

**UNDERSTANDING PERSPECTIVES AMONG YOUNG ADULTS REGARDING
IMMUNIZATION IN THE CHINOOK HEALTH REGION OF SOUTHERN
ALBERTA**

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DEDICATION

*“And that Yopp...
That one small, extra Yopp put it over!
Finally, at last! From that speck on that clover
Their voices were heard! They rang out clear and clean.
And the elephant smiled. ‘Do you see what I mean? ...
They’ve proved they ARE persons, no matter how small.
And their whole world was saved by the Smallest of All!”*

Horton hears a Who! Dr. Seuss, 1954.

For my daughter Elizabeth, may your voice always be heard.

ABSTRACT

This thesis was designed to explore and describe the beliefs and behaviors of young adults (parents or future parents) in relation to immunization. Data were collected via in-depth interviews with 36 young adults (current university students) that resulted in more than 600 pages of documentation for detailed analysis. Nursing and non-nursing student informants were compared under the categories of young adults who delay or refuse immunizations due to alternative health practices, vaccine concerns or religion.

What emerged from the study was that young adults displayed lack of knowledge and disinterest about the immune system, immunizations and communicable diseases. This display of apathy towards disease prevention could subsequently contribute to a decrease in the population's herd immunity in the next generation. A review of more than 300 published journal articles and books was completed and integrated into a *mosaic* of Canadian immunization practice. Policy recommendations based on these findings are presented.

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CHAPTER ONE: INTRODUCTION

Statement of Purpose

Immunization is recognized as a safe and effective method of preventing disease (National Advisory Committee on Immunization, 1998); however, not all parents choose to immunize their children and not all adults choose to maintain or update their own immunization status. The goal of this thesis is to understand why young adults (parents or future parents) make the decisions they do and how they arrive at those decisions. Health scientists need to acquire an understanding of the experience of people in relation to their environments for the purpose of increasing their potential for health. Improved health policies may be developed if we can understand how to serve our populations better as a whole. It is more useful to put into place policy that will be meaningful and followed, than blanket statements that do not put the population's needs first. This study contributes to a better understanding of the thought processes behind persons who choose to delay or refuse immunizations irrespective of the policy environment. The area of immunization is as complex as a mosaic, and true to this metaphor, every tile of information contributes to the overall picture while remaining distinct. This thesis is presented as another *tile*.

Currently in Canada, mainstream immunization is voluntary, though strongly encouraged and freely dispensed to all citizens. Changes are on-going in mandatory immunization policy provincially. Alberta and Saskatchewan pride themselves in not having moved to mandatory laws due to the public health delivery systems in place. (Personal communication, P. Hasselback, January, 2002). As long as most people

comply, the herd immunity remains strong and the risk for developing vaccine-preventable diseases remains low. However, certain groups in the population do not agree with immunization for a variety of reasons. Some of these reasons include theological constraints, belief structures that favor “natural” immunity, beliefs that immunization is dangerous to children, mistrust in pharmaceutical companies and a belief in alternative health therapies such as provided by naturopaths and chiropractors.

What about apathy? Funk and Wagnells (1982) describe this as indifference and lack of interest. Do young Canadian adults feel immunization is important? Do they think about it during their daily lives? What will our future generation of parents do to contribute to herd immunity when they have never seen the diseases the vaccines are designed to prevent? What will happen when the next generation feels overly confident that they will not be touched by these diseases because they are perceived as a “Third World problem” or when they do not understand the ramifications of the diseases? Lack of knowledge of our own immune systems in the general population is high. Because of the complexity of interactions between anatomical structures and biochemistry most laypersons shrug their shoulders when asked how basic immunological functions occur. Policies encouraging health education may emphasize the importance of citizens taking a pro-active role in understanding their bodies and what they can do to remain healthy. In this day of reduced health care budgets more emphasis needs to be placed on prevention of disease. Immunization is an integral cog to the wheel. An analysis of this issue indicates a need for more knowledge to guide health care workers and policy-makers in contributing to immunization.

Description of the Project

The purpose of this project is to ascertain the beliefs of young adults regarding immunization for their children or future children.

The overall objectives of this qualitative study are to:

- a. Determine the theological constructs of young adults who refuse or delay immunization among their children or future children for religious beliefs.
- b. Determine the beliefs of young adults who engage in alternative health practices and refuse or delay their children's or future children's immunizations.
- c. Determine whether young adults (non-parents) are thinking ahead regarding immunization.
- d. Determine if there are gender differences between perspectives regarding immunization.
- e. Determine if there are vocational/academic differences between groups regarding immunization.
- f. Determine the relationship between various groups who do not immunize regarding their decision-making.

Background & Significance

Alberta Health and Wellness states that in Southern Alberta, the site of this research, there are significantly lower rates of immunization than nationally in the rest of Canada. Most of Southern Alberta is rural, with the exception of one large metropolitan

city, Calgary, and two small urban cities, Lethbridge and Medicine Hat. The Chinook Health Region (CHR) is one of 17 regional health authorities that were developed in Alberta in 1995. The CHR, located in Southern Alberta, covers 25,903.5 sq/km and serves a population of 146,000. There are 50 towns, villages and hamlets scattered about the CHR including Lethbridge (68,000 population) at the geographic center. When comparing the CHR to other health regions in the Alberta, it is clear there are factors that have affected immunization rates. Table 1 presents the cumulative frequency of various communicable diseases and their rate per 100,000 people from 1996-2000 as reported to Alberta Health and Wellness (as of March 2001). Current CHR information states that there were no cases of rubella and mumps in 1999 or 2000. The provincial average for rubella was 0.2 for 2000 and for mumps was 0.4 for 2000. Relevant communicable disease rates for CHR and Alberta are presented in Table 2. There have been errors presented in published source information from the Alberta Health and Wellness web site regarding the CHR. As well, "epidemic disease cycles have lengthened such that a 5 year average is of little benefit." Also, "Hep B rates for 96-00 would show opposite findings with Calgary higher than Chinook, due to complexity of disease demographics." (Personal communication, P. Hasselback, January, 2002).

**Table 1: Comparison of Communicable Diseases (cumulative 1996-2000)
CHR and Calgary per 100,000 people**

Disease	CHR freq	CHR rate	Calgary freq	Calgary rate
Mumps	1	0	64	7.45
Measles	27	18.0	39	4.55
Rubella	35	24.2	53	6.12
Pertussis	216	146.28	858	97.88

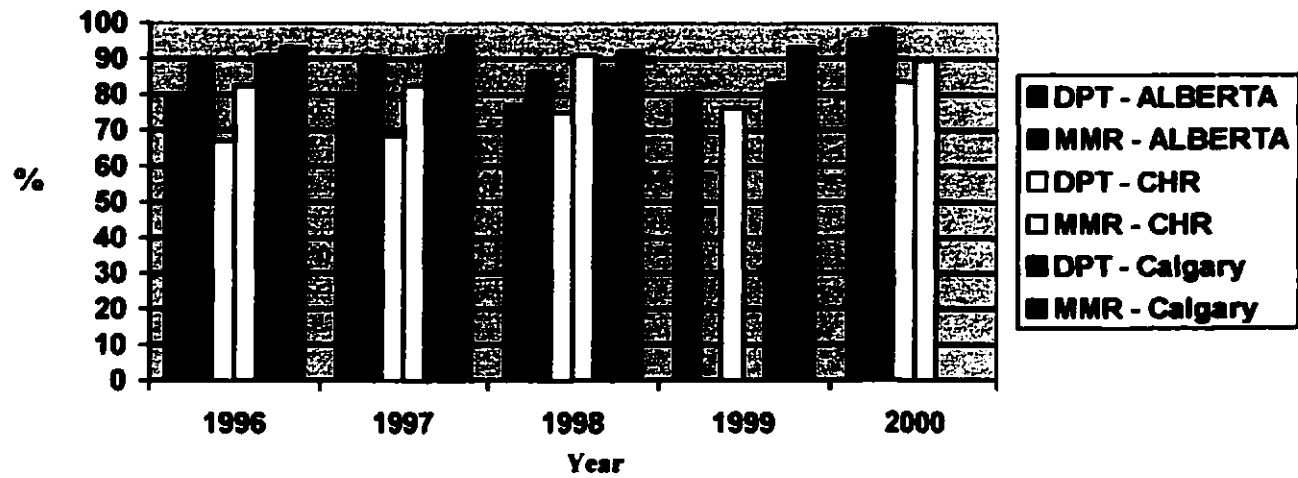
Source: Alberta Health and Wellness as of March 15, 2001.

Table 2: Disease rates per 100,000 people in the CHR and Alberta, 1999-2000

Year	Region	Pertussis	Measles	Hep B
1999	CHR	38.9	11.4	0.7
1999	Alberta	28.6	0.6	3.0
2000	CHR	18.3	4.64	0
2000	Alberta	15.5	4.45	2.27

Sources: Alberta Health & Wellness, CHR

Figure 1: Comparison of Immunization Rates

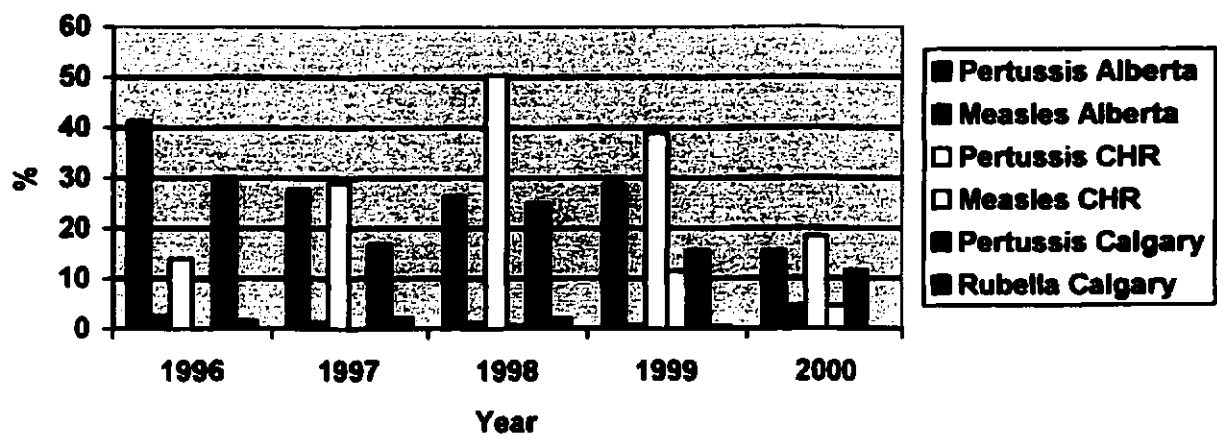


Sources: Alberta Health & Wellness, CHR

DPT = Diphtheria, pertussis and tetanus immunization

MMR = Measles, mumps and rubella immunization

Figure 2: Comparison of Disease Incidence



Sources: Alberta Health & Wellness, CHR

The CHR also continually falls behind provincial averages of immunization coverage and has a higher incidence of vaccine-preventable communicable diseases as indicated by Alberta Health & Wellness and the CHR (see Tables 1 & 2, Figures 1 & 2). Some data was not yet available for the years 1999 and 2000. The lower immunization rates here can be attributed in part to the First Nations People who reside on a nearby reservation. This is demonstrated by the higher rates of immunization in 2000 when their data was excluded for the immunization coverage rates, 94.2 % diphtheria, pertussis, tetanus (DPT) coverage in CHR without First Nations people versus 83.5 % DPT coverage in CHR with First Nations people.

Nationally, Canada was noted in 1998 by the World Health Organization (WHO) as having immunization coverage of 97 % for diphtheria, tetanus and pertussis and 96 % for measles, mumps, and rubella (MMR) for two-year old cohorts (<http://165.158.1.110/english/hvp/sce1998.htm>). According to the Canadian immunization policy, the following is required to be considered immunized; 4 vaccine doses each of DPT and Haemophilus influenza type b (Hib); 3 or more doses of any combination of injected inactivated polio vaccine (IPV) or oral poliomyelitis (OPV); at least 1 vaccine dose of mumps and rubella; and at least 1 dose of measles vaccine after the first birthday. Hepatitis B vaccines have also been included for Canadian adolescents of varying age groups since 1996.

Starting July 1, 2001, Alberta included the chickenpox (varicella) vaccines to the infant immunization program for one-year old children and select non-immune target

groups. The CHR is not currently meeting public health targets of 98 % immunized and less than 18.0 cases of pertussis per 100,000 population or 0 cases of measles per 100,000 population as defined by Alberta Health and Wellness (See Figures 1 & 2) (<http://www.health.gov.ab.ca>). For the 2000 calendar year, 94 % of DaPTP/Hib 3 doses by one year were completed, but only 84 % of DaPTP/Hib 4 doses by two years were completed (aP refers to acellular pertussis vaccine). Additionally, only 88 % of two-year old children had completed their first dose of MMR (Personal communication, S. Yanicki, November 2001). For adults, it is recommended that tetanus boosters be renewed every ten years. Also, high-risk groups such as seniors (65 years and older), adults (18-64 years) with high-risk medical conditions, and health care workers are encouraged to get yearly influenza (flu) immunizations (Health Canada, 2001). In the CHR, 44 % of seniors between the ages of 65-69 years were immunized for pneumococcal, and 68 % of seniors were immunized for influenza for the 2000/2001 fiscal year (Personal communication, S. Yanicki, November 2001).

Previous studies have discovered theological and alternative health belief structures that have promoted the refusal or delay of immunizations (Kulig, Meyer, Hill, Handley, Litchenberger & Myck, 2001; in press). This thesis tries to determine the mindset regarding immunization of young adults who are, or will be, future parents. The difference between the rates of fully immunized children nationally and the rates of vaccine concerns and association to friends or family with anti-immunization views confirm the importance of understanding the beliefs of the three groups (**alternative health influences, vaccine concerns and religious concerns**) discussed here. Policy

implications will be explored to see whether any relevant information can be added to the existing body of knowledge. Therefore, this in-depth qualitative study contributes a *tile* to health science's body of knowledge *mosaic* through the exploration and description of the inter-actional processes that lead to understanding which acknowledges yet transcends differences in opinions and beliefs of our citizens about immunization.

An exploratory and descriptive design was chosen for this study because the goal was to discover and describe the study phenomena as opposed to verifying it (Sandelowski, 2001, 2000, 1998; Sandelowski, Docherty & Emden 1997; Spadley, 1979). This study has also borrowed concepts from grounded theory and ethnography even though the goal was not to produce a theory or describe a culture. Qualitative research has the flexibility to address these questions in a way that best describes them. Unlike quantitative research, there are no set rules for qualitative research. The facts, as always, must remain precise and the flow logical, yet it may remain distinct and allow the researcher to discover meaning through the data (observations) and present it accordingly. The “emic” or insider's perspective represents an understanding of the meaning individuals attribute to their experiences. It is hoped that the findings of this study will assist health care workers and policy-makers with clients who do not view immunization as positive.

Assumptions

The following assumptions formed the basis for this study:

- (1) Young adults are considered expert sources in the personal knowledge of their explanatory models of health and illness;
- (2) Any encounter with a person is an opportunity for acquiring personal knowing, provided that the person has attempted to acknowledge and/or eliminate preconceived notions, and is open and receptive;
- (3) The provision of effective immunization care for citizens is dependent upon understanding occurring between citizens and health care workers;
- (4) A reciprocal caring health care worker-citizen interaction is a mutually empowering experience;
- (5) Understanding within the health care worker-citizen encounter occurs within a caring health care worker-citizen relationship; and,
- (6) Policy can be generated to enable citizens to become educated and encouraged to maintain their personal health while contributing to a healthy society.

Definitions

In the context of this study, the following theoretical definitions were used:

- **Understanding** is the process of interpreting, knowing and comprehending the meaning that is felt, intended and expressed by another (Denzin, 1989, p. 120);
- **Immunization** is the process of being immunized against a particular disease;

- **Health care workers** include individuals from the disciplines of medicine, public health, physical and social science and nursing;
- **Health scientists** are researchers concerned with aspects of health science and health care from multiple disciplines of medicine, public health, physical and social science, education and nursing; and,
- **Informants** are defined as the people interviewed in this study who provided information about personal immunization experiences.

Research Questions

The aim of this study was to answer the following research questions in order to describe and explain:

- a. **What are the theological constructs of young adults who choose not to immunize their children or future children? What is the relationship between these beliefs and the young adults' decision-making regarding immunization?**
- b. **What are the beliefs of young adults who engage in alternative health practices and choose not to immunize their children or future children? What is the relationship between these beliefs and the young adults' decision-making regarding immunization?**
- c. **What are the beliefs of young adults who are concerned about vaccine safety and choose not to immunize their children or future children? What is the relationship between these beliefs and the young adults' decision-making regarding immunization?**

- d. **What are the beliefs about immunization by future parents?**
- e. **What are the similarities/differences between groups of parents or future parents regarding immunization?**

Summary

In conclusion, the purpose of this study was to explore and describe the beliefs and behaviors of young adults with regards to immunization. Due to the trend of increased numbers of citizens opting to refuse or delay immunization, the need to understand why compliance with recommended immunization has changed over the last 10 years is important. This study contributes a *tile* to the body of knowledge *mosaic* regarding citizens' beliefs about immunization, where a shared understanding is necessary for effective care. Apathy about immunization only serves to decrease herd immunity which will ultimately decrease the quality of life for all citizens.

CHAPTER TWO: REVIEW OF THE LITERATURE

Description of the Literature

This chapter presents a review of representative literature relevant to this study. It begins with a critical review of the research published in English from 1990 to 2001, focusing on the concepts of “immunization” and “young adults.” Following this, a more detailed review of specific citations is presented addressing two major themes: (1) the immunization beliefs and behaviors of young adults and (2) policy implications for immunization in Canada. Policy recommendations made in the early 1990s are re-examined in the context of current immunization practice to discover the evolution from basic research to policy recommendations and, ultimately, to policy implementation. This analysis provides insight into how basic research, can contribute into policy practice that affects the grand picture of immunization in general.

Critical Review of Immunization Literature

A critical review of the health science literature related to immunization revealed 97,703 citations. A detailed search revealed about 300 relevant articles of which fewer than 10 were specific to young adults (college and/or university students) and immunization campaigns. None of the articles found included the qualitative analysis of Canadian young adults’ perception of immunization. The purpose of the review was to provide information and recommendations regarding immunization research in health care. The examination focused on the following areas:

- Evidence of studies in specified health care journals;
- Trends in relation to immunization;
- Focus on the study and category designation (immunization vaccines, beliefs, behaviors, refusals, delays, young adults, immune system, policy); and,
- Evidence of the use of a theoretical framework, design choice, sample selection, sample size and analysis.

Both electronic (PubMed, CINAHL, Infotrac, Medline, PsychInfo, HealthStar, and Google.com) and hand searches were done. The literature sources reflected the major research and theoretical health science journals including the disciplines of medicine, public health, biological sciences and nursing as highlighted in Table 3.

Table 3: Journal Sources

Ambulatory Child Health
American Journal of Maternal Child Nursing
American Journal of Medical Quality
American Journal of Public Health
Annual Review of Nursing Research
Australian & New Zealand Journal of Public Health
British Medical Journal (BMJ)
Canada Communicable Disease Report
Canadian Family Physician
Canadian Journal of Public Health (CJPH)
Canadian Medical Association Journal (CMAJ)
Canadian Nursing Home
Health Education & Behavior
Health Education Research
Infection Control & Hospital Epidemiology
Journal of Alternative & Complementary Medicine
Journal of American College Health
Journal of American Medical Association (JAMA)
Journal of Community Health Nursing
Journal of Experimental Medicine
Journal of the Neuromusculoskeletal System
Journal of Public Health Management Practice
The Lancet
Morbidity & Mortality Weekly Report (MMWR)
Nature
Nature Medicine
New England Journal of Medicine (NEJM)
Nursing Administration Quarterly
Nurse Education Today
Pediatrics
Policy, Politics & Nursing
Qualitative Health Research
Research in Nursing & Health
Science
Science Magazine
Vaccine

The major strength of this literature review is the choice of journals that encompass a multi-disciplinary focus on immunization. The major limitation to this literature review is that many of the studies included cannot be easily generalized. Issues

of non-comparable sample sizes and populations make generalizations difficult; however, this does not mean that the information revealed from these studies is not important or relevant to this thesis. Each study included has contributed a *tile* of information in this *mosaic*, even though it remains distinct. It is hoped that the knowledge gained from this review will further strengthen the policy recommendations. The variables of immunization and beliefs for this review were defined by the keywords: **students, young adults, immunization, parents, nurses, Canada, and public opinion**. The substantive content areas that were identified in the electronic PubMed review were the following variables:

1. Immunization, Canada [662 articles]
2. Immunization, Alberta, human, people [12 articles]
3. Immunization, policy, Canada [33 articles]
4. Health behavior, Canada, immunization [18 articles]
5. Health beliefs, immunization, behavior, Canada [1 article]
6. Experiences, immunization, Canada [17 articles]
7. Immunization, Canada, parent [11 articles]
8. Immunization, religion, Mormon [14 articles, 1 including Canada]
9. Jehovah's Witness, immunization [0 articles]
10. Dutch, immunization, Canada [1 article, 382 articles excluding Canada]
11. Immunization, concerns, Canada [5 articles]
12. Immunization, delay, refusal, Canada [9 articles]
13. Immunization, Canada, alternative health [2 articles]
14. Immunization, Canada, rural [6 articles]

15. Health care workers, beliefs, perceptions [14 excluding Canada]
16. Nurse, Canada, immunization [25 articles]
17. Canada, immunization, adult [218 articles]
18. Canada, immunization, young adult [2 articles]
19. Immunization, student, Canada [11 articles]
20. Immunization, apathy [12 articles excluding Canada]

There was some overlapping of articles when they included common variables.

Due to the overwhelming amount of literature on immunizations, it was decided to concentrate on Canadian content for the review when appropriate. *Titles* of pertinent facts and themes from the literature are presented to provide the reader with an idea of what has occurred in the last ten years and what can be built from this information in the future.

Review of Immunology

To better understand how immunizations work, an overview of current human immunology from Delves and Roitt (2000a, 2000b), and Klein and Sato (2000a, 2000b) is provided. Additional sources of information will be provided as necessary for clarification.

The immune system is an organization of molecules and cells with specialized roles in defending against infection. The immune system can be separated into two functionally independent divisions: the systemic division, represented by the thymus,

bone marrow, spleen, lymph nodes and fetal liver, and the mucosal division, represented by lymphoid tissues in mucosa including other mature dendritic cells (DC) and external secretory glands such as palatine tonsils, adenoids, and Peyer's patches. Lymphoid cells are also found in diffuse collections throughout the lung and intestinal wall. Of particular note are that the T-lymphocytes (T cells) mature in the thymus and DC are derived from bone marrow.

The immune system can further be described in terms of functional responses: innate (natural) responses that occur to the same extent no matter how many times the foreign particle is encountered and the acquired (adaptive) responses that improve on repeated exposure to a given pathogen (germ). Innate responses use a collection of phagocytic cells (neutrophils, monocytes and macrophages), inflammatory mediating cells (basophils, mast cells and eosinophils) and natural killer cells (NK).

Dendritic cells occur in different stages of maturation and are found throughout the body in small numbers (about 0.5 % of all nucleated cells). They all fall into 3 broad categories that involve antigen presentation. The dendritic cells:

- (1) are the interdigitating antigen presenting cells (APCs) to T cells;
- (2) seem to induce and maintain tolerance in the T cell system; and,
- (3) as lymphatic follicular cells, act in a role with secondary antibody responses that are able to store antigens on their membranes for long periods.

One type of immature dendritic cell, previously known as the Langerhans skin cell, is found in the skin and is the body's main APC (Dittmar, Rhode, Weiß & Lindemaier, 1998).

Complement, acute phase proteins, cytokine and interferons are used as the molecular component to innate responses. Acquired responses use the proliferation of antigen-specific B and T cells, which occurs when the surface receptors of these cells bind to an antigen. These are generated in the lymph nodes, spleen, and mucosa-associated lymphoid tissue (http://www.delphion.com/details&pn=us06110898-&-5_bsum=1). The immune system can further be described in terms of humoral and cellular responses. Humoral responses occur from B cells that make antibodies while cellular responses occur with killer T cells. Both responses are aided by helper T cells.

Most normal cells, except red blood cells (RBC), carry an identifying protein on their surfaces to avoid being killed by the body's immune system. This variant is a protein called the class I major histocompatibility complex (MHC) (also known as transplantation antigen). There are two classes of MHC, I and II, and further subtypes of each including the Human Leukocyte Antigen (HLA) complex. These mark the cells as "self" as opposed to "foreign" or "damaged" such as by a virus or bacteria or tumor. If cells do not have enough of these proteins, the NK cells destroy them. As "Mother Nature" builds many safeguards into the body, other processes work as a back up. Macrophages also recognize a different inhibitory signal from another protein called CD47. This protein protects RBCs. The negative regulation permeates the immune

system much more broadly than the NK cells to protect the normal cells from self-destruction, also known as, apoptosis (Hagmann, 2000).

Another strategy to protect the body from infection is to produce protective proteins known as antibodies (also known as immunoglobulins: Ig). B cells (B-lymphocyte cells) secrete these antibodies and are encoded by immunoglobulin genes. These B cells have the ability to generate a variety of antibodies via DNA recombination. Different antibodies have different functions in the immune system. They all however, have a variable region that recognizes foreign particles and a constant region (heavy chain) that elicits the immune response to the infection. One of the functions of the heavy chain's constant region is to determine which class of antibody is to be produced in the cell, i.e., IgM, IgG, or IgE which all have distinct functions (Tian & Alt, 2000).

Those cells whose receptors are programmed to recognize antigens (various simple to complex molecules recognized by receptors on lymphocytes) are then selected to proliferate and differentiate into effector and memory cells. These memory cells are established by being the 'antigen experienced progeny' of the original naive B cells (Shultz, 1999; Martin & Goodnow, 2000). These B cell functions are essential to understanding what happens with immunizations. B-cells undergo two major DNA recombination events in their life span. The first occurs when they develop in fetal liver or in the bone marrow, which creates the antigen specificity of immunoglobulins and is called the V(D)J recombination. This occurs in the absence of any antigens. Later, as the B-cells mature in the bone marrow and are activated by an antigen in the spleen or lymph

nodes in response to an immunization or infection, the DNA recombination results in a switch in the production from immunoglobulin M (IgM) to other classes of antibodies (IgG, IgA or IgE) which are then targeted to needy areas of the body and will thus eliminate the pathogens inducing the immune response. Other features of the immune response are the use of cytokines (proteins), produced by helper T lymphocytes to aid in the determination of the antibody class produced by the class switch recombination (CSR). These B cells can persist as memory cells for long periods of time after immunization, even in total absence of specific stimulation by an antigen. This memory feature has also been shown to exist in cytotoxic T cells that destroy virus-infected cells (Stavnezer, 2000).

The immune cells chop foreign proteins into small peptides (epitopes) which are then displayed on APC. They are held in place by the proteins of the MHC. Once flagged, the T-cells (which reach maturity in the thymus) will come into play to either kill them outright or orchestrate an attack by other immune cells. Only a few peptide fragments have the right shape to fit into the MHC proteins to lock it into place (Dittmar, Rohde, Weiß, & Lindenmaier 1998; Barry & Johnston, 1997; Enserink, 2000; Seder & Gurnathan, 1999; Corr, Lee, Carson & Tighe, 1996; Condon, Watkins, Celluzzi, Thompson & Falo, 1996; Waalen, 1997; Katz, 1997; Enserink, 1999; Makela, 2000; <http://DNAvaccine.com>; Delves & Roitt, 2000a, 2000b; Klein & Sato, 2000a, 2000b).

Vaccine Research

One of the complications of vaccine research is that an individual inherits only one variant (as described above) from each parent, and if this vaccine is based on only one peptide it may not work on everyone. Some individuals will also have allergic reactions from some of the ingredients used in vaccine preparation (<http://DNAvaccine.com>). New techniques to solve these problems are well under way in vaccine laboratories (Hagmann, 2000b). Because of the complexity of antigens, various carbohydrates must be coupled with the proteins in the vaccine to make them immunogenic, i.e., to stimulate an immune response. Various pathogens such as viruses, bacteria, and parasites have different outer coats made from either proteins or carbohydrates or combinations of both. Vaccines must accommodate the biochemical structure of each pathogen. Sometimes combinations of both proteins and carbohydrates are used to maximize this strategy (Blakeslee, 2000; Waalen, 1997; Makela, 2000; Enserink, 1999; <http://DNAvaccine.com>).

Some vaccines are effective in stimulating a humoral response that acts on the pathogens on the outside of cells while others stimulate a cellular response, which acts on pathogens that are inside and colonize the cells. Optimally vaccines should stimulate both, however, this is not always possible. Such is the case for the polysaccharide antigen used in the Hib vaccine. In order for it to work properly to stimulate the immune response various adjuvants (protein conjugation) must be added. It is here that lay people become confused about conventional vaccine ingredients. A common adjuvant, used safely for 70 years in diphtheria, hepatitis B and tetanus vaccines, is aluminum salts (alum) (Makela,

2000). To prevent contamination in vaccines by bacteria or fungi, a mercury-based compound in trace amounts called Thiomerosal (also known as Thimerosal) was also commonly used. Negative publicity, based on misinterpretation of ethyl versus methyl mercury compounds found in fish, trickled down to the public. Anti-immunization groups feared the word 'mercury' listed in the ingredients and with subsequent pressure newer conventional vaccines no longer contain Thiomerosal (Gangarosa, Galazka, Wolfe et al., 1998; Sibbald, 1999). Better perceived preservatives are now used, however, WHO still advocates for the use of Thiomerosal as a safe preservative. (Jodar, Duclos, Milstien, Griffiths, Aguado & Clements, 2001) Some anti-immunization groups have targeted both the use of adjuvants and preservatives without dealing with the cellular issues or uncertainty about causality and the result has been a promotion of needless fear (Malakoff, 2000; Plotkin, 2000; Halsey, 2000; Delves & Roitt, 2000).

