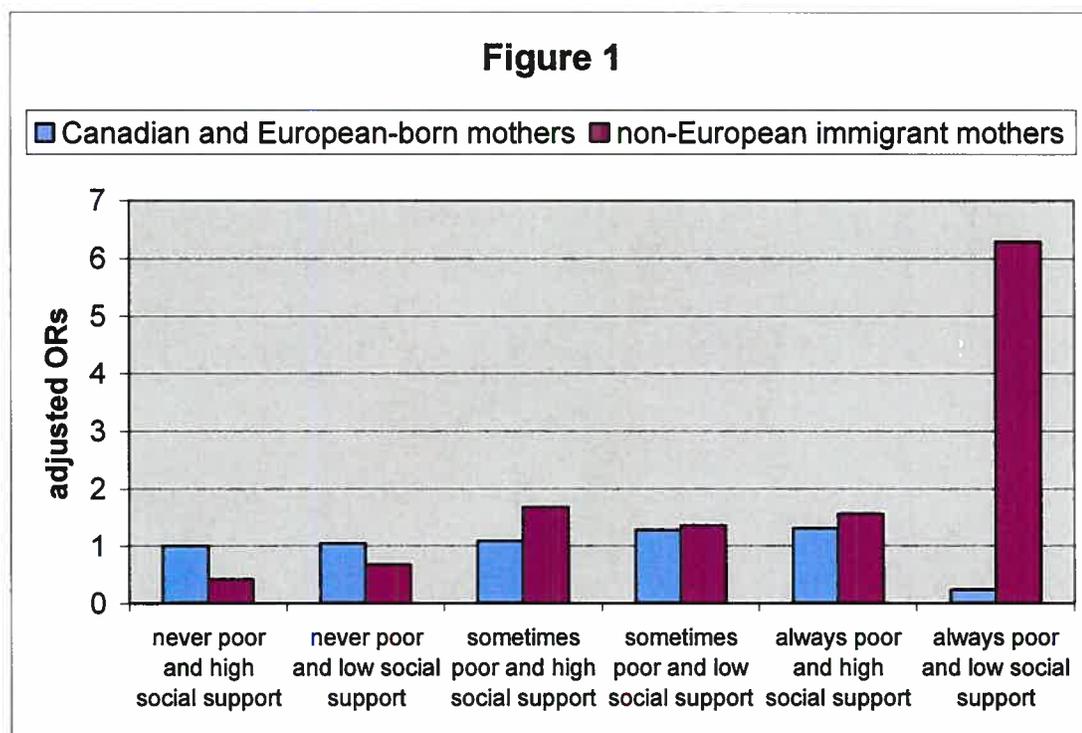
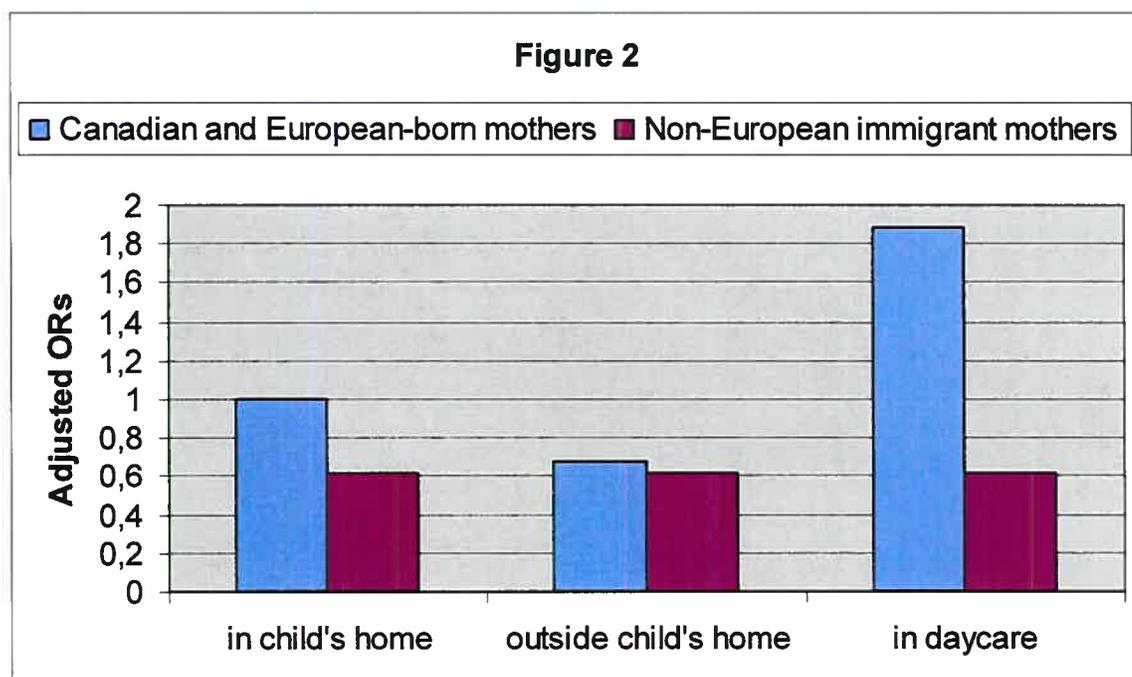