In general, immunization and vaccination refer to the introduction of a non-virulent agent against which an individual's immune system can initiate an immune response that will then be available to defend against future challenge by a pathogen. The immune system's function is to identify invading "foreign" particles and agents primarily by identifying proteins and other large molecules that are not normally present in the individual. The foreign particle represents a target against which the immune response can be made. The use of vaccinations had been singularly responsible for conferring immune protection against several human pathogens. Several vaccine strategies for presenting pathogen proteins include presenting the protein as part of a non-infective or

less infective agent or as a discreet protein composition to promote memory B or T cells (Makela, 2000).

One strategy for immunizing against infection uses inactivated or killed pathogens in vaccines to present pathogen proteins to an individual's immune system. Examples are the hepatitis A, and B vaccines as well as the Salk injected polio vaccine. In such vaccines, the pathogen is either killed or otherwise inactivated using means such as heat or chemicals. The administration of inactivated or killed pathogen into an individual presents the pathogen to the individual's immune system in a non-infective form and the individual can thus mount an immune response against it. Inactivated or killed pathogen vaccines (e.g. influenza and polio vaccines) provide protection by directly generating T-helper and humoral immune responses against the pathogenic immunogens. This is limiting because it does not stimulate a strong cellular response and it wears off over time. Because the pathogen is inactivated or killed, there is little threat of infection. One way to inactivate the pathogen is to use trace amounts of formalin (Makela, 2000; Gangarosa et al., 1998; Sibbald, 1998). The use of formalin had also received negative anti-vaccine attention as the uninformed public associate it with the volumes of formaldehyde used in common high school biology demonstrations and believe it to cause damage.

Another method of vaccinating against pathogens is to provide an attenuated (weakened) vaccine. Attenuated vaccines are essentially live vaccines that demonstrate a reduced infectivity. Attenuated vaccines are often produced by passing several

generations of the pathogen through a permissive host (such as bacteria), until the progeny are no longer virulent or dangerous. By using an attenuated weakened vaccine, an agent that displays limited infectivity may be used to elicit an immune response against the pathogen. By maintaining a certain level of infectivity, the attenuated weakened vaccine produces a low level infection and elicits a stronger immune response than inactivated or killed vaccines. For example, live attenuated vaccines, such as the MMR, smallpox and polio virus (OPV) vaccines, stimulate protective T-helper, T-cytotoxic, and humoral immunities during their nonpathogenic infection of the host. These are considered the 'gold standard' of vaccines because they generally confer life long immunity and stimulate both humoral and cellular responses. There is, however a concern that the use of live-attenuated vaccines in persons who suffer immunosuppression may place them at risk of disease from the vaccine itself.

Component or fractionated (killed then separated) vaccines present only specific components, these include Hib, and newer acellular pertussis toxoids. Recombinant-DNA technology has allowed vaccines to be manufactured where no actual pathogenic component is involved such as new hepatitis B vaccines. New DNA vaccines are currently being tested to alleviate concerns about conventional vaccines (Personal communication, P. Hasselback, 2002; Li, Ewasyshyn, Sambhara & Klein, 2000; Malone & Malone, 2000; Weiner, Williams & Wang, 2000).

Canadian Immunization Policy and Practice

The Canadian Health Care Policy of 1985 (R.S. 1985 C. 6, s.3) states "it is hereby declared that the primary objective of Canadian health care policy is to protect, promote and restore the physical and mental well-being of residents of Canada and to facilitate reasonable access to health services without financial or other barriers."

(<http://laws.justice.gc.ca/en/c-6/text.html> updated Dec 31, 2000).

Since the 1940s, immunization programs have been the cornerstone of public health practice in Canada. By 1998, a Canadian plan for pandemic influenza was completed by the National Advisory Committee on Immunization (NACI). This was an example of policy in action. It took many years to develop and involved consultation with provincial public health and laboratory authorities, the licensing body, manufacturers of influenza vaccine and antiviral agents, and representatives in the UK and USA. Key decisions in creating the framework included:

- (1) Aiming for federal-provincial consensus on the use of vaccine and antiviral drugs;
- (2) A selective vaccination approach (high-risk persons plus essential workers);
- (3) Bulk purchasing and distribution of vaccine through the public sector,
- (4) Leaving antiviral drugs on the open market;
- (5) Careful planning of the communication strategy, and;
- (6) Increased inter-pandemic use of influenza vaccine in target groups.

Tamblyn (1994) recommended that it was time to update the immunization plan to ensure that everyone involved (i.e., public health nurses) was aware of their roles and

responsibilities. From the PubMed electronic literature search, 33 relevant articles were found dealing with Canadian immunization policy. Key factors from these sources and the Canadian government will be presented to give an overview of what has occurred over the last ten years.

A major evaluation study on “Canadian Immunization Delivery Methods” was made by the “Community Health Practice Guidelines Working Group” consisting of Gyorkos, Tannenbaum, Abrahamowicz, Bedard, Carsley, Franco et al. (1994) resulting in three published articles in the Canadian Journal of Public Health. The third article was authored by Tannenbaum et al. (1994). Both policy development and planning of resource allocation were drawn from this landmark study.

The researchers summarized the effectiveness of the delivery methods of childhood and adult vaccines for measles, mumps rubella, diphtheria, tetanus, pertussis, polio, influenza, pneumococcal infection and hepatitis B from scientific literature and clinical trials. They presented results of interventions found to be most effective for each vaccine. From a critical appraisal of 54 eligible comparative studies, the effects of different interventions were obtained and pooled effects were calculated for delivery methods oriented to the client (individuals eligible to receive the vaccine), the provider (health care practitioners) and the health care system (organizational or administrative policies or actions). They found that the sustainability of interventions (like immunization reminders either by letter or telephone or community based strategies) beyond their consideration within the research context had not been documented as of 1994. While health care practitioner (i.e., physician) knowledge, attitudes and practice with respect to

immunization were known to influence immunization rates, little attention was directed at ensuring that immunization was adequately covered in medical school curricula or in continuing medical education courses.

The "Practice Survey on Immunization" (1994) from the Community Health Practice Guidelines Working Group revealed, from a 1991 survey of Canadian epidemiologists and key persons involved in immunization programs, that five areas of practice had the most variation. They included public/private health administration; legislation; monitoring system coverage rates/surveillance; vaccine management and costs. This article was useful in examining issues of standardization (in coding, in assessment of waste, in assessment of coverage), surveillance systems and the use of sero-surveys. In Alberta, it was noted that there was no additional legislation other than the Canada-wide regulation that unvaccinated children are excluded from school during vaccine-preventable disease outbreaks or epidemics. Manitoba, Ontario and New Brunswick had additional laws requiring mandatory immunization requirements for school entry. Alberta's Health Care System Administration of Immunization was dominated by being greater than 98 % "Public Health" instead of the use of private physicians, clinics etc. for the same purpose.

There were large urban-rural differences in Canada, with rural areas having a much larger involvement with public health than urban areas. In Alberta, the monitoring systems of age of immunization assessment was done at 4, 16, 24 months and school entry year. For checking completeness of immunization, an Edmonton based delayed

immunization monitoring program was put in place. This practice was highly variable within Canada. In "The Reported Annual Coverage Rates for Childhood Immunization in 1991", Alberta had assessed that 75 % of the school age children were immunized for diphtheria, tetanus and pertussis and greater than 90 % were immunized for measles, mumps and rubella. Other assessments were done at 4 and 6 months and found 75 % immunized by age two for Hib. All provinces except Quebec and Nova Scotia checked school entry children, and all but Ontario, New Brunswick, Nova Scotia and Prince Edward Island checked the immunization status of two-year old children. The cost of vaccines was found to be difficult to assess due to lack of adequate data. In 1991, Alberta was found to spend an average of \$12.11 per 0-4 year old while New Brunswick spent the lowest (\$12.05 per 0-4 year old children) and Ontario spent the most (\$23.03 per 0-4 year old children).

Additionally, the Community Health Practice Guidelines Working Group, (1994) presented "Immunization Delivery Methods: Practice Recommendations" that integrated the previously summarized papers. Select and thesis relevant policy recommendations were:

- Client-oriented interventions (personalized, health belief postcard reminder, or postcard reminder with a telephone follow-up) aimed at hospitalized patients be included in routine clinical practice for influenza vaccine;
- Client-oriented interventions aimed at out-patient populations be included in routine clinical practice for influenza vaccine;

- **Provider-oriented interventions aimed at out-patient populations be included in routine clinical practice for influenza vaccine;**
- **System-oriented interventions (standing orders to vaccinate clinic or hospitalized patients) be included in routine clinical practice for influenza;**
- **School immunization legislation for MMR vaccine be considered in each province;**
- **The development of a system for surveillance of immunization coverage and recall for MMR vaccine be considered in each province; and,**
- **Computerized surveillance systems for the monitoring and recall of DPT-Polio vaccine be considered for implementation in each province.**

In the following sections are examples how these recommendations have been utilized in the seven years since publication. It is encouraging that information from basic research influences policy-makers and can effect change and make a difference.

The Canadian Immunization Guide (1998) presented the recommended immunization schedule currently in practice as indicated by National Advisory Committee on Immunization (NACI). The NACI, made up of Canadian experts in the field of immunization, formulates general recommendations regarding vaccine use and scheduling, and regularly review these recommendations and monitor the extent to which they can be applied. In Canada, immunization is the responsibility of the health ministry in each province and territory; however, NACI has the mandate to review and make recommendations on issues pertaining to vaccine use. Each province and territory administers its own immunization program developed to meet the needs of its population

characteristics and health care services. Differences among jurisdictions are largely due to the specific products that are used. The roles and responsibilities of federal, provincial, and territorial health authorities in the planning and delivery of immunization programs are described in the Health Canada web site: (<http://www.hc-sc.gc.ca>) "Immunization in Canada." A summary of the nationally "routine childhood immunization programs," as well as "special immunization programs offered to selected high-risk groups," is presented below.

Routine childhood immunization programs in Canada

Most Canadian jurisdictions have a recommended immunization schedule very similar to that recommended by NACI. Quoted directly from this Health Canada web site (October 2001), Table 4 illustrates the "Routine Immunization Schedule for Infants and Children, Provincial and Territorial Practices, Canada (1996)" and Table 5 illustrates "Special Vaccination Programs by Target Groups, Canadian Provinces and Territories (1996)" from "Current Immunization Programs in Canada." All provinces and territories have now revised their recommended schedules to accommodate the second dose of measles vaccine at 18 months of age or between 4 to 6 years of age. Note that this policy recommendation from 1994 was presented earlier.

Manitoba was the only province using OPV exclusively in 1996 but has recently switched to the OPV/IPV combination (Manitoba Health, www.gov.mb.ca/health, October, 2001). Quebec switched to IPV in early 1996. Prince Edward Island did use a

sequential schedule consisting of IPV for the first three doses and the booster for those 14 to 16 years of age, and OPV for the dose at 18 months of age and the booster between 4 to 6 years of age and has just switched to using IPV only. All provinces and territories currently have a universal childhood hepatitis B immunization program (**Manitoba beginning in October 2001); grade levels targeted for immunization are indicated in Table 4. Ontario currently has a one-time catch-up program for students in grades 9 to 13, after which a program for grade 7 will be maintained. Prince Edward Island, New Brunswick, and the Northwest Territories also have immunization programs for infants.

It should be noted that there have been new developments in the **Routine Immunization Schedule** such as the introduction of hepatitis B immunization into secondary schools, in BC a new infant hepatitis B schedule (www.hlth.gov.bc.ca/cpa/publications/annual/2001.pdf), and varicella (chickenpox) immunization in elementary school children. Recent meningococcal epidemics in Alberta (spring-fall 2001) have prompted the province of Alberta to do a mass vaccination campaign for all 2-24 year olds (<http://www.health.gov.ab.ca/>). A new vaccine designed for children less than two years old has been approved in Canada and will be administered in the fall of 2001 in Alberta.

Table 4: Routine Immunization Schedule for Infants and Children Provincial and Territorial Practices, Canada (1996)

Province or Territory	DPT	Polio	Hib	Td-Polio	Hepatitis B (3 doses) Grade/Age	MMR (first dose)	MMR/MR (second dose)
NF	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV	2,4,6,18 months	14-16 years: Td-IPV	Grade 4	12 months	18 months: MMR
PE	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV	2,4,6,18 months	14-16 years: Td-IPV	Grade 3 & Infants: 2,4,15 months	15 months	18 months: MMR
NS	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV	2,4,6,18 months	14-16 years: Td-IPV	Grade 4	12 months	4 to 6 years: MMR
NB	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV	2,4,6,18 months	14-16 years: Td-IPV*	Grade 4 & Infants: 0,2,12 months	12 months	18 months: MMR
QC	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV*	2,4,6,18 months	14-16 years: Td-IPV	Grade 4	12 months	18 months: MMR
ON	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV*	2,4,6,18 months	14-16 years: Td-IPV**	Grade 7	12 months	4 to 6 years: MMR
MB	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: OPV	2,4,6,18 months	14-16 years: Td-OPV	Not planned	12 months	5 years: MMR
SK	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV*	2,4,6,18 months	14-16 years: Td**	Grade 6	12 months	18 months: MR
AB	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV	2,4,6,18 months	14-16 years: Td	Grade 5	12 months	4 to 6 years: MMR
BC	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV*	2,4,6,18 months	14-16 years: Td	Grade 6	12 months	18 months: MMR
YT	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV	2,4,6,18 months	14-16 years: Td-IPV	Grade 4	12 months	18 months: MMR
NT	2,4,6,18 months & 4 to 6 years	2,4,6,18 months & 4 to 6 years: IPV*	2,4,6,18 months	14-16 years: Td-IPV**	Grade 4 & Infants: 0,1,6 months	12 months	18 months: MMR

Source: Health Canada

http://www.hc-sc.gc.ca/hpb/lcdc/publicat/ccdr/97vol23/imm_sup/imm_k_e.html#table

**Notes for Table 4: Routine Immunization Schedule for Infants and Children
Provincial and Territorial Practices, Canada (1996):**

PE* Currently a second MMR dose is also given to children 4 to 6 years of age who would not have received their second dose at 18 months.

NB* Polio booster is recommended for adolescents 14 to 16 years of age who received every previous dose (IPV) by injection.

QC* Polio vaccine at 4 to 6 years and 14 to 16 years of age are omitted if OPV was used for earlier doses.

ON* DPT-Polio 5th dose at 4 to 6 years of age not necessary if the 4th dose was given after the 4th birthday.

ON** Polio vaccine at 14 to 16 years of age is not required if the child has completed primary series and received one or more doses of OPV in the past. OPV was used routinely in Ontario from January 1990 through March 1993.

SK* DPT-Polio 5th dose at 4 to 6 years of age not necessary if the 4th dose was after the 4th birthday.

SK** Polio vaccine at 14 to 16 years of age given only if one dose of OPV not received.

BC* DPT-Polio 5th dose is not necessary if the 4th dose was given after the 4th birthday.

NT* DPT-Polio 5th dose at 4 to 6 years of age not necessary if the 4th dose was given after the 4th birthday.

NT** Polio vaccine at 14 to 16 years of age is not required if the child has completed primary series and received one or more doses of OPV in the past.

Special Immunization Programs

Table 5 summarizes information regarding special immunization programs. In most cases, these programs are based on NACI recommendations; however, the specific target groups for some vaccines differ among jurisdictions. The target groups for influenza and pneumococcal vaccines are very consistent among jurisdictions and with NACI recommendations. They include people with chronic cardiac, pulmonary, and renal

diseases; institutionalized children and adults; people 65 years of age and older; children and adolescents with long-term histories of acetylsalicylic acid (ASA) treatment; and people with specific chronic diseases (such as cancer, immunodeficiency, anemia, and hemoglobinopathies).

Prince Edward Island does not have a program to immunize against pneumococcal infection or influenza as of 1996. Reported recommendations for meningococcal vaccine vary more widely among jurisdictions that have programs for this vaccine. One or more of the four specific NACI recommendations are included in each jurisdiction; Prince Edward Island does not offer the vaccine to any group. Seven jurisdictions report special Bacille Calmette-Guérin (BCG) vaccination programs, mainly for Aboriginal populations. This is supported by the higher rates of tuberculosis among First Nations people. In addition to the vaccines listed in Table 5, most provinces and territories provide hepatitis B vaccination to some of the recognized high-risk groups, e.g. household or sexual contacts of cases and chronic carriers, hemophiliacs, and persons on hemodialysis. No specific information is available for coverage under any of the special programs (Canada Communicable Disease Report, May 1997, www.hc-sc.gc.ca/hpb/lcdc/publicat/ccdr/97vol23/imm_sup/imm_k_e.html#table).

From this information, it is clear that there are complicated and diverse immunization schedules in Canada. Although this heterogeneity in immunization schedules can be useful in terms of acquiring new knowledge and examines the relative merits of different program features and in comparing and evaluating new strategies, it is

not surprising then that many adults and parents have difficulty describing their own personal immunization status or their children's.

Table 5: Special Vaccination Programs by Target Groups, Canadian Provinces and Territories (1996)

	Influenza	Pneumococcal	Meningococcal	BCG
>= 65 years of age	All except NB, PE, NT	ON, NT, YT		
Immunodeficiencies	All except PE	NF, NB, ON, MB, AB, NT, YT	MB, SK, BC	
Chronic cardiac diseases	All except PE	NB, ON, MB, AB, NT, YT		
Chronic pulmonary diseases	All except PE	NB, ON, MB, AB, NT, YT		
Diabetes mellitus and other metabolic diseases	All except PE	NB, ON, MB, AB, NT, YT		
Chronic renal diseases	All except PE	NB, ON, MB, AB, NT, YT		
Cancer	All except PE	NF, ON, MB, NT, YT		
Hemoglobinopathies	All except PE, NT	NF, YT		
Long-term ASA therapy	All except PE, NT			
Institutionalized children or adults	All except PE	ON, NT, YT		
Sickle-cell syndrome	NF, NS, MB, BC	ON, MB, AB, YT	MB	
Asplenia (hereditary/post splenectomy)	NS, MB, BC	All except PE, QC	QC, MB, SK, AB, BC	
Cirrhosis	NS, QC, BC, YT	NB, ON, MB, SK, AB, YT		
Nephrotic syndrome	NS, QC, MB, BC, YT	ON, MB, AB, YT		
Chronic CSF leak	BC	NS, NB, ON, MB, AB, NT, YT	NT	
Travellers to endemic areas	NS		NB, MB	
Contacts of cases in an outbreak			NF, QC, ON, SK, NT, YT	
Family, sexual or other close contacts	MA, AL		NF, QC, YT	
Aboriginal populations				QC, ON, MB, SK, AB, NT, YT

Source: Health Canada

www.hcsc.gc.ca/hpb/lcdc/publicat/ccdr/97vol23/imm_sup/imm_k_e.html#table

Changes in Canadian Immunization Practice

There have been other changes in Canadian immunization practice and promotion over the last ten years, some of which can be linked with the 1994 policy recommendations noted previously. A brief overview of changes in policy development found in the literature will be presented to inform the reader what kinds of changes can be made from basic research. This shows where pieces of information come together in the *tiles* of policy formation over time. Various developments from the 1994 policy recommendations regarding influenza, measles, mumps, rubella, diphtheria, pertussis, tetanus, and computer surveillance of immunization will be shown. It is interesting to see how long it takes for recommendations from basic research to reach the policy stage.

Influenza

The use of the influenza immunization is known to decrease morbidity and mortality, especially with the elderly. The Calgary Regional Health Authority indicated coverage for influenza vaccine is rising. In 1990, Calgary immunized approximately 30 % of eligible citizens aged 65+ years. That increased to 79 % coverage in 1999. Presently, the Alberta Health target is 75 % immunized (www.crha-health.ab.ca/pophlth/region/influ/vacc/flu.htm).

Macdonald, Roberecki and Cosway (1996) stated that the influenza vaccine delivery programs in Canada were insufficient. This study examined the influenza

vaccine distribution and populations immunized in the rural Interlake area of Manitoba. Only 50 % of the elderly in the area were immunized. Recommendations were made to improve the situation.

One researcher in particular (Russell, 1996, 1997, 1999, 2001) has concentrated her time on addressing influenza immunization issues through several studies. The main findings of these are:

- In 1996, it was estimated that about 281,000 persons aged 15 to 64 years in Alberta were eligible for influenza vaccines. The application of age-sex-specific Canadian proportions to provincial census data provided denominators for the estimation and comparison of vaccine coverage among high-risk adults from year to year. This study has policy implications of providing estimates of needed vaccine.**
- In 1997, immunization coverage with tetanus and influenza immunizations was found to be unsatisfactory for adults in rural Alberta. Rates for the rural Drumheller area in Southern Alberta were similar to national Canadian rates for tetanus vaccine coverage, but were higher for influenza vaccine coverage.**
- In 1999, voluntary influenza immunization programs were not sufficient to achieve satisfactory results in long-term care staff vaccination. Influenza shots as a condition of employment was proposed.**
- In 2001, staff and resident vaccination rates in Alberta long-term care facilities were still unacceptably low. Changes in staff vaccination programs even in the absence of mandatory vaccination or work exclusion rules were proposed.**

Barriers for influenza vaccination might include the requirement for written consent when vaccinating residents of long-term care facilities. Only two long-term care facilities out of 133 surveyed had mandatory staff vaccinations and one-third of the facilities had written policies on vaccination of residents with varying consent practices. It was determined that combined interventions such as education plus other program elements like improvements to access were associated with better vaccine coverage than individual elements alone.

Stevenson, McArthur, Naus, Abraham and McGeer (2001) agree that immunization of residents and staff against influenza and pneumococcal pneumonia in Canadian long-term care facilities remained sub-optimal, despite improvements over the last ten years and that improvements must be made in policy.

Nationally, NACI (Orr, 2001) recommended increasing coverage of influenza vaccine not only to those traditionally targeted. "Healthy adults and their children who wish to protect themselves from influenza should be encouraged to receive the vaccine." (p. 3) On the national front, only 38 % of those aged 18 to 64 years who have a high-risk medical condition and only 55 % of health care workers who have close contact with patients were immunized during the 2000-2001 influenza season.

The previous information regarding influenza is presented to illustrate the slowly changing view about influenza immunization. NACI has changed its policy regarding influenza immunization from solely targeting high-risk persons, to including any healthy

adults and children who wish to have it. Issues of mandated influenza immunizations are still ongoing.

DTP and MMR

Both DTP and MMR immunizations are integral for protection from these communicable diseases. Advances in vaccine development have reduced side effects and improved efficacy. Through the literature review, the following articles contribute *titles* of information that illustrate how issues have changed over the last seven years.

Immunization policies were evaluated in all 16 Canadian medical schools by Rowan, Carter and Walker (1994). They found that immunization against rubella was required in 11 of the schools, while immunization against tetanus, diphtheria and hepatitis B was required in ten of the schools. Nine schools required immunization against measles and polio, and eight required mumps immunization. Only three schools required or recommended influenza immunization and one recommended immunization against typhoid fever. National guidelines to coordinate immunization efforts were recommended to help ensure medical students receive proper protection from disease.

In 1997, Poland et al. suggested that current public health policy include a 2-dose measles immunization strategy, with the second dose given at school entry. This would provide significantly high levels of immunity in the community. Gay, Pelletier and Duclos (1998) further supported improvements in measles control by changing Canadian

policy to curtail the continued endemic transmission of measles among older children for the next 10-15 years. They suggested a catch-up campaign giving a second dose of measles vaccine to all children up to 18 years, which would have an immediate impact on the transmission of the disease. It could be maintained by introducing a routine second dose at either 18 months or 5 years of age.

Implications for measles elimination and eradication in both Canadian and American adults were presented by Duclos, Redd, Varughese and Hershe (1999). There was an outbreak of measles in early 1997, mostly affecting the adult Canadian population, despite the implementation of mass school catch-up programs. They stated incomplete efforts to control measles for many years in Canada without attempts to eliminate the disease as the major issue. They further supported maintaining immunization of international travelers to endemic areas as has always been the policy. They also suggested that appropriate measles control strategies in the young would help prevent measles in adults.

In the fall of 1999 another measles epidemic occurred in Southern Alberta, this time within the Dutch ethnic community. They do not immunize due to religious reasons. With the help of quarantines imposed by the CHR, the outbreak did not extend to the rest of the region (Kulig et al., 2001, in press). Clearly measles is still a policy issue for regional elimination or global eradication.

Health Beliefs and Immunization Behaviors

Very few articles deal with the Canadian population's perceptions and beliefs regarding immunization and, subsequently, their immunization practices. The following *titles* of information are intended to give the reader an appreciation of immunization beliefs and behaviors with an emphasis on Canadian literature, where possible. Key aspects of these studies are presented.

A letter in the Canadian Medical Association Journal (2000) highlights an outbreak of measles in British Columbia. Most of the cases were children whose parents had decided against immunization for philosophical reasons. Large outbreaks of measles still occur in communities where vaccine coverage is low. Between November 1999 and January 2000, 103 cases were reported in an unspecified religious community in the United Kingdom, and 2300 cases were reported in the Netherlands during the last 9 months of 1999. Of these cases, 20 % were seriously ill and 3 died. The parents' reasons for not immunizing their children included religious or philosophical beliefs, concerns about safety and efficacy, beliefs that vaccine-preventable diseases do not pose serious health risks, objections to mandatory programs and excessive government interference, and objections to immunization as being "unnatural." Clients' beliefs that vaccination is "unnatural" may be particularly challenging for health care workers. Debating with clients who refuse vaccination may sometimes be futile.

Pneumococcal vaccine is not widely administered in Canada despite strong recommendations by NACI for its use (Spika, Keresz, Deeks & Talbot, 1999). Only seven of the 12 provinces and territories have a program or were planning to implement one within the next year for people 65 years of age and older. Factors that contribute to increased interest for this immunization include: better data on disease incidence and preventable illness from population-based surveillance; data on emerging resistance of *Streptococcus pneumoniae* in Canada to penicillin and other antimicrobials; implementation of vaccine programs for the elderly by public health officials in Nova Scotia, Ontario and British Columbia; completion of a cost-benefit study of pneumococcal vaccine for Canada; and increased attention to pneumococcal vaccination at national immunization meetings and in the medical literature. Increased availability of vaccine and competitive pricing are also making programs for the elderly more feasible and affordable. BC Health recently announced in their 2001 Annual Report that they have a pneumococcal immunization program for high-risk people aged 2-65 years (Annual Report, 2001).

In a Quebec study, Tanguay, Lamarche and Martineau (1997) found that 209 children born in 1991 who were immunized in a private office were 13.3 times at a higher risk for incomplete immunization than those immunized in a *Centre locale des services communautaire* (CLSC), which is a public health clinic. They proposed that parents' adherence to the immunization schedule was more likely when first contact and follow-up mechanisms were put into place by the CLSC. The effectiveness of such mechanisms seems to be related to population-based rather than client-oriented responsibility. However, another report on an outbreak of mumps in a Montreal school shed more light

on the lack of immunization. It was found that a large ethnic population of children (immigrants) was not routinely immunized for mumps as it was likely not available in their country of origin. It was assumed that the children received only the measles vaccine under the Expanded Program on Immunization (EPI). Policy recommendations to include the second dose of MMR to children from EPI countries were made to decrease the reservoir of disease (Bruneau & Duchesne, 2000).

In the follow-up of 513 grade 7 non-participants in a school-based hepatitis B immunization program in Ottawa-Carleton region, Stewart, MacDonald & Manion (1997) found that about 4 % of the parents refused to have their child immunized at the school or catch-up clinics. The major reasons for non-participation at the school clinics were:

- (a) The child was not at school on the clinic day, or the child was sick (51 %),
- (b) There were problems with the consent form (21 %); and,
- (c) The parents did not know of the program (10 %).

Significantly more students from the telephone intervention group (72 %) came for vaccination than did those from the control group (50 %). This finding provides insight into parental intervention for immunizing their children and may demonstrate apathy and/or anti-immunization views towards immunization.

Dow-Clarke, MacCalder and Hessel (1994) surveyed lifestyle behaviors of 173 pregnant women in the Fort McMurray area between April and June 1989. The survey goal was to establish baseline data for coordinated health promotion programs for

expectant parents. Overall, the women were well educated and in high-income households. One of the key points was that 30 % of the women were unaware of their immunization status. This finding supports the presence of apathy in regards to immunization as 30 % of the women polled did not bother to address their own immunization status. This could also reveal that the women simply did not want to share that information.

These *tiles* of information were included to illustrate the concept that health beliefs and behaviors are diverse. Understanding problem areas facilitates better policy development. Religious beliefs and the notion that “natural” is best are known barriers to immunization for several faiths (CMAJ, 2000). Other factors identified in Montreal’s immigrant children could be the insufficient immunization programs of the EPI where mumps and rubella immunizations were not commonly distributed (Bruneau & Duchesne, 2000). Apathy was also demonstrated as a potential factor in both adults and in their children (Stewart, MacDonald & Manion, 1997; Dow-Clarke, MacCalder & Hessel, 1994). Intervention factors (i.e., education, health promotional activities) may be of use where apathy exists. Insufficiently immunized groups of people serve as reservoirs of disease.

Parents

It is important to understand the perceptions of parents with regards to immunization. The literature search discovered a variety of studies that assessed parental

immunization perceptions and learning techniques. These were included in this chapter as they contributed information and relevant concepts emerged.

Four key factors in 28 mothers' perceptions of childhood immunizations in First Nations communities of the Sioux Lookout Zone were identified by Tarrant and Gregory (2001). Perceptions that negatively influenced immunization uptake were: knowledge barriers; the influence of others; vaccine barriers; and, missed opportunities. The researchers recommended further research with Elders and community members, along with culturally sensitive education initiatives to address low immunization uptake. It was thought that changes in health professionals' behaviors could serve to reduce missed opportunities in First Nations communities.

During a randomized clinical trial of a pertussis vaccine, Langley, Halperin, Mills, and Eastwood (1998) found that altruistic reasons motivated 221 Canadian parents to enroll their child in the study. Nonparticipating parents (n=208) seemed most concerned about painful procedures in the study such as blood procurement and concerns about extra immunization. Parents' decisions regarding participation did not appear to be affected by media attention regarding the purported adverse sequelae of pertussis vaccines. The participants' major sources of information about pertussis were health professionals or study personnel rather than the media. Parents who enrolled their children were motivated by the desire to contribute to medical knowledge, the desire to help others and because of the participation of their family physician.

Bell (1995) noted that British Columbia had a 70-fold increase (32 per 100,000 population) in reported hepatitis B cases from 1980 to 1992. Immunization of high-risk groups from the mid 1980s failed to reduce the rate of reported infection. In September 1992, an expanded program of hepatitis B immunization was implemented in British Columbia. The program had two main components: universal immunization of pre-adolescent children in schools and increased immunization of groups at known elevated risk for transmission. The school-based program provided a 3-dose series administered by public health nurses (PHN) to all children in grade 6 (age 11 years) with parental consent. More than 42,000 grade 6 students were eligible for hepatitis B vaccine and the 3-dose series was completed by 91 % of students throughout the province during the 1992-1993 school year.

University of British Columbia researchers, Bjornson, Scheifele and Gold (1997) reported that in a prenatal classroom setting, video and oral presentations were equally effective in conveying key information about infant immunization. From a group of 102 men and 124 women participants, a pre- and post-test questionnaire revealed that core information about immunization could be presented by either means.

In a New Zealand qualitative study regarding immunization experiences and concerns of parents (97 % mothers), White and Thomson (1995) demonstrated limited parental knowledge and a lack of experience regarding childhood diseases among the sample. New Zealand had an immunization uptake rate estimated at less than 60 % for children under the age of 2 years. It was found that some mothers used a conceptualized metaphor of immunization as "protection." Other parents perceived immunization as

socio-politically driven and were distrustful of immunization campaigns. Many parents faced a dilemma about immunization and were highly anxious. There was greater concern about the side effects of immunization than about the side effects of childhood diseases. White and Thomson stated that this may reflect a “developed world” view differing between the concerns of white middle class mothers as opposed to those mothers from the Pacific Islands, where common childhood diseases are endemic and the onus for immunization lies with the mothers. This information regarding the developed world-view was not sufficiently recognized by health service providers. Personalized programs designed to meet the needs of mothers and complement existing population-oriented immunization programs were recommended.

In an Italian study, Angelillo, Ricciardi, Rossi, Pantisano, Langiano and Pavia (1999) evaluated the knowledge, attitudes, and behavior of mothers regarding the immunization of 841 children who attended public kindergarten. The results showed that this knowledge was significantly greater among mothers with a higher education level and among those who were older at the time of the child's birth. Although the respondents' attitudes concerning the utility of the four mandatory vaccinations were very favorable, (94.4 % of the children were vaccinated with all three doses of diphtheria-tetanus (DT), oral poliovirus vaccine (OPV), and hepatitis B), there was sub-optimal coverage for the optional vaccines (only 22.5 % vaccinated for measles, mumps and rubella and 31 % for the three doses against pertussis). Birth order significantly predicted vaccination non-adherence, since children who had at least one older sibling in the household were less likely to be age-appropriately vaccinated. The researchers

recommended that education programs promoting pediatric immunization, accessibility, and follow-up should be targeted to the entire population.

From this information, concepts of parents' attitudes and behavior emerged. Common themes of barriers to immunization were discovered not only within Canada but also internationally. Educational promotions and cultural sensitivities were suggested by various studies as ways to improve parents' immunization behaviors.

Religious factors and immunization

It has been documented that there are religious factors affecting immunization. In Canada there are various groups identified as refusing immunization based on religious grounds. They include some sects of Dutch ethnic background and the Amish. Although Southern Alberta does not have a large Amish community it does have similar ultra-conservative religious communities including the Dutch and Hutterites that are known to delay or refuse immunizations (Kulig et al., 2001). Various sects of the Dutch ethnic community including the Netherlands Reformed Church (NRC), the Reformed Congregation of North American, and the Heritage Reformed Church cite scripture (Psalter, Catechism X, Q. 27) as the reason for refusal of immunization. Essentially, they believe they would be challenging the will of God if they used any preventative medicine. Some Hutterites were also found to cite biblical scripture (Acts II) as referencing the body as a temple not to be defiled. The Kanadier (Mexican) Mennonites are also known to have immunization barriers due to their transient life-style as seasonal

agricultural workers (Personal communication, J. Kulig, November, 2001). Members of the Jehovah Witnesses are known to have issues with blood and blood products, but there was no literature found concerning immunization. Mormons are another prominent religious group in Southern Alberta, but no literature was found concerning immunizations among this group.

Due to the refusal of immunization in certain religious Dutch groups, various outbreaks of vaccine-preventable diseases have occurred in Canada. Wild polio virus was imported to Canada in 1993 (Drebot et al., 1997), pertussis (van der Zee, Vernooij, Peeters, van Embden, & Mooi, 1996) and measles in 1999. The Amish have had various outbreaks of rubella (Mellinger, Cragan, Atkinson, Williams, Kleger, Kimber et al. 1995), measles (Sutter, Markowitz, Bennetch, Morris, Zell, & Preblud, 1991), Haemophilus influenza (Fry, Lurie, Gidley, Schmink, Lingappa, Fischer et al., 2001) and remain reservoirs of “susceptibles” for these vaccine preventable diseases.

From the American Academy of Pediatrics (AAP) Committee on Bioethics 1997 position statement on religious exemptions to medical care, Ross and Aspinwall (1997) considered whether failure to immunize a child is medical neglect. Although they acknowledged that it was, they argued that parental decisions not to immunize on the basis of religious beliefs should be permitted by legislative exemptions since medical neglect does not always merit legal intervention.

Salmon, Haber, Gangarosa, Phillips, Smith and Chen (1999) presented the risks and consequences regarding refusal to immunize based on religious and philosophical exemptions in the US. The paper created controversy about whether peoples' religious convictions were sufficient to refuse a life-saving preventative measure. In a letter published in JAMA and in response to their original article (Feikin et al., 2001) the authors asserted that parents should not be making decisions about immunization based on convenience but should be given adequate information and counseling before making their decisions. They agreed that immunization programs would be more appreciated by the public if they were based on science and better explained. They further maintained that most vaccine-exempt people account for the spread of vaccine preventable diseases, and even if the risk is small, does not justify that it was acceptable.

Immunization and religion seem to be at odds for some faiths, yet are perfectly acceptable for others. Ethics councils debate what to do with these populations and the concept of free choice is dominant. What is the appropriate action that respects the theological needs of non-immunized people, yet decreases the risk of creating reservoirs of disease in society?

Vaccine risks and concerns

Although immunization is very safe it is not perfect. There have been some adverse effects such as allergic responses and rarely, there have been death associated with allergic responses. Most adverse effects have been sensationalized and have served

to undermine confidence in the immunization programs. Vaccines have changed over the last ten years. Adverse effects associated with older vaccines no longer have relevance; however, anti-immunization literature tends to ignore these developments. DT immunization does not cause infantile spasms, encephalopathy or sudden infant death syndrome, conjugate Hib vaccine does not cause susceptibility to Hib disease (Stratton, Howe & Johnston, 1994), and MMR immunization does not cause autism (Dales, Hammer, & Smith, 2001; Fombonne, 1999).

Stoto, Evans and Bostrom (1998) summarized the main themes of vaccine risk communication and decision making by parents and physicians from the Institute of Medicine Vaccine Safety Forum workshop. Health risk communication has traditionally consisted of public messages designed to encourage behavior that reduced individual or societal risk. The researchers discussed how risk communication has changed to an interactive exchange of information and opinion among individuals, groups and institutions. Stoto, Evans and Bolstom conveyed that risk communication must address the experiences, beliefs, values and attitudes of message recipients (the parents) as well as the providers (physicians, nurses and researchers). They maintained that understanding how risks are perceived and the inherent biases of both message providers and recipients are key to good risk communication and decision-making.

The researchers commented that the area of vaccine risk communication was not well developed and there are many uncertainties regarding estimates of risks associated with immunizations. Many problems with risk communication applied to vaccine risks, including the individual's perceptions of disease risk and the ability to control those risks,

the rarity of vaccine-preventable diseases, and the fact that individual's immunization decisions were influenced by decisions made by others. The primary sources of general information on immunizations were criticized as either being too simplistic or incomplete, or having too much technical information for people to understand effectively. The forum found that risk communication was more effective when uncertainty was stated and when risks were quantified as much as science permits. Ultimately, being honest about the uncertainty of vaccine risks contributed most to the trust that was necessary for risk communication to ensure the public's health.

Aside from religious barriers to immunizations, some people have other vaccine concerns. Bennett and Smith (1992) examined beliefs and attitudes towards pertussis (and other) immunizations in three groups of caregivers; those who had fully immunized a target child against pertussis (n=85), those whose child partially completed the course (n=70) and those who refused to have their child receive the pertussis immunization (n=73). The non-immunizing group reported significantly more concern over long-term health problems as a result of pertussis vaccination, a lower risk of catching pertussis if not immunized and attached a lower importance to pertussis vaccination than either of the other two. They also rated their child as more likely to develop pertussis if immunized than those in the fully immunized group. The non-immunizing group also reported a greater risk perception for some other immunizations (MMR) than the other groups. The implications for health education such as good risk communication and decision-making were discussed.

Anti-immunization influences

Challenging the conventional wisdom of universal immunization practices involves a variety of vocal anti-immunization groups attempts to influence the public. Lobby groups promote fear based on plausible conjecture, confusing correlation with causality and encourage parents to make serious decisions for themselves and their children when they are ill equipped to discern fact from fiction.

In 1999, a member of the Canadian Air Force refused to take anthrax vaccine (Cairney, 1999). He found himself between the Armed Forces for a court martial and some small but vocal anti-vaccine lobby groups. The lobby groups are both from Winnipeg: the Eagle Foundation (www.eaglefoundation.org), an organization founded by three chiropractors dedicated to educating the public about side effects associated with vaccines, and the Association for Vaccine Damaged Children, another organization dedicated to educating the public about side effects associated with vaccines. These groups publish newsletters emphasizing “real life vaccine stories,” which are essentially parental anecdotes involving negative experiences that promoting anti-immunization views. American counterparts included the National Vaccine Information Center (www.909shot.com), considered to be at the centre of the new wave of vaccine distrust.

Jodar, Duclos, Milstien, Griffiths, Aguado, and Clements, (2001) of WHO warned that the profound shift in the general public and media interest in adverse events may lead to undue concerns and allegations, which may ultimately jeopardize immunization

programs world-wide. While health professionals have understood this issue for some time, the public and the media have now also become all too aware of the significance of vaccine-related adverse events. Moreover, the familiar vaccines that have been used and well-tested over decades, have not changed, but perceptions regarding their safety has shifted. WHO cited outrageous and reasonable claims that were being made against both the old and the newly introduced vaccines. Concurrently, the immunological and genetic revolution of the last decade may well bring notice to some hypothetical risks that need to be addressed at the pre-clinical level.

Alternative health factors

Alternative health factors were found to contribute to barriers for immunization. Various *tiles* of information are presented to illustrate how this concept belongs in the mosaic.

In the sociology textbook "Health, illness and medicine in Canada" Clarke, (2000) presented a slanted anti-immunization viewpoint. She re-iterated biased anti-immunization literature from 1977 based on McKinlay and McKinlay's much used data on the fall in the standardized death rate (per 1,000 population) for nine common infectious diseases in relation to specific "medical" measures in the United States from 1900-1973. Many anti-immunization authors cite McKinlay and McKinlay with undue reverence (Coulter, 1984; Scheibner, 1993). They essentially say that most of these diseases were on the decline anyway, so the lack of disease is not attributed to

immunizations. The argument that clean water, public sanitation and nutrition have decreased the diseases is flawed because overall rates for chickenpox and Hib remained constant throughout the same time period. Since Hib immunizations became nationally used in the late 1980s, the rate of disease has dropped dramatically. In fact, Health Canada in September 2001, reported the lowest levels of Hib ever recorded in Canada with only 4 cases in 2000. We have not had monumental changes in Canadian hygiene and water from the 1980s to now. New varicella immunizations should decrease the rate of chickenpox in the years to come as more parents immunize their children. Although Clarke acknowledged that immunization affects the health of a population, she stated that it is "overemphasized." She further promoted the notion that serious infectious and bacterial diseases are more often developing world problems and not problems of the developed world. Paradoxically though, she stated that 5 to 15 % of Canadian children are not adequately immunized. A chapter dedicated to complementary and alternative medicine (CAM), describes it positively while describing allopathic medicine in a more negative and power hungry sort of light. She cited a 1996 Statistics Canada survey, where at least 3.3 million Canadians sought treatments outside of allopathic medicine. Clarke cited Cooper and Stoflet's prediction that the per capita number of alternative health clinicians would grow by 88 % between 1994 and 2010, while the supply of physicians will grow only by 16 per cent. A table in the text provided further chiropractor ratios by province from 1992-1996 and shows an overall increase in their use. Alberta has the second highest use of chiropractic care in Canada, with Ontario being the highest and Newfoundland with the lowest.

Alternative health options include the use of chiropractic care, naturopaths, megavitamins, over-the-counter drugs, old-time remedies (i.e., garlic and onion, cayenne pepper drinks), health-food products, healers (i.e., massage, acupuncture and reflexology), herbs, and special diets. Clarke further cited Montbriand's work on CAM as support for the growing use of this practice. Even though the Canadian Chiropractic Association advocates for immunization as a safe and effective means of preventing disease, the main concern is how Clarke presented the view that "anything that can be said to result from or to develop out of the context of a depressed immune system can be treated by chiropractic" care (Clarke, 2000, p.355). To the uninformed reader, this was a major anti-immunization stance. If chiropractic care could treat immune system problems, why immunize? If the individual's vital healing force could heal itself, as in naturopathic medicine, why immunize?

Barriers to immunization

Barriers to immunization have been documented at the international level. Sometimes the barriers are physical, economic, and political, essentially beyond many peoples' control. However, sometimes the barriers, especially in the developed world, are largely within parents' own control, such as lack of knowledge, fear of adverse side effects, inconvenience and apathy.

In an Australian study, Bond, Nolan, Pattison and Carlin (1998) investigated mothers' perceptions of vaccine-preventable diseases and associated vaccines in terms of

perceived susceptibility, severity, benefits and barriers. A purposive sampling strategy was used to choose mothers whose only or youngest child was completely, incompletely (behind the recommended immunization schedule) or partially (parents chose or advised not to have a specific immunization) immunized or had no immunizations. Their semi-structured interviews found that parents who completely immunized believed the risk of vaccines was lower than the risk from disease and that the likelihood of contracting many of these diseases was low. Parents who incompletely immunized perceived vaccines to be less effective in preventing disease and were often confused about which diseases the vaccines would protect against. Parents who refused immunizations were more concerned about unknown, long-term side effects of vaccines than the diseases. Many parents who immunized also believed that preventing diseases was not always possible and for diseases such as measles, mumps and rubella, it was not always necessary or desirable. Parents perceived vaccines as placing stress on the immune system rather than strengthening it. Important themes relating to parents' barriers about the decision to immunize were a lack of "balanced," detailed information and poor communication between health providers and parents. The major barrier to timely, age-appropriate immunizations was the occurrence of minor illnesses in the target child or the family. The researchers found that many parents were balancing the risks of immunizing with the risks of not immunizing and stated that this must be taken into account, along with factors such as difficulties in obtaining immunizations.

Salsberry, Nickel and Mitch (1993, 1994a, 1994b) assessed the barriers to immunization from a community point of view in the United States. They found not only

parental barriers to immunization in the US but also systems barriers (cost, lack of insurance coverage, long office waits, lack of tracking and reminder systems). Although this is useful to consider, Canadian immunization barriers cannot be compared because our health care system is different from the American one. Parental barriers, however, can be compared, because Canadian, American and Australian parents have many common characteristics. The parental barriers included problems with transportation and other American specific issues like costs and insurance coverage that was not relevant for Canada. The researchers were troubled by the pervasiveness and relative importance of the barriers by both parents and immunization providers. The long office waits, inconvenient hours and the necessity of rescheduling when a child was mildly ill added to the burden.

Perceived American parental barriers to childhood immunization delivery were identified by McCormick, Bartholomew, Lewis, Brown and Hanson (1997) in a qualitative study. They found that parents' time off from work, lack of access to well-child care and difficulty understanding the complexity of the immunization schedule were seen as barriers to adhering to an immunization schedule. Parents emphasized problems with taking time off from work to get immunizations, sometimes without pay, and expressed fears that doing so would jeopardize promotions and raises. While some of the parental perceptions were similar to those identified in studies of health care providers, many were not. This study emphasized the importance of gathering information from parents as well as from health care providers.

From the literature it was assessed that there were commonalities of barriers to immunization. Parental convenience and education were found to be important factors.

Knowledge base

The knowledge base of parents was found to be an important *tile* of information during the literature search. Gellin, Maibach and Marcuse (2000) asked a very important question, "Do Parents Understand Immunizations?" (p. 1097) They conducted a detailed national telephone survey (n=1600) in the US and found that although most parents view immunization as very important, many parents had misconceptions about immunization. Misconceptions of a quarter of the parents included "children get more immunizations than are good for them;" parents were concerned that their child's immune system could become weakened as a result of too many immunizations, and "children should only get immunized against serious diseases." The parents who would refuse certain immunizations (n=229) indicated that most would omit varicella (n=173), some would omit the influenza (n=39), hepatitis B (n=18), DTP (n=18), polio (n=17), MMR (n=12) and Hib N=8). Of the parents, one fifth did not think that immunizations were always proven safe before they were approved for use. Most of the parents (84 %) stated their physician as their main source of information, only 8 % cited a nurse and 7 % cited the Internet. The researchers warned that significant erosion of public confidence in vaccine safety could lead to reduced immunization rates and a resurgence of vaccine-preventable diseases.

Wood, Halfon, Sherbourne, Grabowsky and Duan (1997) sought to assess the accuracy of parental recall of child immunizations in an American inner-city population. They found that parental recall of full immunization series received during the first year of life is accurate only approximately 50 % of the time; however recall of individual immunizations might be higher. The accuracy of parental recall of child immunizations was quite variable based on both the complexity of the recall task and by patient demographic characteristics. They found that the immunization provider could assist parents to increase the accuracy of their recall by being very specific in framing recall questions.

To assist UK parents and health professionals understand more about immunizations, Finlay, McKechnie, Pearce and Lenton (1999) developed a telephone immunization hotline service that provided information and advice. The telephone service was staffed by members of the Community Child Health Team and was accessible daily (week days) from 0900 to 1700 hours. It was promoted to members of the primary health care team through a regular immunization newsletter, but was also used by parents. The researchers believed that the hotline provided a useful, professional service accessible to professionals and parents, to answer immunization queries promptly and avoid delays in immunization.

In an Australian study, Donovan and Jalleh (2000) found positive framing of health messages was superior for low-involved respondents, but had no effect for high-involved respondents. High-involved respondents referred to parents or expecting parents while low-involved respondents referred to non-parents. This examined how framing a

health message, such as hypothetical infant immunization, would be influenced by the involvement of the audience. A convenience sample of adult women (mothers or mothers-to-be) was presented with a hypothetical "new" immunization that protected infants against respiratory complaints such as bronchitis and pneumonia. Side effects (the common flu) were framed positively (90 % chance of no side effects) or negatively (10 % chance of side effects). This information is useful for policy-makers and key health professionals promoting immunization.

Rural issues

Geographic issues of rural versus urban frequent the literature. Although they are rare when it comes to immunization, there are some relevant differences.

Russell (1997) examined rural adult influenza and tetanus immunizations in Southern Alberta. A telephone survey revealed just over half of the people aged 65 and older had received a influenza vaccine in the previous 12 months, and 55 % of people 16 years and older had received a tetanus vaccine in the last 10 years. Relevant to this thesis is that 93 % of people aged 16 to 24 were immunized for tetanus, but only 20 % of people aged 65 or older were immunized. Most of those aged 65 and older knew that influenza vaccine was recommended for their age group. Only 59 % of participants in the survey knew that the influenza vaccine was recommended for people with chronic health conditions, regardless of age. Russell concluded that among adults, coverage with influenza and tetanus vaccines varied with age, and was generally unsatisfactory. Rates in

this rural area of Alberta were similar to Canadian rates for tetanus vaccine coverage, but higher for influenza vaccine coverage.

Pruitt, Kline and Kovaz (1995) noted that there was little known about barriers to childhood immunization among rural American populations. They discovered major predisposing factors such as attitudes, beliefs and perceptions that were barriers to immunization. Relevant attitudes included fear of needles, opposition to more than one shot per visit, prior bad experiences and fear of side effects or reactions. Relevant beliefs included that the immunization was unimportant, was against their religion, they had their own remedies and modern medicine can cure diseases anyway. Relevant perceptions included delay of immunizations because of illness, partial series provided enough protection, diseases were not a problem, they were unsure where to go for immunizations and they were unsure when to get immunizations done. The researchers also found enabling factors in investigating perceptions of the availability, accessibility, and affordability of health care. These included clinic distance, waiting time, need for appointment, cost, inconvenience, transportation, inability to leave work and difficulty making arrangements for other children. Reinforcing factors were sought to find who was influencing participants. Approximately one half of the parents responded affirmatively about "doctors," and most of the others were from "parents" and "grandparents" as the influencing factor. Less than 3 % of the participants indicated that the media influence discouraged immunization activities. Overall, Pruitt, Kline and Kovaz promoted the need to validate their finding with other populations and evaluate the success of community interventions in relation to policy.

In a qualitative study, Wilson (2000) found that the following American parental perceptions were identified as factors related to immunizations in this rural setting: knowledge of communicable diseases and vaccines; misperceptions about communicable diseases and vaccines, past experiences; competing tasks, transportation, health care personnel; need for reminders; health system; and, cost. Unique to this study were the importance of relationships with health care providers and the challenge of competing tasks. These findings, combined with the other factors identified parents without enough time, reinforced the importance of rural health care providers' strong relationship with clients, provision of accurate and timely information, and a readily accessible health care system.

In another rural American study, Gore, Madhaven, Curry, McClung, Castiglia, Rosenbluth et al. (1999) found immunization barriers included: living in an areas with a shortage of health professionals; lack of health insurance; negative beliefs and attitudes regarding childhood immunizations, problems accessing the immunization clinic; and, a perception of inadequate support from the immunization clinic. Their study concluded that positive immunization-related beliefs and attitudes, support from the immunization clinic, and ease of the immunization access were important factors in the timely completion of the childhood immunization schedule.

Common features regarding rural issues of immunization were found between Canada and the US. Although health insurance coverage is different, the two countries

can be compared because there are many cultural similarities. Relevant attitudes included fear of needles, prior bad experiences and fear of side effects or reactions.

Socioeconomic factors

Six articles were found in the literature search relating to socioeconomic factors and immunization. All of them dealt with urban American populations. Major findings of five are presented below.

Prislin, Dyer, Blakely and Johnson (1998) showed that differences in immunization among socio-demographic groups were mediated by beliefs about objective barriers to immunization, protection, medical contraindication, safety concerns, distrust, and natural immunity. Protection beliefs contributed to positive attitudes toward immunization; beliefs in natural immunity and safety concerns contributed to negative attitudes. Beliefs about objective barriers, distrust, safety concerns, and medical contraindications influenced perceived control over immunization. Positive attitudes and a strong sense of control contributed to higher immunization rates. The researchers concluded that these findings provided a basis for efficient educational campaigns by specifying which beliefs should be bolstered (because they facilitate proper immunization) and which should be targeted for change (because they hinder proper immunization) in various socio-demographic groups.

Health care resources and perceived barriers to care of families attending free vaccine fairs were determined (Hambidge, Easter, Martin, Melinkovich, Brown & Siegel, 1999). The researchers found that most families attending free vaccine fairs had a regular source of health care. For families with private health insurance or with no health insurance, the availability of free vaccine was the major reason to bring their children to a vaccine fair, whereas for families whose insurance routinely covered the cost of childhood vaccine (HMO, Medicaid), convenience was the major determinant.

Flores, Abreu, Philipp, Reitman, Theodore, Dalope, et al. (1999) found that most children brought to an urban drop-in vaccination clinic were severely delayed in their immunizations and at great risk for vaccine-preventable outbreaks. The researchers thought drop-in clinics might be helpful in immunizing under-vaccinated children, particularly those living in hard-to-reach, vulnerable families.

No significant differences in the immunization rates were found by Salsberry, Nickel and Mitch (1994a) for middle/upper-income (34% immunized) versus lower-income children (28% immunized). The researchers noted failure to receive the 18-month doses of DTP and polio was the most frequent cause of inadequate coverage for both groups. Barriers to immunization reported by both socio-demographic parents were similar, with over one-third of the parents identifying cost and lack of insurance coverage as problems. Additional barriers identified methods of operations of immunization providers.

The psychological costs of multiple injections, adverse events and vaccine-preventable disease were considered by Kuppermann, Nease, Ackerson, Black, Shinefield and Lieu (2000) to be growing in importance. The researchers found that in general, parents were willing to give up more money or time to avoid less desired outcomes. Parents were willing to give up only very small amounts of their own life expectancy or money to avoid minor, temporary outcomes (e.g. moderate fussiness, fever and pain) whereas they were willing to forego substantial lengths of their life or amounts of money to avoid a major, permanent outcome (i.e., permanent disability). Interestingly, much variation was found in the amount of time (or money) parents were willing to trade to avoid outcomes. If this variation represented true differences in preferences, guideline and policy developers must consider the role of individual parent preferences in decisions concerning immunization.

Physicians' & nurses' immunization knowledge base

As shown in the above studies, physicians and nurses rank very high as major influencers of parents about immunization. It is natural then to ask what do the physicians and nurses know about immunization and what are their personal immunization behaviors?

Petrovic, Roberts and Ramsay (2001) sought to determine the knowledge, attitudes, and practices among health professionals in North Wales, regarding the MMR vaccine, particularly the second dose. From the self-administered postal questionnaire

survey to more than 500 health professionals (148 health visitors, 239 practice nurses and 206 general practitioners) the results showed knowledge and practice among health professionals regarding the second dose of the MMR vaccine vary widely. Health visitors (HV) are like Canadian public health nurses except the HV has a special responsibility for children aged 1 to 5 years. The practice nurse typically works with a large group practice, and is more actively involved with patients, like a Canadian nurse practitioner.

Concerning the MMR's second dose, 48 % of the professionals (220/460) had reservations and 3 % disagreed with the policy of giving it. Health visitors were nominated by over half of the professionals as the best initial source of advice on the second vaccine. More health visitors (86/140), than general practitioners (73/158) reported feeling very confident about explaining the rationale of a two dose schedule to a well informed parent, but only 20 % (28/138) would unequivocally recommend the second dose to a wavering parent. One third of the practice nurses (54/163) stated that the MMR vaccine was very likely or possibly associated with Crohn's disease and some (44/164) thought that it was associated with autism. Nearly a fifth of general practitioners (27/158) reported that they had not read the MMR section in the Green Book, and many (44/152) reported that they had not received the Health Education Authority's fact sheet on MMR immunization. The "Green Book" is the most recent Immunization against Infectious Disease publication.

Many professionals are not aware of or do not use the well written resources that exist, although local educational initiatives could remedy this. How similar is this study to Canadian health professionals? No comparable literature was found. Some American

studies indicated that health professionals needed to upgrade their immunization skills and implement them more into their practice.

Using an explanatory survey about pneumococcal immunization, Rushton, Ganguly, Sinnott and Banerji (1994) questioned upper-level internal medicine residents (n = 33) from two American medical clinics. Two-thirds of the house staff correctly answered questions regarding vaccine target groups, and all residents indicated that they did generally obtain a vaccination history in adult patient evaluation. However, a sizeable number (42.4 %) did not indicate a time of the year when they would routinely administer vaccines to patients. Over two-thirds were not confident about their knowledge regarding vaccine guidelines and had an exaggerated fear of hypersensitivity reactions from immunization. Neither the expense of the vaccine nor adverse publicity were major impediments to immunization. Although most physicians knew about the usefulness of the pneumococcal vaccine (93.9 %), many failed to translate this knowledge into clinical practice (66.7 %). 'Pressing' clinical issues (as defined by the physicians as life-saving procedures), were viewed as barriers to vaccination by more than half of the physicians, placing the practice of preventive medicine in a subordinate position.

In 1995, American physicians' knowledge about immunizations was assessed (Hershey & Karuza 1997). The results showed that influenza, pneumococcal, and DT vaccines were provided at varying rates. Each vaccine had a different profile (noncompliance with guidelines). Lack of physician knowledge of guidelines was most apparent with pneumococcal vaccine. Physicians' ambivalence regarding the scientific basis and/or clinical importance was most apparent with the influenza vaccine. The

researchers concluded that explanations for non-delivery of vaccines to adults seem to be multiple. Lack of physician knowledge and physician perception of the guidelines provided some explanations. Patient-related factors including refusal, decreased opportunity for care, and noncompliance played important roles in why vaccinations were not provided.

Hepatitis B perceptions, knowledge and vaccine acceptance were studied by Spence and Dash (1990) among 169 registered nurses in high-risk occupations in an American university hospital. Less than half of the nurses (42 %) had been immunized. Partially or totally incorrect answers regarding transmittal knowledge were given by two-thirds of the nurses. Reasons for failure to be immunized were varied. Fear of side effects of the vaccine, contracting AIDS or hepatitis from the vaccine, or doubt of efficacy of the vaccine were cited by 50 of 88 (58 %) nurses as reasons for not being immunized. The inability to schedule an appointment or unawareness of the vaccine's availability was expressed by 23 % and 17 % of the nurses, respectively. The researchers concluded that to improve vaccination compliance, the vaccine must be made more readily available, possibly through workplace on-site administration.