Figure 2 – Adjusted odds ratios for the presence of two or more infections in the last three months among approximately 17-month-old children in the QLSCD by immigrant status and type of child care



Appendix B – Analyses for frequency of asthma attacks since birth

In the initial phase of this research project, a third child health outcome was included in our analyses. Our research question was whether differences in health, measured in terms of frequency of asthma attacks since birth exist between children born to non-European immigrant mothers and children born to Canadian and European-born mothers in Quebec. We found no differences in the prevalence of asthma between the two groups and therefore results were not presented in the result section. As presented in Table 7, the small size of the immigrant sample and the relatively low prevalence of asthma in the total sample (7%) did not allow for further statistical analyses on this outcome variable.

Table 7 – Distribution of approximately 17-month-old children in the QLSCD according to presence of at least one asthma attack since birth and maternal immigrant status

Health outcome	Immigrant mothers of non-European origin N=165	Canadian and European-born mothers N=1878	Total N=2043	Chi-2 p value
	%	%	%	
One or more asthma attacks since birth	6,7	7,0	7.0	0,881

Source: Direction santé Québec de l'Institut de la statistique du Québec

Although our results are not significant, previous studies on the prevalence of asthma among children born to immigrant parents report divergent results. A study done in the US found higher rates of emergency department utilisation for asthma and wheezing illnesses among children of foreign-born Hispanic families compared with children of US-born Hispanic families (Klinnert et al, 2003). A combination of financial, language and knowledge barriers preventing foreign-born Hispanic families from accessing optimal care for the management of asthma could explain these findings. On the other hand, in their study on immigration and hospitalization for childhood

asthma in Sweden, Hjern and colleagues (Hjern, Haglund, Bremberg et al, 1999) reported lower rates of hospitalization among immigrant children originating from countries other than western European countries (excluding Canada, USA and Australia) after the adjustment for maternal smoking during pregnancy. Both studies report utilisation of health care services for childhood asthma which may differ from the actual condition. In the US, the NHANES III used parental reports of asthma and found that the prevalence of asthma increased from 5.2% to 8.1% in second and third generation Mexican American children aged 5 and less, respectively (Hernandez & Charney, 1998).

Thus, although the prevalence of childhood asthma has increased in previous years, its overall prevalence remains low compared to other more common acute health problems during childhood. More research is needed with larger samples of immigrant and non-immigrant populations so as to determine with greater certainty whether differences in parental reports of asthma attacks according to immigrant status exist, and if so, what factors explain these differences.

Appendix C – QLSCD Questionnaires

The following document presents a sample of questions from the Quebec Longitudinal Study of Child Development (QLSCD) used to collect the data analysed in this study. All questionnaires used by the QLSCD are available at the following web site: www.jesuisjeserrai.stat.gouv.qc.ca/default_an.htm

a) Maternal immigrant status

E2-ICCQ-SOC-Q1: In what country were you born?

b) Mother's perception of child's health

E2-ICCQ-HLT-Q1: In general, would you say your child's health is:

- excellent
- very good
- good
- fair
- poor
- don't know

c) Frequency of infections in the last 3 months

E2-PQCI- #13: In the past three months (namely since last...), how many times has (child of about 17 months) suffered from:

- gastro-intestinal infections lasting a day or more (vomiting and/or diarrhoea)
- ear infections (otitis)
- respiratory infections with fever
- another infection (e.g. Urinary tract infection)

d) Frequency of asthma attacks since birth

E2-ICCQ-HLT-Q43C: Did (child's name) ever have an attack of asthma since his/her birth?