In 1994, Dixon, Keeling and Kennel assessed 46 American pediatric nurses' knowledge about immunizations. They found that nurses often hear the phrases "up-to-date" and "he's had all his shots" from parents as they document histories of children (p. 76). As a result of non-specific details, many immunizations that were missed by parents are never identified. When the nurses were tested, the researchers found that less than

two thirds of the nurses had partially correct knowledge of immunization and 5 % had no knowledge. Only 23 % of the nurses correctly identified all the necessary immunizations. A content analysis of the nurses' responses revealed the following attitudes: nurses *should* play a role in education of parents; nurses *should* collaborate with physicians to ensure implementation of immunizations; nurses *should* advocate for immunizations of chronically ill children living in hospitals and nurses *should* play a role in the actual administration of immunizations. Although well-meaning, many nurses lacked sufficient knowledge to intervene.

From this selection of publications, it would seem that what the physicians and nurses do know about immunization is not always enough. Factual errors need to be addressed in a timely fashion. All health care workers need advanced skills in immunization to be able to fully address parents' questions when they arise. Preventative medicine needs to rise above the subordinate position where many physicians place it. "Alberta essentially uses a specialized approach. Even in other provinces the Medical Officer of Health and PHN are seen as specialized support to other health care workers on immunization issues" (Personal communication, P. Hasselback, January 2002). There have been improvements over the last ten years regarding influenza and hepatitis B immunizations, however, more needs to be done to increase education and compliance.

Physicians' & nurses' immunization behaviors

It is useful to compare physicians' and nurses' immunization behaviors to assess any discrepancies from the general population. One would assume that persons in the

health field would readily accept all immunizations. However, this does not always seem to be the case. Through the literature, many factors were identified as barriers to being immunized in the health care field.

In 1993, Yassi, Khokhar, Marceniuk and McGill found that less than 55 % of workers in high risk areas in a teaching hospital in Winnipeg were immunized for hepatitis B. Promotion through on-site and educational clinics resulted in an overall increase of 13.6 % in the high-risk areas targeted, while high-risk areas not targeted in the promotion showed an overall 6.0 % decrease in vaccine acceptance. This finding confirmed that awareness campaigns and easy availability of vaccines were factors influencing acceptance. This study further revealed that blood and body fluid exposure often occurred with hospital workers not considered at high risk, suggesting the desirability of expanding the list of designated areas.

The attitudes of 1203 out of 3501 American health care personnel regarding influenza immunization in 1991 was surveyed by Watanakunakorn, Ellis and Gemmel (1993). Just over a third received the influenza vaccine. Among the health care personnel, employees who were older or working full time were more likely to receive the vaccine. More physician health care personnel were immunized. The major reasons discovered for not receiving the vaccine were "bad side effects" and "do not like shots." The major side effect reported from influenza immunization was a "sore arm." Multivariate analysis suggested that the in-service was not associated with obtaining the

vaccine and was a negligible influence. Most health care employees who received the vaccine had previous influenza immunization.

The rates and the associated factors for influenza vaccine compliance between 1990 and 1993 among American neonatal intensive care unit nurses were determined by Eisenfeld, Perl, Burke, Blackington, York, Regan et al. (1994). Influenza compliance rates at the three hospitals surveyed were 15 % in 1990 to 1991, 20 % in 1991 to 1992, and 17 % in 1992 to 1993. The nurses expressed convictions regarding vaccine safety and effectiveness, concerns about getting the flu, and awareness of national recommendations for annual influenza immunization. These were shown to be associated with vaccination compliance. The researchers found poor acceptance of the influenza vaccine among the neonatal intensive care unit nursing staff. Educational and research efforts directed toward influenza risks among neonates and vaccine safety and effectiveness, along with incentives to comply, were recommended by the researchers to improve compliance rates.

In 1994, Manian revealed that improved hepatitis B immunization among American surgeons occurred when they instituted a program in their medical center. Surgeons were updated regarding vaccine safety and efficacy, and the cost of the vaccine and its administration at "strategic" locations was underwritten by the hospital. The rate of hepatitis B vaccination among surgeons increased from 62 % to 89 % based on pre- and post-intervention surveys.

L'Ecuyer, Miller, Winters and Fraser (1998) assessed the baseline health status of an American medical school employee population (n=5,007) and this population's acceptance of immunization and other interventions to reduce risk of disease transmission. They designed a retrospective review of an employee health records database for a four-year period. Most clinical employees (96.1 %) did not have a history of prior hepatitis B virus (HBV) infection or immunization, but 77 % of them subsequently completed the vaccination series. Most participants with a negative history for infection with (or immunization against) rubella, measles, and varicella had serological evidence of immunity (90.2 %, 97.9 %, and 87.2 %, respectively). The researchers concluded that review of aggregate employee health databases could assist individuals like policy-makers establish strategies for prevention of occupational illness and disease transmission in this specialized setting. While many participants at risk for HBV completed the immunization series, strategies for improving this rate would be helpful. The researchers recommended future work to analyze reasons why so few individuals for whom isoniazid chemoprophylaxis was recommended completed the therapy, and strategies tailored to the impediments identified should be implemented.

Three Canadian physician groups who care for high-risk children were surveyed by Ipp, Macarther, Winders and Gold (1998). They found that although influenza immunizations were recommended by most physicians to high-risk children, the responsibility for immunization programs was not. Of the surveyed physicians, less than half were immunized for influenza, and nearly a third of them reported that they were

“too busy” to be immunized. The researchers recommended further physician education and a review of provincial strategies to improve immunization.

Russell, Richen, Nickerson and van Hereweghe (1999) surveyed Alberta Long-Term Care staff. They identified those correlates that determined whether influenza vaccine was accepted or refused. The Canadian National Standard is to immunize 90 % of the staff and 90 % of patients. The researchers found only 38.5 % of the total staff was immunized. Reasons cited for not being immunized included the following beliefs: “I don’t get the flu so don’t need the shot,” “Flu shots make me sick,” “Flu shots only needed by the elderly,” “Vaccinations mess up the immune system,” and “Flu shots don’t work.” (p.6) Some staff had other correlates, lack of knowledge, being told to get a flu shot or not knowing it was available at work. Other staff stated social pressures such as family or friends discouraging flu shots, or lack of access as a barrier to immunization. Reasons stated by staff for immunization included assessment of higher personal risk because of their work, and that influenza and its complications are very serious for the long-term residents. Their findings, plus related information from the literature, suggested that even excellent voluntary vaccine programs might not readily achieve satisfactory rates of staff vaccination. They pondered whether making influenza shots a condition of employment would be a solution if the voluntary programs failed to achieve staff coverage of greater than 60 %.

Russell (2001) further promoted changes in staff vaccination programs in long-term care facilities since immunization rates remain unacceptably low. Additionally,

Stevenson, McArthur, Naus, Abraham and McGeer (2001) concur that influenza and pneumococcal immunizations rates among staff and residents in Canadian long-term care facilities remain sub-optimal. CHR reported that the target for influenza immunization is 75 %, but during the 2000/2001 fiscal year only 68 % of seniors were immunized. In long-term care facilities, 93 % of the senior residents and 68 % of the staff were immunized. No percentage was given for other health care staff but the total amount was n = 3,262. Pneumococcal immunization was lower with 44 % seniors aged 65-69 years immunized and 60 % seniors 70 years and older immunized for the 2000/2001 fiscal year (Personal communication, S. Yanicki, November, 2001; P. Hasselback, January, 2002) This was still well below the recommended 90 % rate of immunization for influenza.

From the literature review, physicians and nurses were found to have the most barriers to influenza and hepatitis B immunizations. There have been appreciable improvements in immunization rates over the last ten years. Barriers identified were similar to the general population with “bad side effects,” “sore arm,” awareness of safety and effectiveness, and inconvenience. Most commonly, Canadian physicians were noted to be “too busy” to bother with personal influenza immunizations even if they worked with high-risk children and advocated that others be immunized. Policy issues were addressed with mandatory influenza immunizations, in long-term care facilities, if rates do not improve.

Alternative health care providers

It has been established that Canadians use alternative health care providers and are influenced by them when making immunization decisions. A review of their impact is provided.

Verhoef, Russell and Love (1994) assessed the use of alternative (or complementary) medicine for adults and youths (aged 12-17 years) in rural Alberta. From a secondary analysis of a 1992 population-based survey conducted in rural west-central Alberta they found an increase in use from 19 % in 1990 to 32.3 % in 1992 in a community of greater than 725 eligible participants. Chiropractic use increased nearly three times in two years and was most likely favoured because this was an insured service under the Alberta provincial health care plan. Adults were more likely to see a chiropractor than children; however there was a strong relationship between the use by chiropractors of parents and their own children. More women than men were likely to see a chiropractor or other alternative health care provider.

From a survey of 19 chiropractic colleges in the United States and Canada, Colley and Haas (1998) attempted to determine what attitudes the instructors instilled in their students regarding immunization. The breadth of immunology and immunization instruction was also identified. It was found that basic principles of immunology were taught at all the chiropractic colleges surveyed. Most chiropractic colleges surveyed have faculty who attempt to instill a responsible attitude in their students regarding the risks

and benefits of, and the scientific evidence for, immunization. Unfortunately, several of the colleges had some faculty who appeared to promulgate a predominantly negative view toward immunization. The diversity of opinion regarding immunization among North American chiropractors may be partially explained by their educational experience at chiropractic colleges.

Hurwitz, Coulter, Adams, Genovese and Shekell (1998) described the demographic and clinical characteristics of chiropractic services from 1985 through 1991 in the United States and Canada. They found that chiropractic use is twice the estimates made 15 years ago. The vast majority of clients receive care for musculoskeletal conditions of the back and neck.

From the literature, it was found that chiropractic care was significantly used and had the means to influence many parents regarding immunization practice. Those chiropractors who promulgate a negative view towards immunization may also have a negative influence towards parents immunization practice.

The Adult Student Experience

As this thesis project utilized university students (young adults) for information about immunization experiences, other studies that described similar university student research were sought. Though no studies specifically addressed this issue, valuable pieces of information were found.

Information from undergraduate students, measured by the Health Status Causality Questionnaire, was collected by Woods, Ritzel and Drolet (1996). They found that in comparison to 137 political science majors, 150 health education majors, as a group, believed that: (a) lifestyle is the major determinant of health; (b) health is a status over which most individuals have a high degree of control; and, (c) many people have inflicted their health problems on themselves. The health education majors were significantly more likely to hold these beliefs than were the political science majors.

In 1999, Yardley and Furnham assessed medical and non-medical university students with a questionnaire indicating how willing they would be to try various therapies for treatment. Both groups assessed more traditional complementary practices such as homeopathy and acupuncture as similar to more orthodox treatments such as physiotherapy or prescribed diets. Both groups appeared not to differentiate between established techniques (physiotherapy) and less tested techniques (yoga). Moreover, neither group seemed particularly concerned about the scientific evaluations of treatments.

Immunization campaigns

Hersh, Markowitz, Hoffman, Hoff, Doran, Fleishman et al. (1991) showed that measles outbreaks can occur among highly vaccinated American college populations. Students living in campus dormitories were at increased risk for measles compared to students living off-campus. Students immunized at 12-14 months of age were at

increased risk compared to those immunized at greater or equal to 15 months. This was another reason for the second dose of measles to be included in the updated immunization schedule.

In 1996, Roberts, Roome, Algert, Walsh, Kurland, Lawless et al. tried to determine an accurate immunization rate and identify factors influencing non-immunization in a meningococcal immunization campaign on a Connecticut university campus in May 1993. Immunization and student data were merged to determine demographic factors associated with non-immunization. A case-control study examined reasons for non-immunization. The estimated vaccination rate for students returning to the campus was 93 %. Lower rates occurred among older students, students living off-campus, graduate students, non-degree students, and married students. Perceived poor access to the immunization center was the strongest predictor of non-immunization. The researchers concluded that higher immunization rates might be achieved by specifically targeting students who live off-campus and by providing multiple immunization sites with extended hours.

The predictors of immunization rates during mass meningococcal vaccination programs in community-based and university-based populations in Canada and the US were assessed by Paneth, Kort, Jurczak, Havlichek, Braunlich, Moorer et al. in 2000. From a 1997 mass meningococcal immunization campaign at Michigan State University they noted demographic factors of some 34,000 students. This particular university was known to have the largest dormitory system in the US. Only 51.2 % of eligible students

were immunized. They recommended that university and college immunization campaigns target students who were non-Asian, older, male, majoring in humanities-related fields, and living-off campus.

The American Academy of Pediatrics (2000) reported the number of cases of meningococcal disease in 15- to 24-year-olds and outbreaks of meningococcal serogroup C disease, including outbreaks in schools and other institutions, have increased during the past decade. In response to outbreaks on university campuses, the American College Health Association has taken an increasingly proactive role in alerting university students and their parents to the risk of this disease and informing them about the availability of an effective vaccine. Epidemiological studies demonstrated an increased risk of disease in university students living in dormitories, particularly among freshmen, compared with similarly aged persons in the general population. At least 60 % of these cases were potentially preventable by immunization with the quadrivalent meningococcal A, C, Y, and W-135 polysaccharide vaccine. These findings supported immunization of university students, particularly freshmen living in dormitories. It was suggested that university students and their parents should be informed by health care professionals at routine pre-matriculation visits and during college matriculation of the risk of meningococcal disease and potential benefits of immunization. Vaccines should therefore be made available to those requesting immunization. College and university health services were also recommended to facilitate the implementation of educational programs concerning meningococcal disease and availability of immunization services.

Meningococcal epidemics have been occurring in Canada as well. In Alberta, the health authorities in Edmonton issued a massive meningococcal immunization program following an outbreak in 2000 (Capital Health, 2000). More than 168,000 people aged 2-19 years were immunized in the first 12-day campaign, and an additional 61,900 people aged 2-14 years in the second campaign. Beginning in February 2001, Calgary also began its meningococcal immunization program with a goal of immunizing over 290,000 people. As of September 9, 2001 only 195,574 eligible people were immunized (CRHA web site: www.crha-health.ab.ca/nav/mening.htm). The CHR began its meningococcal immunization program beginning in the spring of 2001 and was scheduled to end in October 2001. To date (Personal communication, S. Yanicki, November, 2001), 37,908 people (aged 2-24 years) were immunized. This represented 69 % of the eligible population and 53 % of the 20-24 year olds. This low level of immunization compliance could reflect barriers among this population. The increase in the past decade of meningococcal may also be part of a longer (40-50 year) episodic cycle. It actually "may have nothing to do with immunization or living conditions. Likewise the role of immunization in herd immunity versus individual protection is questionable as the polysaccharide vaccine does very little to reduce the carrier state and is only 85 % efficacious in the best of conditions." (Personal communication, P. Hasselback, January, 2002).

Student populations were found to be at higher risks for meningococcal and measles epidemics. Recommendations to facilitate immunization campaigns for this

group were discussed. Note that the above publications dealt with the student body as a whole, and nursing students would have been included, though were not singled out.

Non-nursing undergraduates

Various studies have been published concerning university and college students and immunization issues. These have addressed participation in sport, educational promotions, risk assessment and ways to facilitate improved immunization rates in this population.

Dorman (2000) explored the concerns about the possibility of contagion among athletes in competitive sports, particularly sports with much person-to-person contact. HIV was identified as the most notorious of infectious agents; potentially, other viruses, bacteria, and even fungi were hypothesized to be involved. Due to the concern, however, special attention was paid to HIV and hepatitis B infections. For most of the infections considered, athletes are greater at risk during activities off the playing field than while competing. Recommendations for the inclusion of immunizations against measles and hepatitis B among pre-matriculation requirements for colleges and universities would eliminate these two diseases from the list of dangers to college athletes and all students. Dorman maintained that education, rather than regulations, should remain the cornerstone when considering the risks of athletes from contagious diseases.

In the United States, Ganguly, Marty, Herold and Anderson (1998) stated that hepatitis B virus infection occurred predominantly among adolescents and young adults,

despite the availability of an effective vaccine. Immunization status and hepatitis B vaccine (HBV) acceptance among 505 students visiting the student health services of a large southern university were investigated. Only 58 students had received hepatitis B vaccine. The vaccines were purchased either by the students, by their parents or by their employers. Nearly half of the students did not know their immunization status. Lower immunization percentages were found among Hispanics, men, people of lower education levels, and students aged less than 25 years old. Being immunized was related to the perception that the vaccine was affordable, although most students (95.7 %) said that the cost of HBV vaccine was excessive. Health professionals' emphasis on the need for hepatitis B immunization and a reduction in the price of the vaccine could improve hepatitis immunization rates among university students.

In an attempt to determine whether university students who received an informational letter (n = 366) would be more likely to receive a hepatitis B vaccination than students in a control group (n = 366), Marron, Lanphear, Kouides, Dudman, Manchester and Christy (1998) conducted surveys to determine the students' reasons for deciding to be immunized. Rates of hepatitis B immunization were significantly higher among students assigned to the intervention group (10.7 %) than among the control group (1.9 %). Immunized students were more likely than non-immunized students to report having had 3 or more sexual partners in the past 6 months. Students at higher risk for hepatitis B infection were more likely than others to be vaccinated. Although the overall rate of immunization was low, informational letters about the hepatitis B virus and

immunization were found to be effective in increasing hepatitis B immunization rates among students in the setting of a concurrent educational campaign.

Ganguly and Banerji (2000) surveyed university students regarding hepatitis B infection risks and factors affecting immunization status against the disease. Data from 467 students were analyzed using descriptive statistics, t-tests, and a discriminant function analysis. Less than 20 % of the students had received the hepatitis B immunization. Immunization status was related to preventive health care values and knowledge about the disease. Following a brief educational intervention, 28.6 % of the non-immunized students were willing to be vaccinated. Barriers to vaccination were found to be high vaccine costs and lack of doctors' recommendations. The researchers recommended subsidized immunization costs, doctors' recommendations, and more health education to increase hepatitis B rates among university students.

The studies presented concerned university and college students and immunization issues. These have addressed sport, educational promotions, risk assessment and ways to facilitate improved immunization rates in this population as additional *tiles* of information for this *mosaic*.

Nursing students

As nurses make up the greatest proportion of health care workers, it is useful to assess how nursing students perceive immunizations. Pennie, O'Connor, Garvock and Drake (1991) noted that few students in health care disciplines were immunized against hepatitis B. The researchers administered a questionnaire to 435 university and community college students in health care disciplines in Ottawa where there was no hepatitis B immunization program. They found that only 14 % of the students had been immunized. There was significant variability among student groups in their perceptions of the risk of acquiring hepatitis B, beliefs about the efficacy of the vaccine, and their willingness to pay for it. The need for a low-cost vaccine was demonstrated by the fact that only 35 % of the students would pay the wholesale price of the vaccine (\$100), but 94 % said they would pay \$15.

In a Spanish study, de Lorenzo-Solis, Arino and Fernandez (1995) carried out a questionnaire for third year nursing students on the general aspects related to hepatitis B. The evaluation of risk of infection, the degree of acceptance of the vaccine, and the number of vaccinated students were presented. Most of the students surveyed recognized the professional danger of hepatitis B versus other types of hepatitis (94.6 %) and considered that health care personnel were at high risk of contagion. Most students recognized the routes of disease transmission. A high percentage recognized accidental exposure during clinical practice. According to the results of the questionnaire, most nursing students appeared familiar with the schedule to be followed in case of accident

(i.e., needle-stick). In general, however, they did not know the significance of serologic markers. Ninety-two percent knew of the hepatitis B vaccine and considered it to be important. The total number of immunized or about-to-be-immunized students was 92 %. Interestingly, the nursing students felt that they received little information on the importance of vaccination and 94.6 % were interested in receiving more information.

Chalmers, Luker and Bramadat (1998) assessed nursing students' knowledge of and attitudes towards primary health care using a newly developed Canadian instrument, the Primary Health Care Questionnaire. The instrument was refined for use in the UK prior to collecting data from 427 students in degree, Project 2000, health visitor and district nursing courses. Findings indicated that students in all programs surveyed had been exposed to the concepts of primary health care. Students had acquired knowledge about primary health care and, generally, had positive attitudes to the concepts. Significant differences were found between several student groups (degree, Project 2000, health visitor, and district nursing) on both the knowledge and attitude measures. Although further psychometric evaluation of this new measure was recommended, this questionnaire showed promise as a valuable measure for use in assessing the move toward an increased emphasis on primary health care concepts in nursing education. Immunization issues were not discussed.

Nursing students have improved immunization coverage in the last ten years because of educational admission requirements. For example, the University of Lethbridge nursing program mandates immunization as part of the matriculation process. This would be an example of how changes in policy affect immunization status.

Summary

The variety of citations reflected a broad scope of variables and/or phenomena of interest. The focus on young adults' beliefs and behaviors towards immunization reflect this author's interest in policy issues for the next generation of parents and children.

This critical review of the health science literature for the period 1990 to 2001 provides a background context of an emerging body of health science knowledge. The themes of these sections are the current knowledge of the immune system and immunization, Canadian immunization policies and practice, the beliefs of young adults regarding immunization and the factors that are known to influence them such as physicians, nurses and alternative health care personnel, barriers to immunization and pertinent issues of university students.

CHAPTER THREE: STUDY DESIGN & METHODS

Design of the Study

An exploratory, descriptive study was used to address the research questions. In this way, information was generated about a topic that is poorly understood. Open-ended interviews with informants were conducted after informed consents (see Appendix A) were signed. Demographic information (see Appendix B) was also collected. An interview guide (see Appendix C) is attached but additional questions were asked based on the informants' answers. The interview took no more than 1.5 hours. Because data collection and analysis included questions formulated from previous research (Kulig et al., 2001) the topic was fully addressed in both breadth and depth. The author conducted and transcribed all the interviews.

A review of quantitative compared to qualitative research is provided to guide the reader through the study design (Table 6, Fain, 1999). Generally, a quantitative research design refers to a measurement and analysis of a causal relationship between variables at a particular point in time. Inquiry attempts to be objective. Qualitative research design refers to the discovery of meaning rather than cause and effect. The goal of quantitative research is to develop an explanation and prediction from the "facts." The goal of qualitative research is to develop understanding and meaning from participants or informants. The study focus of quantitative research is objects, subjects and cases. The study focus of qualitative research is participants, informants and other people. Qualitative research uses language, concepts, and words other than numbers to represent

Table 6: Comparison of Qualitative and Quantitative Research

Nature of reality	
Qualitative	Quantitative
Social constructs of reality	Reality obtainable in objective terms
Multiple realities	Single reality
Parts interrelated	Parts separate and manipulated
Variables dependent on each other	Variables independent of each other
Context interrupted and subjective	Context free and objective
Broad, inclusive in scope	Narrow in scope
View of humans	
Subjective data	Human data collected is objective
Holistic view	Human is made of parts
Root source of knowledge	
Research traditions: Anthropology Social psychology Philosophy	Logical positivism and empiricism
Intuition, gestalt	Use of observation
Social interactions, values, culture	Psychological and biophysical facts
Orientation of research	
Process, phenomena, person oriented	Outcome, product oriented
Characteristics of design: philosophy, theory, question, design fit	
Emphasis on philosophical bases	Often little emphasis on philosophy
Theory developed initially or during study	Theory developed a priori
Emphasis on philosophy-theory-question link	Emphasis on theory-question link
Theory as a guide	Theory testing
Level of concept and knowledge development	
Less knowledge of phenomenon	Comprehensive levels of knowledge of phenomena
No measurement of concepts	Measurement of concepts evident
Rich description	Often precise in measurement, usually not much rich description
Structure and control of the situation	
Control unimportant	Control important
Description of phenomena	Measured variables
Inclusive understanding	Ruling out alternative explanations
Exploratory designs	Experimental designs

Source: Fain (1999)

evidence from the research. Inquiry is often sensitive to the creation of social experience on process and meanings in context. The relationship between participants or informants and the researcher, coupled with environmental issues may shape the inquiry. Process and meaning are not measured, but may be described in terms of intensity, patterning and frequency. Generally, the type of data sought for qualitative research is subjective, with some objective and is inclusive (i.e., the researcher makes subjective decisions on the data), while quantitative data is objective and exclusive (i.e., numerical data from measurements) (Fain, 1999; Talbot, 1995; Polit & Hungler, 1999).

There are several qualitative approaches a researcher can take, depending on the goal of the study. Descriptive designs are useful when the researcher needs to describe a particular event or process that is poorly understood. Sandelowski (2000) defines descriptive studies as the “least theoretical of the spectrum of qualitative approaches, in that researchers conducting such studies are the least encumbered by pre-existing theoretical and philosophical commitments.” (p.337) In contrast to the more methodologically specific frameworks of phenomenological, grounded theory, or ethnographic studies, descriptive studies tend to draw from the general tenets of naturalistic inquiry. Table 7 outlines the similarities and differences between selected qualitative approaches as outlined in Talbot (1995). The research questions and approach of this study would have been very different had the author had a different goal (i.e., if an ethnographic approach was used the study would have taken place at the informants’ home instead of an office to better understand the informants’ culture, or if a true grounded theory approach was used, participant observation during actual immunization procedures might have been used to help generate a theory). Sandelowski (2000)

maintains that there can be a rich assortment of hues, tones and textures in descriptive research as it utilizes approaches borrowed from methodological frameworks but without the goal of rendering a theory. Thus, a qualitative descriptive study can have overtones of grounded theory when it uses the technique of constant comparison or has hues of ethnographic questions. Mixed method techniques (i.e., using a ground theory approach with ethnographic type questions) are not to be confused with erroneous references or misuses of methods or techniques. An attempt to use these techniques correctly will be made.

Table 7: Selected Qualitative Research Methods

	Conceptual origin	Goal of research	Data collection	Role of researcher	Outcome
Descriptive studies	Social sciences*	Description or exploration of phenomenon	Interviews, surveys	Collects, analyzes, and interprets	Narrative report, case illustration
Grounded theory	Social sciences*, symbolic interactionism, sociology emphasis	A theory describing or explaining phenomenon	Interviews, observations, participant observations	Immerses, observes, compares, conceptualizes, and validates	Substantive or formal theory
Phenomenology	Existential phenomenology with psychology emphasis	Understanding of phenomenon	Interviews, written descriptions	Intuits, analyzes, describes, validates the subjects' descriptions	Essence of phenomenon, essential definition of structure of phenomenon
Ethnography	Social sciences*, anthropology emphasis	Understanding of phenomenon in cultural context	Participant observations, interviews, and document retrieval	Immerses, observes, clarifies and verifies (cultural context)	Cultural report, case illustration
Case studies	Social sciences*	In-depth description or exploration of single or multiple cases	Interviews, observations, and document retrieval	Collects, observes, describes, and explores	Case description

* Social sciences: includes the traditional disciplines of psychology, sociology, history, anthropology, political science and economics

Source: Talbot (1995)

Intensive interviewing was described by Lofland and Lofland (1984) as guided conversations with the aim of obtaining data, rich in description, about the informants' experience and the meaning associated with the experience. Talbot (1995) described the semi-structured interview as having a more flexible outline but the process of the interview, (i.e., phrasing the questions a certain way, the degree to which the topic was explored, response to cues) is left to the discretion of the researcher and can be changed to fit the informant. In-depth, semi-structured, interviewing was found to be an appropriate method of choice for this research study, as the purpose was to obtain an 'emic' or insider perspective of the research phenomena of understanding the perspectives of young adults' experiences and beliefs concerning immunization.

Research Questions Revisited

The aim of this study was to answer the following research questions in order to describe and explain:

1. What are the theological constructs of young adults who choose not to immunize their children or future children? What is the relationship between these beliefs and the young adults' decision- making regarding immunization?
2. What are the beliefs of young adults who engage in alternative health practices and choose not to immunize their children or future children? What is the relationship between these beliefs and the young adults' decision-making regarding immunization?

3. **What are the beliefs of young adults who are concerned about vaccine safety and choose not to immunize their children or future children? What is the relationship between these beliefs and the young adults' decision-making regarding immunization?**
4. **What are the beliefs of immunization by future parents?**
5. **What are the similarities/differences between groups of parents or future parents regarding immunization?**

Sampling Process

Description of sample/ population

In qualitative research, the sample size is determined by the expected point of data saturation. As the objective of qualitative research is to obtain data that are comprehensive and insightful, the large volume of narrative data generated by interviews across different population groups precluded enlisting a large number of participants. The sample is also determined by the actual interest of the people in the population (Sandelowski, 1998; 2001).

To generate information about these research questions, it was estimated that a total sample of 50 persons who choose not to immunize or who choose to delay immunization be originally sought in the following categories:

- 10 persons who choose not to immunize or delay on the basis of religious beliefs;

- 20 persons who choose not to immunize or delay on the basis of alternative health beliefs, and;
- 20 persons who choose not to immunize or delay on the basis of vaccine safety concerns.

The numbers above were estimates based on the diversity within each of these groups.

The actual numbers of informants interviewed were:

- 1 person who choose not to immunize or delay on the basis of religious beliefs;
- 21 persons who choose not to immunize or delay on the basis of alternative health beliefs, and;
- 20 persons who choose not to immunize or delay on the basis of vaccine safety concerns.

There was overlap in two categories, alternative health beliefs and vaccine safety concerns. A total of 44 students initially agreed to be interviewed after the recruitment call for volunteers was given in 4 University of Lethbridge first year Psychology classes and 2 second year Nursing classes with an estimated total of 600 students. A total of 36 students were ultimately interviewed.

Inclusion criteria

The following University of Lethbridge students were sought with a variety of majors (science, arts, and management) including those attending the Lethbridge

Community College site in the Southern Alberta Collaboration for Nursing Education (SACNE) program:

- **Age (18-30 years) preferred;**
- **Parents and future parents who engage in alternative health beliefs and practices;**
and,
- **Parents and future parents with theological concerns regarding immunization.**

Data Collection

Data collection over five months (January to May 2001) consisted of private interviews with students from The University of Lethbridge. Interviews were scheduled at the informants' convenience and all interviews were held in a private office at The University of Lethbridge.

Informed, written consent was obtained before the beginning of the interview (see Appendix A). Informants were asked to provide information on certain demographic variables (i.e., age, education, marital status, parental status). A Demographic Profile Form was used to document the information (see Appendix B). In-depth interviews were conducted using a semi-structured interview schedule (see Appendix C). Additional questions were generated by the thematic content that emerged during each interview and the ongoing data analysis. All interviews were audio-taped.