- yes
- no
- don't know

E2-ICCQ-HLT-Q43D: How many attacks did he/she have?

e) Child's sex

Retrieved from hospital birth files

- f) Child's exact age in months**
Calculated with child's date of birth (retrieved from hospital birth file)
- g) Birth rank**
Calculated with mother's parity which was retrieved from the hospital birth file
- h) Child's health status at birth**
Retrieved from hospital birth files
- i) Duration of breastfeeding**
E2-PQCI- #5: At what age did you stop breastfeeding or giving breast milk to (child of about 17 months)?
- j) Type of child care**
E2-ICCQ-CAR-Q1A3: Do you currently use child care while you (and your spouse/partner) are at work or studying?
- yes
- no
- E2-ICCQ-CAR-Q2A (p173): What type of arrangement do you consider your main child care arrangement?
- k) Maternal age at birth of index child**
Retrieved from hospital birth file
- l) Language spoken at home by mother**
E2-ICCQ-SOC-Q6a: What language(s) do you speak most often at home?
- English
- French
- Other (specify)
- m) Maternal level of education**
E2-ICCQ-EDA-Q4: What is the highest level of education that you have attained?

n) Poverty at 5 and 17 months of age (Variable constructed with different questions and Statistics Canada low income cut-offs)

E2-ICCQ-INC-Q3: What is your best estimate of the total income before taxes and deductions of all household members from all sources in the past 12 months?

E2-ICCQ-INC-Q4: What is your best estimate of your total personal income before taxes and deductions from all sources in the past 12 months?

o) Maternal smoking behaviours

E2-ICCQ-MED-Q3: Did you smoke during your pregnancy with (child's name)?

- yes
- no

E2-ICCQ-HLA-Q2: At the present time do you smoke cigarettes:

- daily
- occasionally
- not at all

p) Maternal level of social support

E2-ICCQ-SUP-Q1B, 1C & 1F: Rate the following sentences on a scale from strongly agree to strongly disagree:

- I have family and friends who help me feel safe, secure and happy.
- There is someone I trust whom I would turn to for advice if I were having problems.
- There are people I can count on in an emergency.

- strongly agree
- agree
- disagree
- strongly disagree

q) Maternal depression

E2-ICCQ-HLA-Q12A to Q12L: How often have you felt of behaved this way during the past week?

- I did not feel like eating, my appetite was poor.
- I felt that I could not shake of the blues even with the help form my family of friends.
- I had trouble keeping my mind on what I was doing.
- I felt depressed.
- I felt that everything I did was an effort.

- I felt hopeful about the future.
- My sleep was restless.
- I was happy.
- I felt lonely.
- I enjoyed life.
- I had crying spells.
- I felt that people disliked me.

- rarely or none of the time
- some or a little of the time
- occasionally or a moderate amount of time
- most or all of the time

r) Maternal self-rated health

E2-ICCQ-HLA-Q1: The following question asks you about your health. In general, would you say your health is:

- Excellent
- Very good
- Good
- Fair
- Poor

Appendix D – Ethics Approval

Université 
de Montréal

Faculté de médecine
Vice-décanat
Recherche et études supérieures

APPROBATION DU COMITÉ D'ÉTHIQUE DE LA RECHERCHE DE LA FACULTÉ DE MÉDECINE (CERFM)

Le Comité d'éthique a étudié le projet intitulé :
Pauvreté, santé et développement cognitif des enfants : perspective longitudinale et populationnelle

présenté par : **Dre Louise Séguin et collaborateurs**

et considère que la recherche proposée sur des humains est conforme à l'éthique.



Dr Vincent F. Castellucci, Président

Date d'étude : 11 novembre 1999

Date d'approbation : 11 novembre 1999 / 2 février 2000 / 26 août 2002 / 21 février 2003

Numéro de référence : CERFM :SCE(99)53

N.B. Veuillez utiliser le numéro de référence dans toute correspondance avec le Comité d'éthique relativement à ce projet.

Le Comité comprend que le chercheur se conformera à l'article 19 de la Loi sur les services de santé et services sociaux.

Le chercheur doit solliciter le CERFM pour toutes modifications ultérieures au protocole ou au formulaire de consentement.