It is important to note that, because data collection and analysis occur simultaneously in qualitative studies, it is impossible to anticipate all possible questions and probes ahead of time. Also, some informants will be better than others (i.e., ability to recall and relate experiences) so there will be variations in the probes and questions required for a particular interview.

A total of 36 interviews were conducted. All of the interviews took place in a private office at The University of Lethbridge. The average interview lasted approximately 60 minutes in length, but was unique to each individual's willingness and ability to verbalize concepts. Initial interviews were relatively unstructured, shorter (30 to 45 minutes), and were based on the research questions. Subsequent interviews became more focused, based on the review of previous interviews, the analysis of emerging themes and lasted longer (60 to 90 minutes).

Talbot (1995) defined field notes as representations of the researcher's efforts to record information and to synthesize and understand the data. For this study, all field notes were kept in written form. They consisted of descriptions of the author's impressions, feelings, reactions, questions, and possible themes following the interviews.

Researcher as instrument

Lincoln and Guba (1985) described how the researcher is the primary data-gathering instrument in naturalistic studies. The adaptability of the person to understand

and evaluate the meaning of the phenomena in the context of environment is a distinct advantage. In this study, the author maintained an approach of mutual participation, where the informants were viewed as experts on their own experiences with immunization. Bracketing (Streubert & Carpenter, 1999) was used by the author as a cognitive process of putting aside her own beliefs and not making judgments about what was heard or seen during the interview process. The use of a diary in the field notes journal explicated the author's ideas as personal thoughts and ideas were written down immediately after the interview. This process enabled the author to approach the topic openly and honestly.

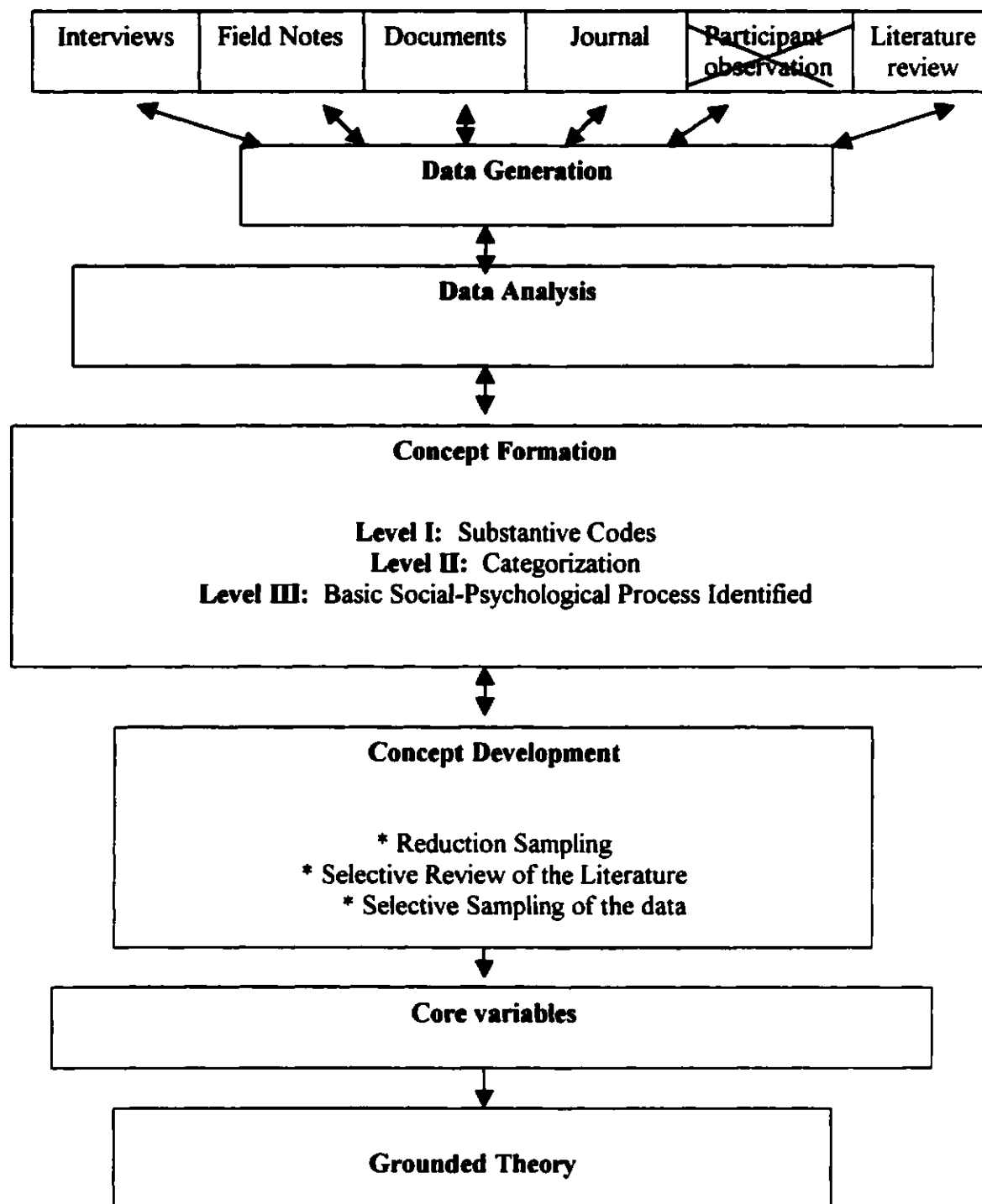
Data Analysis

Both manual and computer analysis were performed. The audio-taped interviews were transcribed verbatim and checked for accuracy by the author. During the course of the interviews, all of the informants volunteered, without coercion, additional help that might be necessary for the author related to this thesis. Because of this offer, informants were asked by e-mail to review summaries of their own interviews for accuracy. These summaries included relevant quotes the author sought to include in the thesis. This kind of review (known as "member check") by the informants was not initially included in the original design of the study and was not included in the ethics review. However, summaries of the thesis supplied to the informants for review, were approved by the ethics committee. Member check is included as a method of data triangulation to ensure rigor in the study. As there was no coercion or distress to the informants, their personal

voluntary reviews were included in the analysis. Content analysis was applied to seek major themes and to identify the conceptual categories and properties generated by the initial coding and analysis.

As an exercise in learning for the author, a structured coding system, based on grounded theory was used. Different layers of thinking emerged from the data based on different themes including concept formation to concept development. A diagram illustrating these layers of thinking in a grounded theory development exercise is presented in Figure 3. The overtones of grounded theory in this learning exercise can be seen as conceptual categories and conceptual properties of categories emerged that had equal applicability across interviews. The goal of this thesis was not to produce a theory. What differed from formal grounded theory methodology was that only one interview was conducted per informant and there was no formal immersion into their daily lives. What is common with the grounded theory approach is that the bulk of the literature review (excluding immunology) is completed after the interviews are completed. Glaser (1978) recommends that this be done as prior reading might distract or mislead the researcher when analyzing data. Also common with grounded theory methodology, was the greater attention given to coding and linking the data with coherent entities or "theoretical constructs." After the different levels were coded, as described by Streubert and Carpenter (1999), the categories were collapsed into a parsimonious set reflective of informants' experiences with immunization. This was designed to identify possible relationships between and among major categories, and proposed conceptual model(s) to

Figure 3: Grounded Theory Development Exercise



Note: Participant Observation was not used in this research study.

Source: Struebert & Carpenter (1999)

capture identified relationships. Participant observation, commonly used in grounded theory, was not used or needed in this research.

Identification of themes and factors across the comparison frameworks of explanatory models also served to contribute to their development. Explanatory models are typically used when the descriptive information is known, but very little is known about the relationships, and proposes an inferential type of analysis (DePoy & Gitlin, 1998). As the focus of this research is descriptive and exploratory, major emphasis was on describing phenomena that was not generally understood.

Lincoln and Guba (1985) described the processes of unitizing and categorizing to elicit factor categories that either facilitated or impeded the development of each dimension. Unitizing is the process of identifying units of information that arise either intuitively or from sensitizing concepts. Categorizing involves the development of provisional categories and category descriptions that can be used to justify inclusion. The constant comparison method guided the process. The continuous contrast of units of information in the same or different categories, and review of categories for overlap, was used for discovering possible relationships and refinement. An extensive list of facilitating and hindering factors emerged from the examination of the data. Factor categories were described and refined through the constant comparative method. Lofland and Lofland (1984) described a framework of “thinking units” which were categories of meaning, practice and consequence that might prove useful in the process. (p.84) The facilitating and hindering factors are defined in Chapter Four.

A team approach commonly used in analyzing research was not used by the author because it was not feasible. However, audio-taped interviews and member checks by the informants ensured reliable data, in addition to an ongoing analysis by the author's academic supervisor validating emergent themes and categories. This approach is also known as methodological triangulation (Talbot, 1995). The author completed the preliminary analysis of theme and factor category identification. A summary for each data set consisted of theme identification, facilitating and impeding factors, and reflections on the analysis process. Comparisons of the summaries were then made. This process generated deeper insights and refinement of the thematic descriptions and factor category descriptions. The process was vital to understanding the informants' perceptions of immunization.

QSR NUD*IST

The use of the software, QSR NUD*IST 4 (Qualitative Solutions and Research, Non-numerical Unstructured Data * Indexing, Searching and Theorizing) was initially attempted to analyze the data (QSR Nudist, 1997). Several articles were consulted in working with this software (Richards & Richards, 1992, 1993; Hansen, 1999; Cannon, 1998; Manerson, Kelahar & Woelz-Stirling, 2001). The author did not find this software to be the best approach. The biggest hurdle was trying to get the software to generate themes when it was beyond its capabilities. The author had previous quantitative research experience and was used to analyzing data as such, i.e., code the data, input the data, get the result. It was a tremendous learning experience to examine vast piles of documents

generated from the interviews and pick out quotes that served as supporting data. QSR NUD*IST is essentially a specialized word processing software that has abilities to compare large data sets and generate 'trees' of thought. The benefit of this software is more apparent when there are enormous quantities of data or when several researchers are involved in a project and multiple processes can be viewed. Consequently, the author opted to use Microsoft Word instead as all of the interviews were transcribed using this software and were readily available. Split screen methods on the computer served to easily copy and paste quotes directly into text.

Rigor and Trustworthiness

How can the reader be assured that what is presented has passed rigorous procedures with honesty and trustworthiness? The basic issue of qualitative research is convincing the reader that the findings are worthy of attention and are trustworthy. Many researchers (Lincoln & Guba, 1985; Talbot, 1995; Fain, 1999; Polit & Hungler, 1999; Sandelowski, 2000; Burns & Grove, 2001; Gillis & Jackson, 2001) describe methods of rigor and trustworthiness using a variety of words such as **truth-value** (credibility, validity), **applicability** (transferability, fittingness), **dependability** (reliability, audibility), **confirmability** (objectivity), consistency and **neutrality**. Some words are synonymous while others have different purposes. All of these words serve to label the meticulous methods used by researchers to present their findings in the most honest and trustworthy way to control error.

Burns and Grove (2001) provided insight in critiquing qualitative studies. The skills needed for critiquing qualitative research included: context flexibility; inductive reasoning and theory analysis; and, transformation of ideas across levels of abstraction. They emphasized the standards that are used to evaluate qualitative research: descriptive vividness (including essential and accurate descriptions); methodological congruence (rigor); analytical preciseness (researcher's decision-making processes); theoretical connectedness (logical conceptual framework); and, heuristic relevance (recognizable to the reader). These skills and standards were applied in this research.

Two primary directives guiding naturalistic inquiry that the author borrows for this study are: (1) that no manipulation on the part of the inquirer is implied; and, (2) the inquirer imposes no a priori units on the income (Lincoln & Guba, 1985). Thus, meanings and interpretations of the data arise from the interactions of author and informant, grounded in the world of lived experience. Therefore, the aim in data collection is thick description. Denzin (1989) explained thick description as an attempt to rescue, in detail, the meanings and experiences that have occurred from the informant's point of view. These also include a rich and thorough description of the research setting or context and of the transactions and processes observed during the inquiry (Polit & Hungler, 1999). Thick descriptions are indicated by detailed accounts of thoughts, emotions and actions, located in the social context in which they occur, and are both sequential and historical.

Polit and Hungler (1991) defined the purpose of descriptive studies as to observe, describe and document phenomena as they naturally occur. This process allows for greater awareness of the individuals' experiences within the context of their environment. The exploratory, descriptive design was the appropriate design for this study, which explored and described understanding within the context of young adults and immunization beliefs and behaviors.

This thesis was guided by the framework suggested by Lincoln and Guba (1985) and Sandelowski (1986; 2000) based on the four factors relating to tests of rigor. They were: **truth-value, applicability, consistency and neutrality**. Guba and Lincoln (1985) described **truth-value** as being assessed by the study's credibility, or by the descriptions or interpretations of the human experience that is immediately recognized by people who have the experience. The experience, when it occurs, could also be recognized by others based on their reading of the study. According to Sandelowski (1986), truth-value "resides in the discovery of human phenomena or experiences as they are lived and perceived by subjects rather than in the verification of a prior conception of those experience." (p. 30) The truth-value of a qualitative study can be affected by the closeness of the researcher-informant relationship. In this study, the researcher-informant relationship was always of a professional nature. Description and interpretation of the researcher's responses and feelings in relation to the research process is considered a helpful strategy in maintaining credibility.

Credibility measures how vivid and faithful the descriptions of the phenomena are and provides the standard for judging the truth-value. University students (informants) were considered the experts of young adult experiences (as most were young adults) and therefore, the most credible sources of information. A qualitative study is credible when the participants recognize the descriptions and interpretations of the experience as their own (Sandelowski, 1986, 1993; Hoffart, 1991). Therefore, an interpretive summary of the transcribed interview (containing quotes by the informants considered relevant to the author) was reviewed by each informant by email and was asked to validate conclusions that were drawn.

According to Rew, Bechtel and Sapp (1993), "meticulous attention to how data are collected is a prerequisite to accurate, meaningful interpretation of those data." (p. 300) The author served as the instrument through which data were collected in this qualitative study. Immediately following each interview, the author's reflections were written in a notebook. In every interview, the author consciously tried to convey an approach where the informants were considered experts in the knowledge of their own immunization experiences. The author focused on attentive listening rather than making interpretive comments during the interviews. All of these strategies were utilized to increase the credibility of this study.

In 1986, Sandelowski defined **applicability** or fittingness as the study's ability to represent the context of the real world. By interviewing students from an introductory

psychology course it was hoped to obtain a more general representation of the student body because most students in the liberal arts program take this course.

However, Fain (1999) maintains that generalizability is not the aim of qualitative research. In addition, in-depth interviews, the use of field notes and member check served to capture the multi-dimensional, multi-factoral, complexity of understanding.

Consistency is the third characteristic towards assessing the study's rigor. The main criterion suggested by Yonge and Stewin (1988) to measure consistency is the audibility or the ability of another researcher to follow the thinking, decisions and methods used by the original researcher. If another researcher can also conclude the same things about the study, it is said to meet criterion of consistency. This criterion was achieved through the identification of the research process that outlined the decisions that were made, and the written review of the process by the academic advisor. To further meet this criterion, interviews were audio-taped and transcribed verbatim. Notes were also taken reflecting the author's thinking process, the influence of the informants, and her motivating interest in the study phenomena. Documentation was maintained regarding the informant's review of the interpretive summaries. This documentation provides the necessary information to audit the decision-making trail.

Neutrality is the final characteristic described by Lincoln and Guba (1985), and Sandelowski (1986). This is the freedom from bias in the research process. Neutrality is measured with the criterion of confirmation or when truth-value, applicability and

audibility are established. Table 8 presents a comparison of qualitative versus quantitative research designs as outlined by Fain (1999), to aid the reader in understanding the process. This study addressed the criterion of confirmability, through the above-mentioned strategies for credibility, applicability and audibility. Another way to convince the reader that the study is worthy of attention is to address trustworthiness, which can be viewed as credibility, transferability, dependability and confirmability. A qualitative research audit trail approach was utilized as described by Rodgers and Cowles (1993). This has been addressed in the thesis.

Ethical considerations

Ethical approval was from the office of Research Services at The University of Lethbridge (Human Studies Review Committee) and at Lethbridge Community College (see Appendix D). As with all research studies, the guidelines forwarded by Social Sciences and Humanities Research Council will be used in this study. Informants who met the inclusion criteria and agreed to be contacted were approached by the author. The purpose, procedure, examples of interview questions, and voluntary nature of participation in the study were presented to potential informants. It was explained that they could choose not to be interviewed or to withdraw from the study at any time with no foreseen harm. Written, informed consent was obtained immediately prior to commencing the formal interview by the author.

Table 8: Qualitative versus Quantitative Research Designs

Trustworthiness of Findings	
Qualitative	Quantitative
Credibility	Internal validity
Function of informants' confirmation and completeness of the information; researcher's self reflection	Link among variables; "hard" objective substantiation; internal validity indicators
Generalizability not an aim of research	Statistical significance, which enables generalizability

Researcher/Informant Relationship	
Informant; participant-observer; involved; insider perspective	Little involvement; observer, detachment from subject; outsider perspective
"Tool" or instrument for investigation is usually the researcher; uses a variety of sources to collect data	Questionnaires; structured interviews; psychometrically sound instruments

Design Structure as a function of Qualitative-Quantitative Dimensions	
Strong philosophical perspective	Strong theoretical base
Understanding of human action	Explanation among variables
Subjective approach	Objective approach to phenomena
Meaning of concepts	Measurement of variables
Description of phenomena	Precision in measurement
Trustworthiness of findings	Control of error; internal validity

Source: Fain (1999)

Informants were interviewed in a mutually agreed upon private place. Anonymity and confidentiality was maintained. The list of the informants was kept separate from the transcripts and was destroyed when the data collection was completed. The individual's name did not appear on any notes, demographic forms or transcripts. The transcripts were maintained in a secure, locked location available only to the author and academic advisor. This material is being kept for a 7-year period and then destroyed.

All informants were current students of The University of Lethbridge. Voluntary convenience sampling was used from the student population. Methods of generating interest to recruit informants in the study were done two ways. First, the introductory psychology students of 4 different classes (N = approximately 500 non-nursing students) were briefed about the project in class and then asked to participate using current methods approved (as described for e-mailing students) for use in the Psychology Department. The use of e-mail has shown to be a successful venue for recruiting students. Here a brief explanation of the project and details of the study were highlighted along with contact information of the author including e-mail and telephone numbers (See Appendix E). Nursing students from 2 different second year classes (N = approximately 100 students) were also included in the sample. The nursing students were briefed in class at the Lethbridge Community College site and given bulk sign-up sheets to volunteer. Subsequent e-mailing was not available for this sample at that time, so paper sheets were used. Students were contacted by telephone to arrange a convenient interview. A sample consent form is included (see Appendix A). All of the informants were told that they had the right to withdraw without prejudice at any time. This was included on the consent form. No deception was required for this study.

Risks and benefits

As a possible risk, there was some anticipated emotional or psychological discomfort associated with discussing beliefs that vary from the mainstream about immunization. In order to allay this, a non-judgmental attitude was relayed by the author

during the interviews. Informants did not display discomfort during the interviews, and, some displayed interest in learning more about current immunization programs.

In light of recent outbreaks of disease in non-immunized populations the information generated from this study is particularly important to protect the well-being of all residents within the region, including those who choose not to immunize. Overall rates of non-participation in immunization programs are significantly higher in Coaldale, Picture Butte and Fort MacLeod community health sites. Understanding the reasons for choosing not to immunize will assist Public Health Nurses (PHN) in providing appropriate counselling and advice on immunization and communicable disease control which respects the choices of parents and young adults. It is essential to understand the perspectives of future parents and young parents to further address the issues of immunization for the coming generations, not only for their children but also for themselves.

Privacy and confidentiality

To respect the privacy of informants and protect confidential data the following were done:

1. The informants' names were not recorded on notes, tapes or any such materials;
2. The list of informants was kept separate from the data and was accessible only to the researcher (author) and academic supervisor;
3. The list of informants will be destroyed when the thesis is accepted;

4. When the findings are discussed or reported, the identities of the informants will not be revealed; and,
5. The informants were required to sign a consent form. It was explained that they have the right to refuse to answer certain questions or to stop the interview at any time with no risk of harm.

The results of this research will be disseminated accordingly: thesis to the university for partial fulfillment of Masters of Science; summary to the informants; and, report to Wellness Services Department of CHR and other appropriate CHR personnel. Attempts will be made to publish and present the findings through relevant journals and conferences. The informants will receive feedback regarding the research by means of a summary sheet to be distributed to them either by e-mail or post. Informants were told that they could discuss the findings with the author at any time by e-mail or telephone.

Limitations

Although the research presented is sound, it has some limitations. This research did not address limitations with the population used in the study. A convenience-based, self-selected group of volunteers were used. Although generalizability is not the main focus of qualitative research, it would have been beneficial to have a more representative purposive sample of informants. For example, only one informant had religious issues with immunization. This may also reflect the fact that people with religious concerns about immunization were not found in the population studied. Findings may also be

limited to this geographic area. The finding may also be limited to a particular time period in the informants' lives. As the informants are university students they may not represent other young adults' views on immunization.

Summary

Chapter Three outlined the research process where an exploratory, descriptive design was employed to explore and describe the dimensions of understanding of young adults' perception of immunization. Data were generated from a convenience sample of 36 informants through the use of intensive, semi-structured, interviews, and the collection of demographic information and field notes. Data analysis, using the methods of thematic analysis, domain and constant comparison were explained. Ethical considerations for human participants were identified, and strategies addressing rigor, trustworthiness and limitations were described.

CHAPTER FOUR: ANALYSIS & PRESENTATION OF FINDINGS

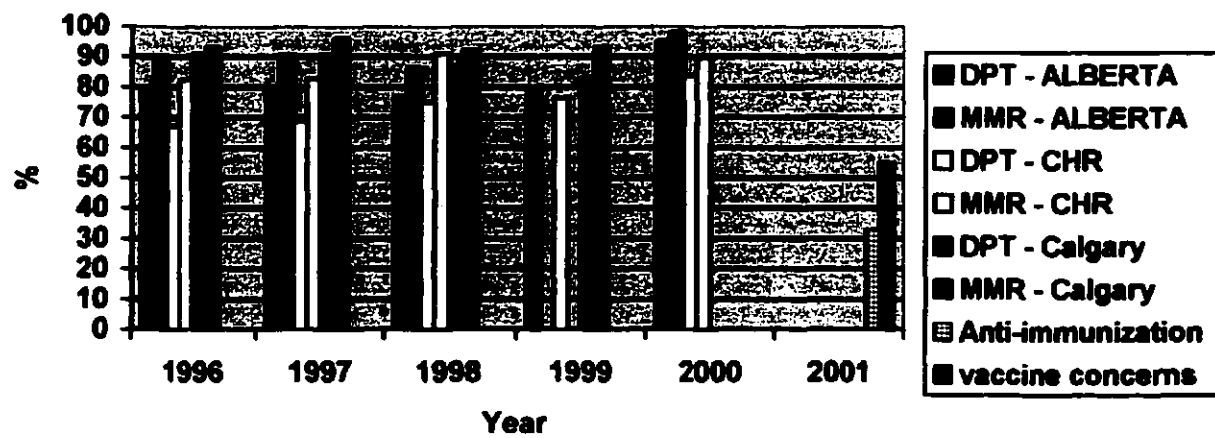
The Context

To explore the beliefs of young adults in relation to immunization, key questions were asked regarding their knowledge, perceptions and attitudes about the immune system, immunization and communicable diseases. To examine the behaviors of young adults in relation to immunization, key questions were asked regarding their previous immunization history, their present practices and future intentions for themselves and/or their families. A second purpose of this study was to document young adults' knowledge, perceptions, experiences and attitudes of the barriers to, and facilitators of, immunization practices in their lives.

Face-to-face in-depth interviews were conducted with the informants who were attending The University of Lethbridge (i.e., non-nursing or nursing students). The interview transcripts provided a rich database of young adults' experiences with immunization, as well as their perceptions of key factors which could enhance or hinder their continued immunization of themselves or their children (or future children). This generated more than 600 pages of documentation and more than 200 hours of analysis. This chapter presents the dominant themes that emerged from the analysis of the informants' data. Figure 4 illustrates immunization rates for the province of Alberta compared with the CHR, the city of Calgary and the informants' vaccine concerns or anti-immunization stance. This was intended to show the regional differences and to highlight the informants' vaccine concerns and how many had friends and or family who

were anti-immunization. Although the sample (n=36) is small and is not intended to be generalized for the entire population, it is relevant to consider that over half of the informants have some kind of immunization concern and about a third of the informants have close ties with people who are anti-immunization.

Figure 4: Comparison of Immunization Rates with Informants' Concerns



Notes: "Anti-immunization" refers to family/friends of all informants (n=36) who do not immunize and "vaccine concerns" refers to all informants (n=36) with vaccine concerns.

Sources: Alberta Health & Wellness, CHR & author.

Demographic profiles of the informants are summarized in Table 9. Relevant findings of the informants are summarized in Table 10.

Table 9: Demographic Profile of Informants

		TOTAL (n=36)		NON- NURSING		NURSING	
		Male (n=8)	Female (n=28)	Male (n=5)	Female (n=18)	Male (n=3)	Female (n=10)
AGE	%						
	18-25 yr	11	69	3/23	16/23	1/13	9/13
	26-29 yr	3	0	1/23	0	0	0
	>=30 yr	8	8	1/23	2/23	2/13	1/13
MARITAL STATUS	%						
	Married	8	8	1/23	2/23	2/13	1/13
PARENTAL STATUS	% with Children	8	8	1/23	2/23	2/13	1/13
RELIGION							
	Mormon	6	6	1/23	1/23	1/13	1/13
	Roman Catholic	8	25	3/23	7/23	0	2/13
	Jehovah Witness	0	3	0	1/23	0	0
	*Dutch (C.R.)	0	3	0	0	0	1/13
	None	3	28	1/23	6/23	0	4/13
	Other	6	14	0	3/23	2/13	2/13
EDUCATION							
	1 st year	8	44	3/23	16/23	0	0
(Post-Secondary)	2 nd year	6	25	0	0	2/13	9/13
	3 rd year	8	8	2/23	2/23	1/13	1/13
ETHNIC ORIGIN							
	Caucasian	19	72	4/23	16/23	3/13	10/13
	Native American	3	0	1/23	0	0	0
	Hispanic	0	6	0	2/23	0	0

*Canadian Reformed Dutch Religion

Table 10: Relevant Findings of the Informants (n=36)

- Most non-nursing disciplines of study were represented in the 4 classes that were recruited from the first year psychology course including students from management, fine arts & music, science (psychology, chemistry, biology), arts (English, history, modern languages), humanities (social work) and education.
- Some non-nursing informants get a yearly flu shot (75% of them are over 28 years old). Almost all nursing student informants get a yearly flu shot.
- A third of non-nursing informants have Hepatitis B immunization (all under the age of 21 years old). Almost all nursing informants have Hepatitis B immunization.
- A third of all informants have friends/family who are anti-immunization.
- Over half of all informants have vaccine concerns.
- All of the informants described themselves as 'pro-immunization.'
- Few of the informants wanted to delay childhood immunizations.
- None of the informants mistrusted the pharmaceutical companies.
- Several of the non-nursing informants were concerned about the risk factors of immunizations while none of the nursing informants were concerned.
- Several of the informants did not understand the concept of herd immunity.
- Very few of the informants had religious barriers to immunization.
- Many of the informants used alternative health practices.
- Most of the informants said they would readily immunize their children or future children, however 1/6 of them would not.

Descriptions of the Dimensions

Study findings suggested that immunization beliefs and behaviors were comprised of six dimensions. The clusters of dimensions for beliefs were KNOWLEDGE, PERCEPTIONS and ATTITUDES; immunization behaviors: HISTORIES, PRESENT PRACTICES; and, FUTURE INTENTIONS. Enhancing or hindering factors to

immunization are summarized in Table 11. These factors are relevant to consider during immunization policy-making because enhancing factors need to be understood in order to be maintained and expanded while hindering factors need to be reduced.

Table 11: Summary Table of Dimensions of Understanding and Enhancing or Hindering Factors for Immunization

BELIEFS		
Dimension	Factor	E/H*
Knowledge	- correct (detailed or minimal)	E
	- false	H
Perceptions	- risks	E/H
	- benefits	E
Attitudes	- positive	E
	- neutral	E/H
	- negative	H
BEHAVIORS		
Immunization History	- complied with the norm	E
	- delayed/refused immunizations	H
	- positive experience	E
	- negative experience	H
Present Practices	- maintains recommended schedules	E
	- delays/refuses recommended schedules	H
Future Intentions	- will maintain recommended schedules for self and/or children	E
	- will not maintain recommended schedules for self and/or children	H

*E = Enhancing Factors, H = Hindering Factors

Core Themes

The following **core themes** emerged from the DIMENSIONS:

(KNOWLEDGE)

1. What the informants knew about the

immune system,

immunizations, and

communicable diseases.

(PERCEPTIONS & ATTITUDES)

2. What the informants perceived, for

risks and benefits or,

what they displayed as

positive, neutral or negative attitudes,

(HISTORY)

had **experienced** about immunizations and communicable diseases either from

themselves or people close to them (**friends or family**) and;

(PRESENT PRACTICES & FUTURE INTENTIONS)

3. What they intended to do about immunizations for

themselves, or,

their children (or future children) presently or in the future.

It became apparent during the analysis that nursing students and non-nursing students could be grouped separately under the original categories of young adults who

delay or refuse immunization based on alternative health practices, vaccine concerns or religion. Differences and similarities between the two groups of informants (nursing students versus non-nursing students) emerged from the data to be more pronounced than anticipated. Many of the informants revealed rich descriptions about their knowledge, experiences, perceptions and attitudes that are presented as data. Although all of their voices are important, only a representative sample of illustrative quotes is included. Most people say “um” frequently while they speak, this has been omitted from the quotes for ease of reading. Long pauses and emotional outbursts have been maintained to illustrate the magnitude of expression of the informants’ responses. Analyzing these quotes is essential to generating contextual meaning and understanding.

Understanding the immune system

When the informants were asked to describe how the immune system worked most thought they had sufficient knowledge of this topic. As this is based on facts, knowledge can be assessed in whether the facts are correct or false. Although most could come up with words like "antibodies, germs, viruses, bacteria, antigens and white blood cells" they failed to give logical sequences of how the immune system really works or the specialized components at the cellular level (i.e., what happens with T cells and B cells). This included the nursing students. At best, the informants displayed only fundamental concepts and at worst, they described the function or concept incorrectly (*italicized in illustrative quotes*). Samples of both nursing and non-nursing groups of informants’

quotes will be presented to illustrate what knowledge they demonstrated during the interviews.

For the question: “Do you know how the immune system works?” one nursing student answered:

“White blood cells, phagocytes, red blood cells, leukocytes, but they are the WBCs, macrophages, I think it’s your whole body has to fight, it’s blood mediated. *I mean if you have an infection, like in your stomach it goes to your stomach, all the blood goes there and has to fight there.*”

Another nursing student responded with different incorrect information:

“(laughter) like leukocytes and erythrocytes? Is that right? Different components of your blood, and like your regulating things in your brain, like, like your *hypothalamus* and stuff to give you fevers and stuff if you’re sick. Regulatory mechanisms like your, (long pause), I can’t think of the word, oh *your flight or fight response*, like your sympathetic and like your nervous system, your autonomic I guess? I think it plays a part in immunity but I don’t know what part when you’re sick.”

A typical nursing student response was:

“Yes, it’s the system in your body that’s, responds to any type of foreign invader to fight it off, infection, disease, any thing foreign to your system, . . . (long pause) **oh gosh! (laughter), oh gosh!, oh God!** It’s made of like (laughter) cells, antibodies, I’m not sure if the lymph nodes are in it, and the lymphatic system, blood, in the circulatory system, liver, thymus, **oh gosh!**”

Some of the nursing students also expressed their lack of knowledge by stating: “It makes me feel like I don’t know anything (laughter).” It was common for the informants to diffuse their inability to articulate answers correctly with exclamations, pauses and laughter.

Similarly, non-nursing student informants had difficulty expressing correct and complete information regarding the immune system. The following quotes illustrate typical responses.

“Forgive me but I’m feeling kinda dumb, but... Yeah I did, in Bio 30 [Grade 12], and stuff like, huh, now I’m trying to remember, I just remember we watched a video and stuff on like the T-cells and B-cells and stuff. (Pause) Helper T-cells! That’s what it was! But I can’t remember, I’d assume it’s probably somewhere in your lungs area maybe? I don’t know (laughter).”

Here the informant diffuses the issue with laughter when realizing s/he could not describe the information as thoroughly as anticipated.

“Well I know there’s antibodies in the blood and, I’m really not sure. I should be able to think of some (organs), I’m not sure, lymph nodes and stuff? Do they have anything to do with it? I don’t know they come to mind, I’m not sure.”

This informant also displayed minimal information about the immune system and realized that s/he could not expand on it.

“Yes I do! Parts of the body, hmm, well your blood is in it, and so I guess in what ever way your blood is like, well your whole body in a way in involved in it. And so when the disease is in you the immune system has to fight back, by defending itself against whatever it the disease is.”

This informant’s confidence in thinking s/he knew more about the immune system than was actually demonstrated was typical.

Ideally, if the informants were making informed decisions about accepting immunization, they should have demonstrated a detailed knowledge about the immune system and how immunization works. The informants demonstrated that they did not

have the background necessary in immunology to assess the vaccines or interactions in the body. The informants also demonstrated apathy by their lack of interest in understanding immunology and communicable diseases and relying on 'the system' to keep them and their families up-to-date and healthy. Most informants did not take an active interest in their personal immunization status, although most of the time their responses indicated positive intentions towards immunizations.

Overall, nursing students had a better understanding of the immune system, albeit limited. Sometimes the informants thought they had a better grasp of the information than they actually demonstrated during more rigorous questioning. No major differences between gender, ages, or non-nursing students were discovered. Most provided descriptions of the immune system including the words "blood" and "antibodies." Typically, most of the nursing student informants had positive attitudes but limited knowledge.

Understanding immunizations

To gain a better understanding of the knowledge dimension of the informants, detailed questions about their personal immunization history and what they understood about immunizations were asked. Asking what they remembered could be assumed to indicate the amount of interest they took in their immunization status. All of the informants indicated that they were immunized, but only some of them could confidently list their immunizations. More nursing student informants were able to provide details about their immunization history than non-nursing student informants.

When asked whether they were immunized and if they knew with what, typical responses from the nursing student informants included statements like “Yes. Absolutely everything that I need to be.” The confidence in affirmative responding followed by the lack of detail was unexpected in the nursing students’ as they are required to provide current immunization status for matriculation. Another nursing student provided incorrect information by referring to the Hepatitis B immunization as the “*Hepzime* immunization.” Often, nursing student informants confused the TB test with TB immunizations as illustrated by:

“**TB, I (laughter)** I don’t know a lot about immunizations. I know we had to get everything done before school so whatever that is, but I can’t remember, it might be DPT or whatever.”

It was unlikely that the BCG immunization was actually given to this non-Native informant. Sometimes the nursing student informants free-associated names of immunizations that they knew of and assumed that they had. This process was demonstrated by this nursing informant:

“No, probably everything, but there’s no record of it. I just go on the word of mouth from my mother. I don’t have one of those little round marks that my wife does. That was for some gun thing for injections but I’m not sure for what. It was for immunizations. There is whooping cough, measles, mumps, I had the mumps so, I must not have been vaccinated for it. (Pause) rubella, *diphtheria*, *hmm*, *I thought that was the same thing as whooping cough*, **I think I’ve got them all mixed up in my head**, so, the German measles, polio.”

Non-nursing students also had difficulty articulating with what they were immunized. This was demonstrated by this typical response: “As far as I know because we had an immunization program in high school. I honestly don’t know the type.” Sometimes the informants deferred responsibility by attesting that “I don’t know cause

my parents always dealt with that.” Another non-nursing student response demonstrated how they remembered immunization experiences in school.

“I had my tetanus shot in grade six, and then um, in grade nine **at my school** they gave tetanus and another shot, but I can’t think of what the other shot was, but I had to get the other shot because I already had my tetanus. But I can’t remember what the other shot was. **I should know but I can’t.**”

Sometimes the non-nursing students informants over emphasized how often they received immunizations at school. It was unlikely to receive an immunization every year at school.

“Yes, I’m up to date. I got a meningitis shot just last year. **And those ones we got at school**, I don’t remember exactly which ones we got. It was like tetanus and stuff. I got them every 3 or 4 years, I just got my tetanus one in grade 11. **I know I got a shot every year at school.**”

Other incorrect information regarding personal immunizations was articulated by a 19-year old non-nursing student informant who stated “I guess like with vaccines like, yeah for like *smallpox*, measles and I did that Hep B one with the three stages just last year.” This informant was too young to receive smallpox vaccines. The author also noticed no scar on the arms as this informant was wearing a sleeveless top and had bare arms during the interview.

Nursing students were able to list more immunizations than non-nursing students. This can be explained in part as nursing students are required to verify their personal immunization status prior to admission to the University of Lethbridge nursing program. However, some of the nursing student informants forgot or confused details of what they had. Many confused the TB scratch test with an immunization, or thought they were immunized for smallpox when they were clearly too young and did not display the typical circular and puckered scar. Some informants revealed apathy for their personal

immunizations status and noted that it was “taken care of” by their parents so they did not have to. A common phrase for all informants was “I’m up to date” but was rarely backed up with specific details.

To assess how knowledgeable (i.e., level of understanding) the informants were regarding immunizations, detailed questions were asked about how immunizations worked. This also assessed how interested the informants were in gaining knowledge about immunizations. The author assumed that people who are generally interested in something are motivated to gain a greater understanding about that topic. The amount of factual information gathered could be compared between the two groups.

A typical nursing student response to the question “Can you tell me how immunizations work?” was:

“I don’t know a lot, but you get, when you get immunized it’s just, it’s more like antibodies in your body to kill off the antigens, it helps fight against the antigen. The antigen is like something bad in your body that can eat away at things, well, I guess not necessarily eat away at things but destroys.”

Sometimes the nursing student informants were able to give more detailed answers however lacked sufficient depth that was presented in Chapter Two. Here the informant believes immunizations to be made of bacteria, yet forgot or never knew, viruses are also used. Other nursing student informants would talk about viruses instead of bacteria:

“What it is that they’re injecting a weakened strain or dead form of *the bacteria* into you and that like is enough that it won’t harm you or give you the disease but it is enough that your body recognizes it as a foreign substance so that um, your white blood cells, like your T cells and killer T cells they can break it down and against it in your immune system and the next time if your back with that, they have it in your memory. You have memory cells to kill it and form an antigen in the immune system to kill it.”

Non-nursing students had less detailed information regarding how immunizations worked than nursing students. Typical responses included: “Yes, they inject you with the disease and then your body produces antibodies against it, that’s what it’s supposed to do?” and

“They give you a shot of the actual virus so that your body will recognize it and your cells can fight it if you get that disease you will know how to kill it off, I don’t know that was what I was told. (I was told) by health nurses in school and doctors. That was the general thing they told me.”

Sometimes the non-nursing students said they were unsure how the process worked and said:

“No, (pause), I know that you get a shot and, and it’s supposed to protect you so that you don’t get the... isn’t it something like you get bacteria in you and then your immune to it or whatever? You don’t get it. I have a vague...”

Another typical response was:

“They inject, I think they inject some part of the diseases into you and I don’t quite understand what part they inject into you, but, it’s part of the disease and the body will build up an immunity to it, just to fight it off, but it’s such a small portion that it doesn’t effect you.”

Most of the informants had very little knowledge on how immunizations work. They confused details regarding viruses and bacteria. Nursing student informants generally gave more information and showed more interest regarding antibodies than non-nursing student informants. The meaning of these quotes to the author revealed the overall lack of knowledge by the informants.

Understanding communicable diseases

To further assess whether the informants had a clear understanding about communicable diseases, detailed questions were asked. Fact sheets are provided in Appendix F to aid the reader in reviewing communicable diseases. The nursing student informants were able to list more communicable diseases than the non-nursing students; however, both groups expressed erroneous concepts. Many informants were confused with the term “communicable” and needed prompting to generate further discussion. Communicable diseases are those that can be transmitted from one person or animal to another, i.e., they are contagious. Infectious diseases like tetanus or anthrax are not technically communicable diseases as they are transmitted by spores and cannot be transmitted from one person or animal to another. Vaccine-preventable diseases can include both communicable and infectious types. (Dorland, 1985)

When asked to tell the author what they knew about communicable diseases and list as many as they could, typical nursing students’ responses were:

“Well it means that it’s transferred fairly easily, once there’s one case it can spread fairly rapidly in urban settings and cities, and most of them are usually, well some can die from them, but are fairly serious. Well, (laughter) I don’t know if, I don’t think AIDS is considered one, but I’m not sure, I not sure about hepatitis, but there are things like meningitis, I don’t know about the chickenpox, **I’m not sure about any of those.**”

Sometimes the nursing students gave incorrect information as demonstrated by:

“Um, just *diseases that are in a community, the ones that are more prominent...* Tuberculosis? And those kinds, I don’t really know a lot about these kind of diseases as I don’t, **I’m not very aware and I feel ignorant about them**, um, tuberculosis... maybe chickenpox and those kind of things... measles, um, polio, smallpox, mumps,

rubella, scarlet fever, um, I don't even know if that classifies, whooping cough; pertussis, that's probably about it (**laughter**)."

And also:

"I know but I just can't think right now, *the diseases that they just don't have cures for yet, medications or cures*. They can be, they can be caught by contact, from someone that has them, I can't quite remember the term."

Again the use of laughter was displayed by many of the informants to diffuse feelings of uncertainty. Typical short answers included phrases like: "I believe it's the diseases that people can pick up that are out there." They were correct but lacked depth of understanding.

Non-nursing students' faired equally well as the nursing students when the depth of understanding of the answers were analyzed. Common phrases included "*diseases in the community*." Typical responses by non-nursing students were:

"It's a disease that's transferred between individuals, um, usually first, I think it would refer to contact, direct contact, but I'm sure you could probably get it by airborne, airborne anything, it's communicable too..."
and,

"Communicable? Like in contagious? (**laughter**) oh, what do I know about them, oh my goodness.... You've got your STD's, AIDS, HIV and Hep, **I don't know**, those childhood diseases, chickenpox, I think, flu, 'cause you can get flu vaccinations, is tuberculosis? Aren't all other them communicable to some extent? Oh but not like cancer, I guess that's not one. It seems that most are contagious from other people."

Again, laughter was used to diffuse the response when the informant did not know the answers to the questions. Sometimes the informants commented on other countries with reference to communicable diseases. This is illustrated by several informants' perceptions

of communicable diseases being emphasized as Third world problems by the following comment:

“Hmm, (long pause) Or that are a little more common than like if you go outside into another country or go to another country, I don’t know, um, maybe easily transferred from one person to another for something similar. Um, if I knew I was right about what communicable diseases are! (laughter), I don’t know, like the flu or something? Um, bronchitis, um, Strep throat, I’m not sure if I’m right about these things or not, um, well I’m not so sure how serious communicable diseases are, or can be so it kind of inHibits me, with ideas for me cause it could be like, the need, like the needle thing it could be like AIDS or something, but I’m not sure. So AIDS, I don’t know.”

The informants most often knew communicable diseases were contagious. The nursing students’ informants had more information regarding communicable diseases, but generally there was little difference between the two groups. Interestingly, many of the younger informants thought of STDs before any other communicable diseases. Both groups of informants used laughter to diffuse the conversation when they did not know the answer to the question.

Some informants could not think of any communicable diseases, so the author tried prompting them with the term “childhood communicable diseases.” This was successful and often jarred informants’ memories and generated more useful information. One nursing student responded, “Chickenpox, measles, polio, whooping cough, croup, RSVs (long pause) that’s all I can think of.” Another nursing student responded with incorrect information:

“Measles, mumps, whooping cough, um, *is syphilis a childhood disease?* Are children at risk? I know that’s an STD as well, um, and then I was thinking there, there is *herpes*, um, chickenpox, smallpox is in there, it’s making a come back,

um, tuberculosis, um, meningitis, and there is kinda all I can remember. Nothing else is coming to mind.”

Similar responses were noted among the non-nursing informants: “**Oh!** whooping cough, scarlet fever, um, measles, chickenpox, mumps, that’s about as far as I can go on that one.” And another informant said: “**Oh!** Like measles and chickenpox, and smallpox! That’s the one I was trying to come up earlier. **There we go!**” Non-nursing students also gave incorrect information as indicated by stating measles was like a simple cold:

“Well I know it’s like mostly children get chickenpox, *like measles, um, it’s like a simple cold*, I don’t know. Um, like they can get meningitis I suppose. (**long pause**) that’s all I can think of right now.”

Another non-nursing student identified malaria as a childhood disease. While it is true many children in tropical places of the world do indeed contract malaria, it is not as yet common in North America. More non-nursing students had difficulty describing communicable diseases than the nursing students. Sometimes this prompted unusual responses like how the smallpox vaccine was discovered or that syphilis and malaria were ‘childhood’ diseases.

To assess the depth of understanding of vaccine-preventable diseases from the informants, several diseases were mentioned after they had listed as many communicable diseases that they could remember. Representative samples of their responses are presented. Diphtheria was selected because it is no longer common in Canada, yet it is still included in routine immunizations.

Several nursing students incorrectly described what diphtheria was. One nursing student commented:

“I don’t because I’ve never had it or met anyone with it. I know it was bad and it was (pause), *but to me it’s like smallpox*, I know it’s bad but, I’ve never had it or met anyone that has. *Apparently it has been eradicated* so, (laughter) I don’t think I ever will. I’ve thought that diphtheria was still around because we still get it, I remember one of our professors telling us that I thought she had said she had been in Egypt and, one of her colleagues had gotten it. And she got malaria. *A lot of these things I’ve mentioned were things we get in Canada, so it’s a disease if you travel abroad. I’ve just never been immunized for it and never expect to get it.*”

This comment illustrates not only incorrect information but also focuses on how this informant minimized the disease, thinking it was only a risk while traveling abroad and that s/he never expected to get it. What is also interesting is the comment of never having met anyone with the disease. This is typical of vaccine-preventable diseases, when the herd immunity is high, disease rates decrease to the point of being unrecognizable. Other nursing students confidently, albeit erroneously, described diphtheria as **“It’s a *GI disease. Gastro-intestinal and you have to travel abroad to acquire it.*** Others were not as confident and guessed: **“I’ve heard of it but don’t know what it is. Is it another high fever one?”** and **“diphtheria, not sure exactly. I think it’s another one that affects *the nervous system.*”** Other nursing students remembered hearing of the word yet admitted to not knowing what it was: **“Yes. See now that you’re talking about them, I’m recalling what children get vaccinated against. But no I do not recall what that is. I know that’s a vaccination that I’ve had.”**

Similarly, non-nursing students failed to describe diphtheria correctly. However, they were less inclined to guess about symptoms and more readily admitted to not knowing what it was. A typical non-nursing student response was:

“I’ve heard of it but have no idea what it is. It sounds to me like something that would be associated with cold symptoms um, pneumonia symptoms like, probably, it sounds like that.”

Sometimes, the non-nursing students did try to guess what it was but ceded that they were unsure of themselves like the comment **“Yeah I think so. Isn’t that something related to your *bowel movements*? I’m not entirely sure about that one.”** As with the nursing student, the non-nursing students also spoke of travel as illustrated by:

“Diphtheria, yeah I’ve heard of it, it would be something I like, cause when I hear a certain word and it sounds neat and rolls off the tongue, and I’m always like, *eyeah*, but, diphtheria, I think that is one I got immunized to go to Africa for some reason, hum, diphtheria, diphtheria, diphtheria... I have no clue what you get. Is that when you get some kind of curse? No that’s wrong, well they call it some kind of name, and you can get it from *drinking water in Mexico*, and but we’re talking about something completely different.”

This comment also illustrates how the informants free-associated ideas to answer the questions. This particular non-nursing student confused the “curse of Montezuma’s revenge” (diarrhea) with diphtheria, which is an entirely different illness.

Both groups of informants demonstrated their lack of knowledge and interest about diphtheria. Nursing students generally guessed more often than the non-nursing students while answering questions.

Tetanus was selected as another disease for discussion. This vaccine-preventable disease is common and readily recognized. When asked what tetanus was, a typical nursing answer was: "Yes. Tetanus is a disease, I have it, I just can't, I know what happens, I can picture it, it's like a bad disease (laughter), it can be prevented, I know that (laughter), I just can't think of the words." Rarely did the nursing students identify the tetanus toxin from soil such as this one: "From something in the soil like I guess thinking back when I stepped on a rusty old, I think it was a nail or a pin or something, so I had to go and get a tetanus shot." Sometimes, the nursing students would give incorrect answers confusing tetanus with rabies as illustrated with the comment: "Heard of it. It's a stiffening of the muscles. From dogs. Or from rusty nails, bacteria I guess." However, C. tetani spores are sometimes associated with the saliva from certain animals, and the CHR does ensure in cases of dog bites that immunization with tetanus is up-to-date. This informant's quote does illustrate that immunization is often based on personal experience rather than education (Personal communication, P. Hasselback, January, 2002).

Similarly, the non-nursing student informants also associated tetanus with rusty nails or confused it with rabies as illustrated by the following quotes:

"No, but I have a general idea, it's a disease associated with metallic objects, that's about as much as I could tell you. How it gets immune from metallic objects I could only guess. With like, it's just a foreign objects in the body."

And from another non-nursing student:

"I know it has to do with infections because when I got mine done I stepped on a rusty nail and it went into the joint of my toe, so I had to get my tetanus so it wouldn't get all infected. It was to fight off whatever was on the nail. To fight it off."

And by another non-nursing student:

“I believe you get that after you’ve *been bitten by an animal* usually, and it has to do with blood. I think my brother is allergic to tetanus shots, he has too high a natural tetanus or something? I don’t know but he’s not to have another shot. He had a reaction when he was young, probably not more than a toddler, he had a fever and a bit of a rash and crying all the time, (laughter) **yes I remember, it was not a pleasant experience I was about 5 or 6. He was a very unhappy child for a bit.”**

This comment also illustrates negative experiences with immunizations from the non-nursing student informants’ perspective. The most consistent theme to emerge from the interviews was that almost all of the informants associated rusty nails with tetanus. The tetanus shot was also the most recognizable for all of the informants. Many of the informants also confused dog bites with tetanus instead of with rabies. There was little difference between the two groups of informants.

Disease recognition questions were asked to assess whether the informants understood details of some common vaccine-preventable communicable diseases. This was mentioned after they listed as many communicable diseases as they could remember. Measles, mumps and chickenpox were often associated with childhood diseases. One nursing student commented:

“Um, to be honest, I think measles are more painful, chickenpox are more itchy, um, **I can’t remember having it, but I know chickenpox can leave scars and I had one for a couple years but it went away, I guess I scratched it and never recognized it, measles I think is more of a rash, and smaller dots where as the chickenpox are spread farther apart on the skin and they can also cause apparently shingles when you get older.”**

Often, the nursing students confused mumps with measles as illustrated by the comments **“Hmmm. Yeah I heard of them (mumps), are they *the same thing as measles?*”** and:

“Mumps are more common and less severe. *Signs and symptoms of mumps, I always thought were hives and it comes almost like an allergic reaction. Like red, blotchy sort of things. But I could be wrong.*”

Similar responses were elicited by the non-nursing students as demonstrated by the comments: “No, I believe I was vaccinated for it too. I think you get spots, it just sounds like a horrible disease. **Mumps, I don’t really know.**” And:

“Yes. When I think mumps, it’s definitely bumps, mumps, bumps, I think little ones, mumps, bumps, mumps. **No, never had them, never have seen them.** Not that I would know of, but I’m probably immunized for it though.”

Many of the informants, including the nursing students, confused mumps and measles. All of them recognized, and most experienced chickenpox, but none had experienced measles and most never experienced the mumps.

Since many of the younger informants (and all of the nursing student informants) were immunized for hepatitis B, detailed questions were asked to assess how much information was retained. Typical responses from the nursing students to the questions “Do you know what hepatitis is?” and “What do you get when you have hepatitis?” was illustrated by one informant as:

“These are hard questions, **(laughter)** I should have studied before I came. **(laughter)** say, I’m trying to think on how to explain it. It’s a **(pause)**...Liver. I’m not sure, I don’t think you can tell just by looking at them, unless they’re severely jaundiced. And even then you can’t be certain.”

Another response was:

“Hep B is a disease that affects the liver and is spread primarily through body fluids such as sexual contact and saliva, um, *I know it’s curable*, there’s a vaccine for it. That’s all.”

Unfortunately, hepatitis B is not yet curable. The lack of correct information regarding hepatitis B was further shown by another nursing student as:

“I think you get a fever. And I don’t know it can be like deadly, I wouldn’t know what you would see, but I think, yeah I wouldn’t know what you would see. I think it is *neurological*. But I don’t know I’ve never seen it before. Hepa could mean liver. Is it part of the liver? Oh! The liver makes antibodies too. (laughter) yeah it does.”

Laughter was a common response when informants could not explain or describe a topic as fully as expected.

Similarly, non-nursing students also demonstrated a lack of correct information regarding hepatitis B despite the fact that several younger informants had recently been immunized for it. A typical non-nursing student response was:

“Hep B shot... yes! Yes! We got them last year in Grade twelve. Yes, (had all three shots) with [displeasure in voice remembering them]. I know they started immunizations for those a while back and if you got them done earlier then you don’t need as many shots. But they started it whenever we passed that grade they started them in, so they gave them to us. Um, I’m not sure if hepatitis B is sexually transmitted. Um I think. I’m not really sure what it is.”

This informants’ response is important for several reasons, it denotes displeasure in remembering the immunization experience and also confirms the informants’ lack of understanding of why s/he was immunized. It also signifies that hepatitis B is primarily associated as a sexually transmitted disease. Although this is true for most cases of hepatitis B, this is not the only vector for transmission. One non-nursing student confused hepatitis B for herpes by stating: “I think if I’m right, a form of hepatitis could come in the form of *cold sores*.” The next non-nursing student stated s/he did not know what hepatitis B was and also revealed weaknesses in the immunization campaign by

merely receiving an information sheet without enough dialogue from the health care workers:

“No. (pause) they told us some of the symptoms, it was on the sheet but I can’t remember it off the top of my head. I don’t remember. I remember my friend always telling us why she wasn’t getting the hepatitis shot, because she was never gonna have sex, but I don’t think the hepatitis, that it had to deal with that, for some awkward reason. I’m not too sure. I read the pamphlet at the beginning but I can’t really remember, it wasn’t really overly important to me at the time. Well it was at the time, but I’ve been remembering other things like, but it’s gone.”

This informant also revealed interesting sources of secondary information. His/her friend announced that she was not going to receive the hepatitis B immunization because she did not intend to have sex. This informant also revealed how little importance immunization was to him/her at that time of life.

The nursing student informants had more knowledge about hepatitis B, albeit limited. Of the non-nursing student informants, an age difference was discovered. Younger informants had more experience and information regarding hepatitis B due to recent high school immunizations.

Immunization perceptions

To assess the informants’ perception and interest regarding immunizations, a question regarding parental immunization status was asked. This also demonstrated the amount of family communication regarding immunization. The author was interested to

see whether this was a common topic of familial conversation. Few informants were able to state whether their parents were immunized. A nursing student commented:

“I don’t honestly, I’ve never discussed it with them. They’re pretty law abiding so I assume they would get immunized as they came out, whatever that was required.” Other nursing students stated that their parents were immunized but lacked certain ones as illustrated by: **“Yes. Well they don’t have the flu shots or the hepatitis shots.”**

Similarly, non-nursing students had difficulty recalling whether their parents were immunized. Some non-nursing student informants had anti-immunizing parents as revealed by the statement: **“I don’t think so, cause they hate doctors.”** Most often though, the informants simply did not know and as one demonstrated the lack of importance to him/her about it by stating:

“No, I never really thought about it (asking parents about vaccinations) I never, I mean it is important to me, but I think my parents would have had them all done. I never really paid specific attention or something later on..., I guess it was always understood that I got all my vaccinations.”

This informant also revealed how s/he took being immunized for granted and was thus not an important topic.

Overall, few of the informants knew whether their parents were immunized or not. There was no age or gender difference between the groups. Many informants indicated that parental immunization status was not a common topic for conversation, nor were they interested in it.

To further assess how observant and perceptive the informants were about parental immunizations, questions were asked regarding the common smallpox immunization scar. It was hoped this would illustrate the informants' interest and awareness in immunizations and question-seeking behavior. Many nursing students had little awareness of the smallpox immunization scar on their parents. Comments varied from: "Yes they both have it. What is it? Why would it be that big? Was it a *branding*?" to "No, not that I recall. Was it the *rubella vaccination that girls get*? I don't know. I know they can do that and that girls get that when they are young. I don't know if guys ever got it, so. I don't know anyone who has been vaccinated against it." Other nursing students confused this immunization to measles or tetanus shots.

Similarly, non-nursing students had equally vague answers regarding parental smallpox immunization scars. Some did remember noticing the scars by stating: "Yes. They both do. But I don't know if they keep up to date with them." And some informants revealed that they were not interested but now were as indicated by this statement: "I've never really looked so I don't know, **(laughter)** now I'm gonna look actually."

Most of the informants had difficulty remembering whether their parents had the smallpox vaccine scar on their arms. Informants remembered the scar on their mother's arms more than their father's arms but few informants knew what the scar was from. There was no difference between the groups of informants regarding this topic.

To assess the informants' perceptions of other people in society, questions were asked why they thought people comply with the recommended immunization schedules.

Nursing students took time to give thoughtful responses that illustrated their perceptions.

A typical nursing student stated:

“Well it depends, if you are talking about the average person that doesn’t know very much, it’s because it’s kinda, even though it’s not officially mandatory in Canada it is in some other countries but um, it’s just kinda become the norm now. You get it because you’ve been told it’s good for you, but I think also, because they saw that smallpox is gone and polio is for most people virtually unheard of, um, well not for a long time anyway, and for a long time it seemed like meningitis was, but it’s making it’s turn again in Alberta, it’s making it’s rounds especially in Alberta, and now kids need to be immunized again. So I guess they just don’t have any reason not to. **Once they’ve heard from like naturopaths, some chiropractors, um, some chiropractors are against it** I know that um, because of, um, what was I reading it was because one of the founders of *chiropractology* or something was very much against it and his son didn’t like them so, it was a part of chiropractic since it’s started and I think that everything is just connected to the alignment of certain spinal nerves.”

This nursing student illustrated awareness to facilitators (“it’s the norm”, “it’s good for you”) and barriers (chiropractors, naturopaths) in immunization.

Non-nursing students equally gave careful thought to this question. A typical non-nursing response to “why do people choose to go along with immunizations?” was:

“Some might because **they might actually don’t want to get sick** or they know what they’re talking about. Like when they get their shots it has a purpose, but for others, it’s like everyone else is doing it so you might as well, I suppose. **Some people don’t even know why they’re doing it. But I don’t know.**

This informant revealed common themes of compliance for a purpose of preventing sickness and participating in a normative way. Another non-nursing student who was a world traveler further illustrated the perceived benefits of immunization:

“**To get rid of diseases**, like the plague and that. It’s basically gone, at least in North America, and where we, have gotten rid of diseases, and they live longer I guess, it would be of **benefit**. And **infant mortality rate**, that has dropped and

people are living longer and children are able to grow up and be adults, we saw a lot of people in Africa where kids don't even grow up, it's awful because they get these diseases and so, **definitely it does a lot for society**. It helps I guess for them to grow and be older."

Essentially, most of the informants said that they thought most people go along with immunizations because it was beneficial and presented it in a positive way.

Questions regarding known non-immunizing families were asked to the informants to assess how-wide spread this practice was. Often, the non-immunizing families were friends or related to the informants. It was hoped this would generate detailed descriptions of the non-immunizing families from a secondary source close to them. Many of the nursing student informants also had academic-related exposure (from a practicum in either public health units or hospitals) to non-immunizing families.

A nursing student spoke of families s/he knew personally that delayed immunization. This comment illustrates how families can miss opportunities to immunized due to "busy lives:"

"I've met families that were **kinda lagging**, but it wasn't because they didn't believe in it, it was just that **they got busy and didn't go**. Unless you keep the schedule up like we try, **you can easily miss it where you are doing your year and a half shot at three years or four years**, you see I've met **Mexican Mennonites and Hutterites** and I'm not sure if they immunize or not, so I may have I just don't know."

This nursing student also identified Mexican (Kanadier) Mennonites and Hutterites as possible non-immunizing families. Another nursing student identified a specific immunization that would be refused by another family:

"I know some that won't worry about the **chickenpox vaccination**. But as far as the others, all the people I know will have gone for the regulation regular shots. I

think it's not important or it's a rite of childhood or it's a mild thing that they don't worry about chickenpox because it's not dangerous. They don't have maybe all the information of how dangerous it can be. What risks they're putting to their children."

According to yet another nursing student informant, secondary information was revealed that identified another non-immunizing family as Dutch Reformed. The informant said:

"I've been in contact with more people who just haven't at all. Yeah, I think so, they are all the Dutch Reformed." Other non-immunizing families was identified by an additional nursing student informant as:

"I think we used to have Natives working for us on the farm and I know they didn't do any kind of health care. If one of them got sick then all of them would get sick, a lot of the kids anyways. I think well, farm, farm families who don't practice immunization. We have some neighbors out by (Town Name) and I think they are Mexican Mennonites and we know their family pretty good and you know if the mom is sick then all of them get sick, it just happens that their kids get sick a lot. Well I don't know if that has anything to do with going to Mexico for the winter or I don't know if it's related to that."

This secondary information given by the informant was consistent with the literature.

Non-nursing students' also identified non-immunizing families and tried to convey their stories. One non-nursing student said:

"I wouldn't understand why. I know, I know some people don't believe in doctors and medicine but, I know there were a few people at our school that weren't getting vaccinated because there a one in so many chance that you, the vaccine could, make you sick and I know some people who didn't want to take that to be that small percentage. But other than that, I guess they're afraid they're gonna be that one in so many. I mean there's statistics so it's gonna happen to someone."

This passage illustrates the perceived risks to immunization instilling fear in some families. The informant's comment about "statistics" is also consistent with the literature

as a barrier to immunization. Another non-nursing student informant revealed reasons behind some friends not immunizing:

“Well I’ve met friends of mine that didn’t want to be further immunized, I guess like the one for meningitis, like when that whole thing came about and they decided they would do a mass immunization for it, it was like “I’m not gonna get that !” “ I’m afraid of needles” or “it’s not gonna touch me” or “if everybody else is immunized then why do I need to bother? Because obviously its not gonna exist anymore but then there would be people for with like religious reasons that they would choose not to. I guess some people would say “God will protect me” and like “I don’t need this” and other people might say “I have this amulet, its going to clear up everything”, so I guess there could be a hundred reasons.”

A different non-nursing student identified another non-immunizing family. The informant revealed:

“I did ask, but my friends couldn’t tell me a lot. They said it was just something that ‘my parents wouldn’t let us’. I never totally knew, I think it was with religious reasons, but I’m not too sure. I think they were Hindu or Muslim, it’s one of those two. Yes they were in (Town Name), but they just moved to (Town Name). I was younger, I remember my friend got the measles and that’s why I definitely don’t want her to go thru that. Well I don’t know I just find you’re a lot healthier if you get immunized.”

Although this was a secondary source, and the informant was not clear about which faith the friend were (Hindu or Muslim), further investigation is recommended to clarify if this was a common religion-based immunization barrier.

Most of the nursing students and many of the non-nursing student informants had met families that did not immunize. Different reasons were stated ranging from religious to alternative health. Sometimes the families chose to refuse certain immunizations like chickenpox, while others delayed due to apathy disguised as “being busy”.

Questions regarding herd immunity were asked; such as whether the informants thought their immunization status affected others. It was hoped this would reveal attitudes and perceptions of the informants regarding their personal immunization status. A nursing student presented a positive attitude when asked whether s/he affected others by being immunized as illustrated by:

“With others? In terms of health, well I’ve never got any of these diseases like polio so that’s a positive effect in terms of others around me, and in my attitude I firmly believe in immunization, especially because it’s helping the body do what it’s supposed to do, you’re not making it do something it’s not supposed to do, so I would tell anyone who was having doubts about immunization, not that they’re stupid, but that they would actually understand what they are deciding on. I don’t think it affects my day-to-day life it’s just never comes up.”

Interestingly, this nursing student didn’t perceive immunization to affect his/her day-to-day life. A different nursing student supported this perception by stating:

“I don’t see that unless it came up in conversation. Um, unless somebody was talking about it, um, it came up if you were immunized, but why would someone and so on, but other than that I don’t see how it. I don’t ask anybody unless it comes up.”

This nursing student also demonstrated apathy towards immunization as it would not be considered unless it was specifically addressed in a conversation. This particular nursing student informant did not see any other effect to others by being immunized other than a topic of conversation! Other typical nursing student responses were directed as a means to decrease the spread of disease: “Well I guess it would prevent me from spreading it to other people. Like if my body has a resistance to it then, I don’t imagine that I can spread it then.”

Non-nursing student informants gave similar responses as the nursing students.

One non-nursing student commented that they saw themselves as affecting others by being immunized by:

“It’s helping other people cause if I caught that I’d keep spreading that, I’d be just another link in the chain. I don’t want to cause, chances are once you catch something that you can pass it along without even knowing you have it. You know so…”

Another non-nursing student revealed other psychological features to immunization as:

“I believe it does affect other people around me as well. It’s also a psychological thing to go with this as you feel a lot safer to know that you have it so you’re not walking around in fear, that you won’t contract something from somebody else, and I’m also assuming that a lot of other people feel the same.”

Many of the informants thought that they were positively affecting others by being immunized since it decreased the chance of spreading disease. Many described the concept of herd immunity without realizing the term existed.

Additional questions regarding herd immunity were asked, about whether the informants thought other people’s immunization status had an effect on them. It was hoped this type of questioning would reveal detailed information from the informants. Most nursing students revealed concerns about other people not being immunized. One nursing student focused on people “not being immunized it could spread and that costs the health care system and that costs me because I pay for it.” Interestingly, one nursing student was not concerned about others not being immunized around him/her and commented:

“Um, if, if, these diseases aren’t for a risk of mutating, or at least not rapidly, no, as long as I’ve been immunized against it, they themselves are at risk for

passing it on to each other but me, no, if they are like the common cold or flu then yeah I could possibly be at risk.”

A different nursing student revealed how other people who did not immunize concerned him/her:

“I would say that it bothers me. But I don’t know if that’s because, I mean, the choice was made for me when I was a baby, and I just grew up, and my parents gave me my beliefs, and, now that I’m seeing things, I think I would have chosen the same thing and I’m not sure why people would chose not to immunize. And, yeah it’s bothersome to see that you can have a very sick child and they won’t immunize but they will bring them to health care settings and to have care provided for when it could have all been prevented.”

Another nursing student revealed his/her similar concerns with non-immunizing families:

“Hmm, I, yeah, I think it’s, you know it’s their own choice and (pause), and it’s their values that they’re upholding, but and I really don’t know the reason why they chose not to immunize but I went to (Town Name) for the special unit there and for a practicum rotation I saw there was a guy out there who, he, (pause), he had the measles when he was just a newborn and it went to his cerebral spinal fluid and so he’s paralyzed from the neck down and he, I don’t know he just, he’s totally dependent on everyone. He just has his little chair that he uses. And that scares me like it could have been avoided, if he was immunized, I don’t know I just think, why did that have to happen? It could have been easily prevented, in these times I guess.”

This was a poignant experience for this nursing student. Several pauses in the conversation revealed emotional content for this informant. Although the concept of “choice” was demonstrated by several nursing students, there was apparent difficulty accepting this.

Non-nursing student informants also revealed their perceptions on whether other non-immunizing people in society affected them. One non-nursing informant revealed:

“I’ve heard of, but only with magazine articles and things like that. I read Maxim, but the one I can recall was from the Globe and Mail article. Somebody actually, a Mormon pastor I think, or something like that, he was a Mormon and somebody of stature, and he was suggesting that God had intended these

diseases to be so we should not play with that. There was another article where people were concerned about **having shots of any kind.** For consequences that would hold just because, well I think it was just because of the **media.** Like they hyped it up quite a bit but um, obviously, there was a **Hep C scare,** and you need to tell everyone, to stop taking the blood without checking it, and **there is no need to make people worry about every single vaccine out there."**

This informant diffused the question about how non-immunizing people affected him/her by talking about magazine articles. Different themes of religious and media hype were discussed. A typical non-nursing student was more concerned for future children that were too young to receive immunization and would be at risk from non-immunizing people.

"Um, hmm, well I suppose I personally couldn't get anything because I'm immunized but I still think they should **because say like if I had kids, until my kids get a shot for some particular disease then they're at risk** and they wouldn't be able to risk it from a person who could get it who has it, is like out there with that sickness, so yeah I don't think that they should, not get immunized if they can have it."

Another non-nursing student addressed the topic of education:

"It could be a question of education. **I'm not sure whether I'm the ignorant one, or that they're overeducated and are paranoid.** But I know that some of **these people do a lot of reading and they get enthusiastic about all the detrimental effects and the problems that can arise.** And I don't know, I get the feeling that those are the type of people that tend to look at track records and see the **worst case scenario,** as far as I'm concerned."

This informant viewed non-immunizing people in a negative light although questioned whether they were the right. It left a feeling of doubt. Another non-nursing student was also unsure whether non-immunizing people affected him/her as demonstrated by: "Not necessarily. **It could.** If they came into contact with something and they ended up with something that may affect me or my family."

A dominant theme to emerge from this question was the matter of choice. Both groups indicated that it was others' choice whether to immunize and this concerned them. There were little differences between the two groups of informants concerning choice.

To assess how the informants related to non-immunizing people, more questions were asked. It was hoped this would reveal the informants' inner attitudes and behaviors towards non-immunizing people. A nursing student stated:

"I guess you can't really. It's not something that we usually bring up if they're not immunized. A lot of people we see, they are not immunized then, the chances of encouraging it are just very slim. For the younger ones with the parents, especially if it's because of religious affiliation, we don't discuss it with them because we can't intrude on their personal life. So I guess we kind of, well I kind of turn a blind eye to it and hope they get better and don't get sick any more."

Another nursing student discussed another immunization experience with a client who did not want preventative medical interventions:

"Actually, I had a lady when I was in labor and delivery, that well there are these eye drops and you get them after you come out of the birth canal, gonorrhea, I forget the actual name of it, but she decided she didn't want them because she said her baby would never have gonorrhea symptoms and she totally refused, but she did have the vitamin K for the clotting factor, but she didn't want that. That's really the only thing, about what you're asking, she was very adamant that she wasn't going to be having that. That's really the *only experience I've had with immunization though*. I'm thinking that the name of these drops start with a G, um, it's an antibiotic, I really should know the name of them too (laughter) I think it's garamycin or well I'm just guessing, I don't know. The reasons for this woman, it was just her self-conviction. She thought there was no way that her baby was at risk you know."

A different nursing student had a negative immunization experience with a client during a practicum:

“Ah yes, a Hutterite, yeah. Um, she had read some articles I think in an Alive magazine, and it had just discussed how you’re basically injecting poison into your children, where the vaccine could have lead in it, it could cause side effects, so she was just basically scared. Yes, we actually went out to her house to do a baby check up. I went with the public health nurse. We basically just presented the facts about immunization and left her the information and let her know it was up to her to decide, when once she had all the information, to make her decision, it was left at that.”

Most of the nursing student informants talked about their negative practicum immunization experiences. These were usually involving clients who refused immunization and how the nursing student felt and behaved during this experience. Non-nursing students also identified their frustrations with people that refuse immunizations.

One informant illustrated the magnitude of frustration when s/he stated:

“Well actually I think that’s stupid because, if they don’t then, they could make other people sick who won’t take it or I don’t know what it costs to do this, but maybe if you can’t afford it maybe, I’m not sure whether it’s free or not, but if costs a lot of money and you can’t afford to do it, then you really don’t have a choice but other people who do have a choice and don’t do it, they can make you sick and, I don’t know it’s just not good.”

This informant felt unsure about the financial costs of immunization (routine immunizations are free in Canada) and thought negatively towards non-immunizing people. Another non-nursing student informant discussed experiences with personal friends who did not immunize. The initial response was surprise in realizing their friends did not immunize, however, ultimately tolerance was shown as guided by the issue of choice. This informant explained:

“We’ve got friends who won’t immunize. They just won’t do it. We pretty much accepted that that is the way it is. They are the same age as we are, Caucasian, they’re Jehovah’s Witnesses, I don’t (know) what (demographic) that would be. They’ve got two kids too. Pretty much exactly the same family. It was much like one of those things where the health unit calls and my wife and she were having a conversation of how to get a convenient time. It was to go to the health unit on certain days and she said that she didn’t do it. This came as a surprise to my wife, and she explained that it was part of her religious belief,

and partly out of their own personal beliefs that they don't immunize their kids. I didn't think more about it after that. I thought it was their choice."

Another non-nursing student commented that non-immunizing people are responsible for their own demise should something happen and they get ill. This was a more antagonistic display.

"It's weird, like, I don't understand it, like, there's no way she can guarantee that she will never gonna have sex, and I think she is more just hurting herself more than others by never getting immunized, like if what if something does happen and she does get hepatitis, the only person she has to blame is herself because of that."

Feelings of frustration changing to feelings of tolerance were typical in the responses of non-nursing informants as with nursing students. Many of the informants had anti-immunization experiences with friends or relatives. Nursing student informants had clinical experiences with non-immunizing people that troubled them. Many of the informants handled these experiences by stating that immunization was a matter of choice.

Immunization experiences (barriers & facilitators)

To assess barriers and facilitators regarding immunization, the informants were asked to describe their own experiences. It was hoped that their descriptions would reveal factors that could be utilized for policy-making about immunization. One nursing student commented:

"Well I remember, I think it was one that it made your arm hurt. Like the flu shot but, I just remember hearing a lot of people complaining and then they just put us thru the classroom alphabetically, it was all pretty quick, there was a line you had to wait for. And I was getting a little nervous."

Another nursing student relayed stories from a friend about a negative immunization experience:

“Well, I think you hear stories, like I can tell you like I had a friend who had a little boy immunized and developed seizures after. He developed seizures and he’s basically autistic now. And people were saying that well, it’s maybe from the immunization.”

This story about autism created doubt in the informant’s mind. A different nursing student also had experience with a person who had a negative immunization experience that also created doubt.

“I had one person who contracted Guillian Barre Syndrome and he thought he got it from the influenza virus vaccine, and so he chose not to get anymore flu shots, I know a lot of people who get the flu shot, and they think it actually makes you sicker. Some people have said that it’s not necessary to get those shots because these diseases don’t exist anymore around here only, like polio and like that. And I’ve heard people talk about side effects, like, just like growth development delays and things like that. And their kids were like that.”

This informant did not critically question the perceived side effects or the actual incidence of disease and essentially accepted these ideas at face value. Another nursing student revealed how s/he felt during a negative immunization experience during a practicum:

“... it makes me feel kinda helpless, like someone whose going to go into health promotion and prevention as a nurse, cause lots of people read that (Alive magazine) and that’s all they’ll ever read and they will not read the other sides of it.”

Although the non-nursing student informants did not have practicum experience, they did have relevant immunization experiences that they wanted to discuss.

One non-nursing student revealed:

“What my parents had me do when I was little before I can recall, it’s different, it’s probably one of those suppressed memory things that I just never cared too much it’s always one thing I do remember was the needle. With the tetanus shot I had, it wasn’t so much pain as it was a feeling weird. Because I could actually feel it, kinda trickling down my arm, when they put it in, on the inside, very, I don’t know, unnerving. Like if I need a shot I probably wouldn’t hesitate to do it. Needles in general when they start taking blood out of me I can handle, but I can’t stand to see my own blood. (laughter).”

Another non-nursing student revealed a family friends’ negative experience with immunization:

“I think it would do with religious or cultural beliefs, it’s background if you know someone with a severe reaction. I know a little boy who is having seizures now, and he’s only at about grade 3 for mental capacity, and he I think that could be a stumbling block for some people. And I think, for us, we have faith in the medical establishment and that mostly it’s safe and you have.... Boy with seizure, don’t know for sure which one it was, it was one of the childhood vaccines, I think he was 2 and he had a very serious reaction that is only controlled by diet now, they’d be very frequent otherwise, he had rash and fever, and, it’s damaged his brain. It’s about 5 to 6 years ago, he’s 7 now. Yes it was from that (vaccine) but they don’t have enough to sue over it. The doctor didn’t write that he insisted on taking it or they probably would seek legal advice. Yeah, it was one of my mom’s friends.”

This informant believed that the boy’s brain damage was caused by a vaccine-induced seizure. This experience impacted her confidence in immunization and served as a barrier. From a different perspective, a rural non-nursing student informant chose to discuss ranching experience with immunization:

“The one year we didn’t vaccinate for IBR, we got IBR in the herd and lost like 20 % of the calves or something. It makes a huge difference. I think we didn’t vaccinate for IBR because it’s a really rare occurrence to get it, but it just happened to get it that year we didn’t vaccinate for it, so there’s always that chance it’s gonna happen. The calves are all born deformed and you have to put them down, like they don’t live. They are either still born or deformed.”

This negative experience in ranching facilitated the informants' confidence in immunization for people. Another informant revealed a barrier concerning flu shots that were about cost:

"We discussed getting the flu shot, cause we live in residence, but when we found out what we had to pay for it and it was kind expensive. So we didn't. We didn't get the flu shot."

Immunization experiences varied with the informants. Common themes emerged among the informants with farming/ranching experience. Nursing students had heard stories of adverse side effects. Common facilitators were positive immunization experiences in ranching and beliefs that it was beneficial. Common barriers to immunizations were religious beliefs, adverse side effects, costs (i.e., flu shot) and painful memories of sore arms.

From the literature, it is known that some people who use alternative health practices also have negative immunization issues. By asking the informants about their alternative health practices, it was hoped to generate information as to whether it was a barrier or facilitator regarding immunization. Most of the nursing students did acknowledge they used some form of alternative health practice. One nurse discussed his/her success with Yoga as illustrated by the comment:

"Relaxation, increase in flexibility, better alignment. I've started this (Yoga) a couple of years ago and do it on and off, but just finished one class in it. I've bought books about it and do some at home by myself as well."

Another nursing student revealed what the different alternative health practices s/he has tried:

“Chiropractic, and I’ve been to an iridologist. I’ve been going, just went to the iridologist (in Town Name) just once, and I’ve just started to go to the chiropractor for about a month. ... I went for my neck, and the iridologist I didn’t really notice anything. I just got cleaned out (laughter). Oh he puts you on a bowel-cleansing program. He looks in your eyes and can tell you all that’s wrong with you. I went more for curiosity than (laughter) apparently everybody needs a proper bowel cleansing. (laughter) It’s all with herbs. I did the whole program, but no didn’t find much difference.”

This nursing student diffused the conversation with laughter in a self-mocking tone that was based on curiosity to try new alternative health methods. Other nursing students told of positive experiences with massage therapy and chiropractic care as indicated by one:

“Yes. Massage therapy. Um, mostly just muscle relaxation, just cause I get sore muscles from working out in the gym, so it helps with that, and stress relief. I find it improves my circulation. Just cause I usually have cold hands and feet, and after I get a massage, they’re colourful and warm. I had a friend that recommended, he had it done, so...”

Another nursing student said:

“I go to the chiropractor as often as I can. The rest of it I don’t see any of them. Headache kind of stuff, it helped for any headaches that I ever get, for neck tension, so if I feel that my neck needs to be adjusted I’ll go see a chiropractor.”

A different nursing student also reported to using chiropractic care often, but also revealed more:

“Um, probably three years, three to four years. I don’t feel like you’re polluting your body with drugs or something. And I don’t like taking pills and stuff. Like I’ll take tea if I have cramps or things like that. I’ll use a hot water bottle or a bath. Just from listening to different things in the media. And the literature about it. Yeah especially the massage therapy. It’s relaxing, stress reliever. It just feels like you’re doing something good for yourself. My brother does, my dad does go to the chiropractor. I guess they do, but not as much as I do.”

This particular nursing student was interesting because she stated a commonly found theme in the literature “polluting your body with drugs or something” that was a barrier

to immunization. Most nursing student informants however were not found to be negatively influenced by alternative health practices despite its wide spread use.

Alternative health practices were commonly used by the non-nursing student informants. One informant stated:

“Like taking vitamins? Yes I go to the chiropractor about once a month and go to the massage therapist once in while cause I had a neck injury about 3 years ago and there is tension in there. My parents and my grandparents are really into herbal remedies for colds and stuff like garlic and vitamin C, echinacea.”

Another non-nursing student commented:

“I guess I’m old school, I don’t go to the doctor that often, maybe for check-ups, or if I’m really sick, I don’t seek out a lot of that, yeah I guess that’s why, I guess if I was dissatisfied with the care I was getting I guess I would try something else, like chiropractors.”

These non-nursing students did not indicate a negative influence from chiropractic or massage therapy. However, a different non-nursing student was influence more from alternative health practices as indicated by:

“Like I’ve been going to a chiropractor from like 7 years I guess it’s been a while since I’ve been up here, I guess but yeah, and just this past summer I went to a what are they called... a naturopath. He did the whole “shota” tapping thing, you know, where they tap and they can tell, feeling your energy what’s blocked and it was very cool. It was just the energy field and stuff where humans have this energy field, and they have an aura, you know, I’m just very much into this energy thing, you know this chemical medicine isn’t always more exact. I’d actually like to go and see an acupuncture person, a reflexologist or whatever else. Does massage therapy count? Because I think that like yeah, that developments in the medical world are wonderful, but, it’s all these chemicals, that are engineered and it’s not natural and I think the natural methods are better. All you do is build up a resistance to these chemicals like these antibiotics they give you all the time. Eventually they just stop working. Why use them if there are other ways that can be useful.”

This informant was very much influenced by the “natural methods are better” school of thought and also had difficulty in accepting immunization for any future children.

Although both groups of informants used alternative health practices, few informants were negatively influenced by them. Some highlighted the “natural” approach to alternative health care. The most commonly used alternative health practice was chiropractic care. This seemed to be a neutral factor for both groups of informants.

The informants were given the opportunity to voice any vaccine concerns or questions that they had. This also gave the author the opportunity to assess whether there were any facilitating factors or barriers with regard to immunization. This occurred later in the interview and was designed to make the informants comfortable with expressing their thoughts. One nursing student voiced a common concern:

“Well I kinda already know the purpose, but I guess for the immunizations, **where do they come from** if they are man made or if they are derived from **something natural** or, if they, well I already know this, but if they work forever, if this has to be repeated or if this has to be repeated after a while, and, I’d want to know what this is protecting me against, and how you can catch what ever it is, how you can contract what ever it is and what’s it’s protecting you against, things like that.”

Another nursing student also concurred with the ‘natural’ component but also added the feelings of fear and influences of the media:

“**A little bit scared.** Cause I think you can only do it so long before it’s **naturally** going to beat it anyway. It’s kinda like antibiotics, I don’t know if that’s right.... No, I’m just saying that, um, **probably in the media.... Well from getting the vaccines, like the flu shot, you can get sick from those but it’s temporary,** but I’ve never heard of it causing the disorder or condition.”

A different nursing student commented that s/he did not comply with the recommended flu shot because s/he did not feel at risk:

“This year, no I did not (get the flu shot). Just because I wasn’t working in the hospital much, it wasn’t something that I felt at risk for. I rarely get sick. Something like hepatitis. For starters I don’t believe hepatitis can go for small children, I’m not sure but I think there has to be a certain extent of muscle development, just their immune system in general to make sure that there is very little risk of them developing hepatitis from the immunization or again or if it’s just an antibody they won’t develop the disease. But there’s something else I’d worry about. Others (sigh), what else would come later on, I guess if smallpox became a real problem again I don’t know when they would immunize because I wasn’t, they stopped doing it after so long because it just disappeared so, I don’t even know if anyone is alive today that has had the smallpox immunization. But if that became a problem again, at what age would they have to do it at, than yeah it, I would have to think about that one. Some of the others, because I couldn’t recognize it like diphtheria, I don’t know how lethal they are for small children I would have to look into that for more information when that time comes as to what you can put off to let them decide and make up their own mind up. I would have to know if they would die from it and of course my [wife/husband] would factor that in as well.”

This nursing student informant revealed many interesting characteristics, perceived risks with the influenza immunization, the lack of factual knowledge (smallpox immunization), and difficulties in immunizing future children with certain vaccines.

Non-nursing students also revealed vaccine concerns. One informant said:

“I always think of those kinds of things, like I have two children so, yeah, I’d watch them closely and when they were immunized, so, yeah I guess I would be concerned at some level. I was concerned about the whooping cough, because there was some public discussion at that time when my kids were done, um, about side effects, I think it was brain damage, I’m positive about that, and I, so, when you get them immunized you read the handout, about what the main immunization does and what, what side effects to watch out for, I, as they got them, I would get familiar with different things, and then as long as they got though it ok, that was it.”

This informant was concerned with negative media attention to the pertussis immunization even though his/her children had no negative side effects.

A different informant voiced concerns over 'scares' and questioned whether vaccines were still necessary:

"All these scares that are coming out I wonder if we really need them or not, probably cause they are scary I'd want to know if we need them or not (vaccines) but if there is any doubt, take them."

Another non-nursing student informant had different vaccine concerns of having his/her children being part of an experimental process:

"I wouldn't want, I personally would mind being part of an experimental vaccination program, but I certainly wouldn't want my kids to be part of that, just in case, you know, since you're being introduced to the actual disease itself and your not 100 % sure whether that's a vaccine or is it gonna go away in time. Cause you know how sick you could get over normal vaccinations. I would hate to see how sick you could get if it was tweaked just right, if the dosage was off or whatever."

A rural non-nursing student voiced a more common concern as to whether immunizing is still important when they do not see disease anymore:

"I'm from a really small town and we just never talked about it (vaccines) I guess it's just one of those things that hasn't really been of utmost importance to people but it is an important issue. You know, I don't know it's weird, cause in school you talk about, you know, sex ed., and you don't talk about diseases and things. I wondered what the point was of you know why if nobody has these diseases why are we bothering to vaccinate ourselves still."

Adding to the diversity of the non-nursing student responses to vaccine concerns, another informant commented:

"I was really curious about meningitis because when the meningitis epidemic was going around in Edmonton, they vaccinated all the way out to the neighboring town to us and did not vaccinate us. And that's scary, cause if they're worried about that town, then they just cut it off, and well we go into the city all the time and I'm from a really small town to that you're not gonna be in (Town Name) all the time, everybody goes into the city to shop and there's nothing in (Town Name), it just kind of scares you that they stop right there. It makes you nervous, if they are worried about the town next to you, why aren't they worried about you. I mean like me and my brother were playing on all the

teams so you're going to all the towns around you, some are vaccinated and some aren't, and you're traveling all the time and you start to think."

This type of comment of rural exclusion was not found in any previous literature. What was different about this comment was not that vaccines were perceived negatively but were not perceived to be available to rural communities outside of campaign zones. It is important to note that to one Medical Officer of Health:

"The conclusion about the rural exclusion is a misinterpretation. The immunization program was directed at Edmonton and the "four counties" area, with the inclusion of one small rural area from a fifth county and one reserve. The defining line were rural municipal boundaries, not urban centers. The choice of areas was based on disease rates – and for small areas were inclusive of sometimes single cases. There was a broad buffer circle, hence the inclusion of the reserve and the part of a fifth county. The fallacy here is that the informant assumed that the dividing line was based upon urban centers rather than rural boundaries – the individual, while living in proximity to the urban centers, would actually have been resident just outside the rural municipality/county boundary. The arguments that they posit are the same that were received from a whole wide range of urban and rural residents across the province – so the interpretation is propagated in several areas that follow. It does however raise many questions about the understanding of communicable disease control decisions by public health" (Personal communication, P. Hasselback, January, 2002)

Vaccine concerns were diverse, ranging from safety issues to lack of coverage in rural areas. Concerns about the need for immunization were discussed by several informants. Concerns about side effects were also voiced by the nursing student informants. No major differences were found between the informant groups.

From the literature, it is known that there are religious concerns regarding immunization. Informants were asked whether they had personal religious concerns regarding immunization or whether they knew someone close to them who had concerns. Only one informant had religious concerns regarding immunization and her concern involved blood products.

Nursing student informants revealed secondary sources of religious concerns about immunization. One nursing student expressed feelings regarding Dutch religion by closed body language, a big pause and sigh when she thought about the question. It is known from the literature that some faiths from the Dutch ethnic background do not immunize. This informant looked troubled when she said:

“(Big pause and sigh) you know I’m Canadian Reformed (Dutch) and you know I don’t think we practice anything against immunization. Um, my mom’s a nurse so that totally influences how our family views immunization.”

There was a reluctance to further discuss the matter so the author did not force the issue.

Another nursing student also discussed members of a Dutch religious faith:

“I think with the parents that don’t do it, or don’t want it or hesitate, either are either religious, cause when I was on pediatrics there was this woman who wouldn’t, what was she? Um **Christian Reform (Dutch), I think, and she wasn’t immunizing any of her children, because of her **religion**. Or they just don’t understand enough about it and or they got the false information. And they are **scared** and they don’t think all this stuff they’re hearing is going to help them. And **instead of getting their questions answered they are just giving up.**”**

This was a secondary source of information that was consistent with the literature.

Only one non-nursing student identified herself as having religious concerns with immunization. She was a member of the Jehovah Witnesses and recited scripture that disallowed any use of blood or blood products. She said:

“Well it’s in **Leviticus (laughter) I don’t have my bible with me, the **Third book** in the bible, in **Mosaic law, prohibited very specifically eating blood**, you had to pull out the blood of an animal before you could eat it, um, and in analogies they couldn’t say you couldn’t have transfusions because you didn’t have transfusions back then, but I mean if someone was to relate it to alcohol, and they would take it orally, or stick it intervenously, it would be synchronized because the life is in the blood. And the blood is sacred. Anything you eat alive you’re**

gonna die. So it's out of respect to God because he gave us life, and so we abstain from blood. It's also reiterated in Acts 15 readings Verse 29, to abstain from blood. There's quite a few references. (Jehovah Witness Church is pro immunization so long that vaccines are not cultured in blood) You could accept it if you really wanted to, nobody says it's gonna kill you or something but it is a very strong religious doctrine. I think once upon a time some of the hepatitis ones were (cultured in blood) before I got my Hep B vaccine we checked all that out and now it's synthesized in culture, cause now I accepted it. I think it's great to have, 'cause I want to do dental work, so it's great. I don't know if Hep A is but I would consider taking that as well as long as it wasn't cultured in blood."

She further revealed the magnitude of her convictions:

"I don't think people understand quite why we take it so seriously. I mean you always have prejudices against religions and just because it's not in your background, and I think there is a lack of understanding with that. How serious do we want to take it. It's not like we want to die or something (laughter) or to accept a blood transfusion but there are a lot of alternatives and um, we definitely want to live and enjoy life and things, but yeah it's just a different perspective."

This informant was able to articulate why it was a matter of faith and had nothing to do with perceived risks of the vaccines themselves.

"It's a basis of faith, even if there were no risks in blood products I don't think any Jehovah's Witnesses would accept them, cause they feel very strongly about that. If I were to receive a blood transfusion, what would happen to me? Let's see, um, well I view it like rape. If I were to receive a blood transfusion, well, like I carry a blood card, and it specifically outlines that I'm a Jehovah's Witness for so many years and I will not accept blood products, it's signed dated, has witnesses, it's a legal document, um, so that if I'm in an accident and can't speak for myself, it has people to contact, allergies, and so people will now and look through my wallet and realize, like I would view it as bad as rape."

This particular informant also provided the author with a package of documents designed to aid health care workers understand blood-less products and procedures.

The nursing student informants had concerns about the non-immunizing Dutch community. One of the nursing student informants demonstrated non-verbal concerns, as

expressed by deep sighing and closed body language, when she discussed her faith in comparison to a similar non-immunizing one in the Dutch community. A non-nursing student informant expressed concern regarding immunization if the vaccines were cultured in blood products. The barriers to immunization were explained by the informant using Jehovah Witness scripture as a reference. Religious concerns regarding Hutterites, Mexican (Kanadier) Mennonites, Mormons, Jehovah Witnesses, Muslims and/or Hindus, and the Dutch also emerged during questions asked previously in the interviews.

If the informants were parents, questions were asked about their children's immunization status. It was hoped this would assess past and current immunization practices and interests. One nursing student informant revealed:

"I don't think they've had their MMR, see my wife/husband is the one who always takes them, and we've just followed the list they gave us. So um, I know that they're up to date but I'm not sure with what. 'Cause it's D, um, diphtheria, tetanus and? um, is it polio you get first? Yeah, and then you get your MMR, uh huh, um, measles mumps and rubella, I think, um, anyways, they've had them."

Gender differences emerged from the data that more mothers were responsible for immunizing children than fathers. Another nursing student also indicated a lack of interest in remembering his/her children's immunization status: "Measles, mumps, rubella and polio. That's about it. I can't remember them all." A different nursing student also revealed the lack of knowledge he had regarding his children's immunization status:

"He is... with what, I don't know. (laughter) I'm not very clear on that. He's had all of his immunization shots. Yeah. I took him for his chickenpox vaccine so I can vouch for that one. Yes, he's had all his series or shots, the one year shot, the um, I don't know I think there is a 6 month shot, but I don't know, maybe one following that, I'm not sure though, my wife and I took him about a year and a half ago for his chickenpox."

Although this nursing student was pro-immunization, he deferred the responsibility of immunizing his children to his wife. He also lacked interest in remembering what his own children received and trusted in the system that all was well.

A non-nursing student informant discussed a negative immunization experience with his/her daughter. This however did not contribute as a barrier to further immunization for this family:

“My daughter, after one of her booster shots, got very fatigued. And told us she felt very sick. She felt queasy. Not in so many words, ‘cause she was quite young, but she was very fatigued for about 3-4 days. Well it wasn’t her first shot, but it was the one before kindergarten. If I recall correctly it was about flu season, it was that time of year where everyone was getting sick and um, she got sick, she brought something home from church (Mormon), she goes to church with her mother/father. I think she wasn’t feeling all that great but went to the health unit and had it done. So she just stayed in bed most of the day which wasn’t her way. She was out of it for a few days.”

This non-nursing student informant, though concerned about a negative immunization reaction, did not panic or refuse further immunization for his/her daughter. Another non-nursing student informant also revealed the lack of effectiveness in current immunization literature given to parents as the information in them is not retained:

“I’m assuming they are (fully vaccinated) since the health unit calls and I go down there. **I’m not really good at remembering the literature there** [on reading the pamphlets given to him at the health unit] **they were in and out.**”

A different non-nursing student informant supported his/her nine-year old child’s decision to refuse the Hepatitis b immunization based on displeasure of needles:

“My 9 year old has had the MMR and the polio and the tetanus. **[no mention of Hib]. I’ve just seen the letters.** When the kids bring the forms home we discuss, like my son wasn’t too **thrilled** of getting the Hep B, the Hepatitis shots because it’s a three round, but he totally understands that there’s no way that he would not, because we asked him, if he, **you know I wasn’t gonna sign the paper if, you know ‘I’m making you’, so we discussed it and he said no,** I totally understand

that I need this because those diseases are out there. It doesn't mean that he likes it, the needles."

Here the parent diffused the responsibility of immunization to his/her nine-year old son.

Although few informants were parents, there was a definite gender difference regarding parental involvement for immunizations. It was more typical for the mother to have the child immunized. The informants also had difficulty remembering specific details regarding their childrens' immunization status.

Informants that were parents were questioned further about why they chose to immunize their children. It was hoped this would identify barriers and facilitating factors from their answers. One nursing student commented positively: "Because it's the **right thing to do. Why put your child at risk?**" Another nursing student concurred: "Because **I don't want them catching these kinds of diseases.**" A different nursing student commented: "Ah, no **I just went and got them vaccinated.** And he [non-immunizing husband] didn't have a problem with it." Interestingly, this informant had a non-immunizing husband yet he did not refuse immunization for his children or cause tension in the household. The informant revealed that the husband's non-immunization behavior was a matter of choice and did not extend to the children.

Other non-nursing student informants also revealed why they chose to immunize their children. One non-nursing student said:

"Hopefully to prevent the diseases. I would rather, you think, you know, I, given the pros and cons of doing it or not doing it, I would rather, the risk related to doing it or not doing it, I would prefer the lower risk of having them immunized

and hoping there's no complications, well on my side of the family, we've always been reasonably healthy, we've never been serious sick with health problems, and I think that has a lot to do with my attitude, and also the environment I grew up in, well doctors were gods, and medicine, the medical community was all knowing and all, and it's sort of bred into you, it was for me, so anything they said was good, was good, you know, and at that time we didn't have any other kind of information about that, it just wasn't made public, or the we just didn't have that kind of knowledge, so you know when it came to choosing whether or not I was to immunize my kids I didn't, like I said I always had some concerns and I'd watch them closely, I you know would pay attention to the side effects I was to watch out for, but there was no question whether I would do it or not."

This informant's comments were interesting because it showed that despite concerns of vaccine safety, s/he still chose to immunize because of perceived greater good. This informant was also about ten years older than the average non-nursing student informant.

A different non-nursing student informant gave a typical response about immunizing their children:

"It was both our decision. Because there is diseases out there like this and we want them to be able to be, you know to have something, more in their system to help them fight the chance of getting this type of disease. I think that's the main reason, and, well, when they're small, they're susceptible to things too, so you, I guess it's just the part of being a parent, looking after them. And me from hearing history from my parents about how bad the diseases were and how bad polio was and what it did to people, when there's a vaccination out there why wouldn't you want to shield your children from those types of diseases."

Although this informant's response was typical in that parents want to protect their children, it was also unusual that there was family discussion regarding parental history with immunization. Few informants revealed much family discussion regarding diseases and immunization. Although most informants were not parents, those that were parents and immunized their children, stated that they did so because they thought it was safe and useful.

In order to assess past immunization behaviors, the informants were asked to describe their interests regarding vaccine knowledge. This was designed to demonstrate any emerging themes as facilitators or barriers. One nursing student commented: “Cause **it didn’t mean anything to me back then**. Now I need to know so I can **teach my patients**. And so I know too.” This reflected an age barrier to immunization as the informant was ready to listen to the information at that stage in the life cycle. Another nursing student informant supported this idea:

“But I think sometimes it was me too, that **I just didn’t ask**, when I really should have asked, as I think about it now, I really don’t know why or a lot about hepatitis. Yeah I know this was such a weakness because I really don’t know a lot about immunizations.”

What was typical about the nursing student responses was that they became interested in learning more about immunization now as they realized it would be important in their career.

Non-nursing student informants also revealed why they were not interested in learning about immunizations. One non-nursing student responded: “I’m young, I’m 18, in my **prime, nothing’s gonna happen to me (laughter)**.” This student jokingly felt invincible to illness. A different non-nursing student revealed apathy towards previous immunization experiences:

“Well I don’t know, this is kinda humbling, now I’m starting to ask myself, if I do know. I kinda think I know, **but I’m not really one to pay attention to science**, or anything like that I’m just well it just makes sense to me, well what I’ve heard. I would never take a science course in university, **it’s over my head**.”

This informant felt understanding immunization was out of his/her grasp because of the lack of scientific interest. Many of the students revealed that they didn’t consider vaccine

knowledge to be important. They felt invincible and/or apathetic to the whole thing. This was common to both groups of informants.

To assess previous immunization experiences of the informants from their health authority (left to be open to interpretation by personal physician, PHN or health clinic) open questions were asked. The informants described their perceptions and attitudes from past experiences. Many of the nursing student informants revealed rich descriptions. One nursing student said:

“Yes and no. Yes I got enough information because I believe in it and because I’m in nursing, I knew what was happening and no because if I hadn’t been in that situation and had wanted to know or had doubts nobody actually said this is a part of a virus or a protein of a virus or a protein of a bacteria or whatever, all it does, is that in your body it is so small that it won’t cause you problems but it will allow your body to see it and get ready to fight this little bit off and it will be ready if you ever are exposed you know, it will know what to do, and you won’t get it because you can come down on it. But I also believe I never asked, so it’s kinda their fault and my fault because if I had not known I would, I might not have asked, and I guess in a herd mentality (laughter), is well, is to do it because it has become the norm. But I think that they should so people do know what is going on.”

This nursing student did not think they received adequate information but also admitted to not asking for it either. Other nursing students revealed less satisfaction regarding their immunization experiences. One said:

“No. Not with the Hep B, she (PHN) never told us why we were getting it, we just were lined up. We had to get it because we’re in contact with close contact because of the hospital. I mean I knew why we were getting it but the nurse never told us. She just gave us the shots, maybe she just assumed that nursing students would know why we were getting it.”

Another nursing student concurred with this and added additional information that they were still unsure why they received the hepatitis B immunization:

“Um, it’s a blood disease (hepatitis B) There’s different types and different modes of transmission. It’s serious. I’m not really sure why we had to get it, they never really made that clear, it’s just a fact that we were going to a hospital setting. Well, no I won’t say so, especially from my earlier ones that I don’t remember, really I could have gotten the information, I don’t know if I bothered or not. The ones at LCC it was just the nurse at the health center and she just, well she didn’t really offer any information but if we’d have asked or I would have asked she would have given it to us. No we really weren’t offered that much information. We were just told to line up on the wall.”

A different nursing student also commented unfavorably to his/her immunization experience:

“No. We were told basically we had to get it and it was required. I think time was a big factor. There was only one nurse in the clinic there and she was really busy, it was not like she didn’t know, I know she knows about it (laughter) and could teach us it was just time I’m sure. And lack of questioning on our time, on the student’s part.”

This comment was also emphatically supported by another nursing student:

“No! I know that there were so many of us, that they just had to have us line up just outside the cafeteria (Calgary) and they just kept calling people, it was just so, they didn’t really explain anything.”

Interestingly, most of the non-nursing students did not complain of not receiving adequate immunization information from their health authority. However one non-nursing student commented:

“Not really, like when I go for my shots, They just set up this huge thing in my school and like we have a common room and with lots of benches and stuff and they set up in there and you all line up and with nurses on each side, you go to your curtain and they inject you and then you’re gone, they don’t tell you anything, you don’t talk to them, not really, but if I sat there for a few seconds I probably could you know after. No presentation before the line-up, but the teachers would sometimes say the nurses are there, and the nurses would indicate what immunization was for what, but it wasn’t enough.”

This non-nursing student had similar grievances as the nursing student informants. An additional non-nursing student concurred:

“Um, not that I’ve seen. There could be more information there, but it doesn’t really get to me. So. Like if they put it in the mail or well my parents will probably get it so, so, I don’t really know if they want to get to people my age, then they’ll have to do something else. I guess it’s easy to miss.”

This was an interesting comment because this non-nursing student addressed an age issue, where young adults who are not parents receive little attention regarding immunization. These informants defer to their parents’ responsibility.

Most of the nursing student informants were dissatisfied with the information given to them during their personal immunization experiences. Less dissatisfaction was expressed by the non-nursing student informants. Most informants reflected that they had not initiated questions with the health care workers and went along with the immunization process, although they felt dissatisfied later. It is important to note that the nursing student informants would have been immunized by a health nurse and not a PHN.

Immunization intentions

If the informants were not yet parents, they were questioned whether they would immunize their children if they became parents. This line of questioning served to illustrate the informants’ intentions and to assess the amount of interest they displayed. Barriers and facilitators emerged from the data and revealed that certain factors may influence future decisions. Most nursing students responded with: “Yes I would. To protect them against diseases.” Some nursing students gave richer descriptions that illustrated why they would immunize future children such as:

"Ah yes I will. I just think, if they ever want to travel or move abroad where these diseases haven't been eradicated they need to be protected. I just think the small risk factor for that adverse effect is much smaller than what would happen if they actually caught the disease."

The discussion of travel was common for both groups of informants. Another nursing student however had difficulty accepting immunization for his/her future children as illustrated by:

"(long pause and sigh), it's kinda a tough question, I think the initial immunizations will be done, something like tetanus and, is TB one of the first ones they can do? Yeah there's a vaccination you can do for that, (pause), but anyways, some of those early ones where children don't have a great risk for or they're not able to make up their mind, then yes I would try to do that to try and protect them, but later on, I'm more likely to give them the information and let them sort of make their own choice. (pause) just I don't know to let them have some sort of responsibility to make that choice."

This nursing student initially identified him/herself as pro-immunization yet had difficulties with acceptance for future children and emphasized the issue of choice.

This type of uncertainty was also demonstrated by non-nursing student informants. One example is:

"I'd do some research on it first. I don't know, exactly what is out there that needs to be strongly considered for immunization. And chances are I probably would get them vaccinated but I'd obviously have to do research on them. On what ages would be best for the kids. I think too, that I'm pretty sure that there are some shots that babies probably wouldn't take too easily or probably some kids should have them at a certain age so they don't become immune to the immunization. I do know that that sometimes happens, depending on the age. I've heard that it's there are certain ages that are best to immunize at, that's where I'm coming from I guess. If I were to have a child I guess I would make sure that they would get immunizations at the right time. Um, to make it most effective for them so that they don't have to worry too much about them in life."

Another non-nursing student commented: "I think any thing that you prevent is good, as long as there is **no major reaction or risks** I think it is a good idea."

Many non-nursing student informants responded positively to immunizing future children. A typical rural response was:

“Definitely! Because there’s a lot of diseases now that you can get and it’s just safer to know that your kids are vaccinated. I mean we vaccinate all our cows and it keeps them, it’s just better than taking a risk. The risk would be contracting dangerous diseases like it’s every time you get sick it’s just like sicker and your body just I don’t know, it’s just there’s a comfort in knowing your kids are not gonna be in danger of getting diseases, like meningitis or a flu that you can’t do anything about.”

Interesting, informants with ranching experience tended to respond more favorably to immunization. Urban-based informants who responded positively to immunizing future children typically commented with:

“Oh yes! ... Definitely! Why to protect them from things that can harm them, potentially I wouldn’t want them to die if it could be preventable by vaccine. It would just be stupidity not to as far as I’m concerned.”

These informants were positive and accepted immunization as beneficial.

Although most informants had positive attitudes regarding the immunization of their future children, not all of them accepted it wholeheartedly. Concerns regarding safety and choice were voiced by both groups of informants.

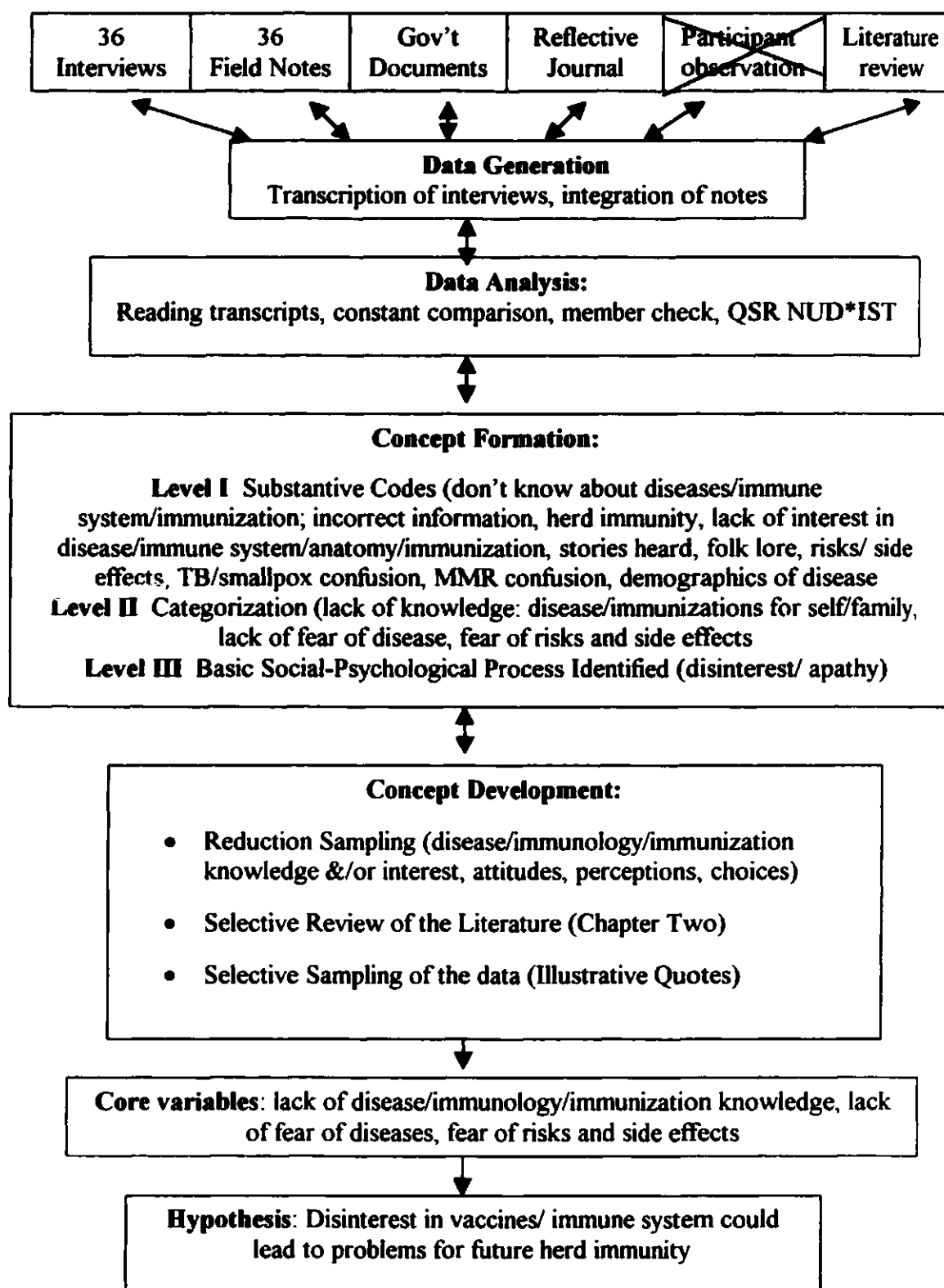
Audit Trail Addressing Rigor

Addressing the topic as rigor, and as an exercise in learning, a grounded theory approach was used with the data. Figure 5 illustrates the thinking process used by the author to generate the hypothesis from the data that “Disinterest in vaccines and/or the immune system could lead to problems for future herd immunity.” It must be noted that

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this hypothesis is limited as certain criteria used in grounded theory methodology were absent from this study and as such is only of academic interest.

Figure 5: Audit Trail for “Disinterest in Immunization”



Summary

An audit trail revealed the author's use of scientific principles in this study. Data were collected from 36 face-to-face interviews, 36 field notes, a review of relevant government documents concerning immunization, a reflective journal containing the author's impressions of the interviews, and a comprehensive literature review. Data were generated from the transcription of the interviews and the integration of notes. Data analysis consisted of reading the transcripts, utilizing the constant comparative method, member check and computer assisted analysis. Concept formation was modeled from grounded theory in that three levels of thinking emerged from the data (1) substantive codes were generated, (2) categorization, and (3) basic social-psychological processes identified. Concept development followed with reduction sampling, a selective review of the literature and selective sampling of the data. Core variables emerged as lack of knowledge and interest about immunology, immunization and disease, a lack of fear of diseases, fear of risks and side effects. Finally, an *academically interesting*, hypothesis emerged from the exercise: *Disinterest in vaccines and the immune system could lead to problems of future herd immunity*. The goal of this thesis was not to generate theory but to explore and describe the phenomenon of immunization delay or refusals in young adults. However, this exercise in grounded theory development facilitated deeper understanding in the phenomenon under study.

Nursing student and non-nursing student informants were found to have more similarities and differences than anticipated. These two groups were compared under the original categories of young adults who delay or refuse immunizations due to alternative

health practices, vaccine concerns and religion. Because not all informants were parents, detailed information was also gathered regarding their personal immunization status and intentions to immunize future children. Secondary information was also gathered from these informants about persons close to them that were included in the original categories of immunization delay or refusal. Findings included:

- A general lack of interest and knowledge about detailed immunization processes from both groups emerged from the data. Nursing students used a more scientific vocabulary than non-nursing students but still lacked deeper understanding;
- The most common vaccine-preventable disease to be identified was tetanus; interestingly, almost all of the informants associated tetanus with rusty nails;
- Very few informants in both groups could describe less common diseases such as diphtheria, polio or measles, mumps and rubella;
- Although both groups indicated that they were pro-immunization, one-sixth of them had difficulty accepting immunizations for their future children;
- Over half of the informants had some kind of vaccine concern. This revealed new information regarding rural issues (i.e., informants' feeling excluded during meningococcal immunization campaigns);
- Both groups of informants used alternative health practices, yet this was not found to be a hindering factor as discovered in the literature search;

- **Very few informants in both groups had religious concerns regarding immunization; however, new secondary information regarding friends and family of various religious groups emerged from the data; and,**
- **Both groups of informants did not reveal any mistrust of pharmaceutical companies as found in the literature.**

The informants' descriptions illustrated their beliefs with the dimensions of knowledge, perception, and attitudes regarding immunization. The informants' descriptions illustrated their behaviors with the dimensions of immunization history, present practices and future intentions. Factors that were enhancing or hindering immunization were revealed as core themes emerged. Understanding the data and finding meaning in what the informants had to say provides guidance to policy-makers interested in serving the needs of the people more fully.

CHAPTER FIVE: DISCUSSION, RECOMMENDATIONS & CONCLUSIONS

Profile of the Informants

This thesis examined the perceptions of young adults who were students regarding immunization beliefs and behaviors. The adult student population that comprised the sample had unique health care needs. They were enthusiastic about learning, but often neglectful of primary health care needs. They were mostly young adults (age 18-25 years) and were newly independent from parental care. Such independence included personal preventative health care. Rarely did they speak of immunization with friends or family. The older informants (older than 26 years) often neglected personal immunization boosters and influenza immunizations. Apathy that existed in this population may become a concern in the next generation of parents. Rarely did the sample trouble themselves with immunizations and sometimes psychologically distanced themselves from the risks of the diseases.

There was a lack of basic understanding of the immune system, diseases and immunizations and a lack of interest in learning about it. Some informants joked that they were not science students and shrugged the matter off. They tended to trust that the medical profession would take care of them should the need arise, abdicating responsibility for their own health care. This could be a sign of their age and place in life cycle. The question then becomes, are the professionals at the front lines of contact with clients skilled enough to motivate this generation to maintain their immunization status,

answer the tough questions and quell any fears they might have? How do we encourage young adults to take an active interest in immunization?

Discussion of Findings

Several interesting findings emerged from this study; some unexpected. There were more differences between the two informant groups, non-nursing and nursing students, than was originally expected. However, common dimensional factors did exist for both groups. New findings regarding rural resident issues were discovered.

With regard to rural issues, the informants with vaccine concerns were not so much concerned about vaccine ingredients and side effects as they were with concerns that they perceived they were not receiving adequate vaccine coverage during outbreaks of disease. When large urban centers set up immunization campaigns for diseases such as meningitis and measles, the rural informants felt neglected because they lived outside the immunizing area. They noted that even though they lived in rural areas, they were highly mobile and often traveled to the major urban centers for shopping, entertainment and educational activities. Another rural issue identified by an informant was regarding sporting activities and the concerns that rural students were not as immunized as their urban counterparts during outbreaks. The informant stated that it was common to travel to large urban centers during sporting events and there was much personal sweaty contact between players. This particular informant was a wrestler who worried about contracting meningitis and stated she was not eligible for free immunization because she resided in a

rural area just outside the immunization campaign area. However, Dorman (2000), found no additional risk for athletes than non-athletes (for measles and hepatitis B).

Interestingly, the rural informants who lived on ranches had a better immunization understanding than their urban counterparts. Although they appreciated immunizing their livestock, they often did not realize humans are at risk for similar ailments i.e., diphtheria.

Most of the urban-based informants with vaccine concerns were consistent with the literature. Examples included fear of side-effects, and lack of fear of diseases (Stoto, Evans & Bolstrom, 1998; Bennett & Smith; 1992). The informants questioned the safety of the vaccines and wondered whether it was still necessary to have them.

The nursing students often complained that they were not given adequate information during immunization campaigns. They commonly voiced concerns about being rounded up in the hallways or cafeterias of their schools and quickly given their shots. The non-nursing students were less concerned with this practice and did not feel that they did not receive adequate information regarding immunization from their health authority. Typically, the informants stated that letters were sent home for their parents to address. Most of the time they commented that they had positive experiences from their physicians or nurses when immunized, but quickly forgot most of the information that was given to them. This demonstrates apathy by the students in the minimal effort to retain important information about their personal health status. Again this could also reflect where they are in the life cycle.

Many of the informants used alternative health practices. Contrary to the literature, this practice alone did not seem to be a major deterrent to immunization (Colley & Haas, 1998; Prislín, Dryer, Blakely & Johnson, 1998; Pruitt, Kline & Kovaz, 1995; Kulig et al, 2001). It sometimes led to vaccine concerns and questions, but did not hinder overall positive attitudes towards the immunization process by these informants. However, the use of alternative health practices coupled with other factors like lack of knowledge and interest about immunization, or negative experiences did contribute to more negative attitudes and perceptions.

Only one participant had religious concerns regarding immunizations. Those concerns were solely based on blood products and whether or not immunizations contained them. The fact that the informant likened receiving a blood product to being raped illustrates the magnitude of her concerns. Interviews with other informants revealed perceptions that other religious groups had immunization barriers. These groups were identified by secondary sources, but were people closely associated to them. The groups were Mormons, Dutch Reformed, Jehovah Witnesses, Muslims or Hindus, Hutterites, and Kanadier (Mexican) Mennonites. Several primary informants who identified their faith as Mormon did not state a refusal or delay of immunization. It may be coincidental that the secondary information about Mormons was incomplete, i.e., the motivating factors for these people were immunization barriers other than religion and they were just coincidentally of the Mormon faith. Further study of these religious groups regarding immunization would be advised. People from the First Nations were also identified in the data to have lower immunization practices. Here it was not so much a religious barrier as

apathy, the lack of compliance to the norm, highly transient lifestyles and other complications living on reserves that are beyond the scope of this thesis to explain.

The lack of knowledge and interest about the immune system, diseases and immunization was more pronounced than anticipated. There were large gaps of knowledge for both informant groups. The only common vaccine-preventable disease that both informant groups were aware of was chickenpox, because most had the disease at some point. There was much confusion about measles and mumps and even bigger gaps when asked about smallpox, polio and diphtheria. Tetanus was readily identified, as most informants remembered getting a tetanus booster in high school; however almost all of the informants primarily identified it as the disease caught from rusty nails. There was an age difference between groups regarding hepatitis B immunizations. All of the nursing students were required to have it before starting their matriculation, but only the younger (18-20 year old) non-nursing students were immunized for hepatitis B.

With the lack of knowledge, interest and fear of these vaccine-preventable diseases coupled with apathy and bombardment of anti-immunization campaigns, this group of future parents may forgo immunizing their future children if something is not done to change current immunization practices. Physicians and nurses, and particularly PHN who are at the front lines of immunizing children, have to continue to improve efforts to interest and educate parents about immunization. All members in the discipline of health science can contribute to improve the situation. Even though this study included only 36 individuals, the rich descriptions given by them provided important data *tiles*

regarding their perceptions, attitudes, beliefs and practices regarding immunization that was essential in creating this *mosaic*.

What concerns the author is that currently one-sixth of this sample identified they had difficulties in accepting immunizations for their future children and over half of the informants had close ties with families that either delayed or refused immunizations for their children. Apathy was demonstrated at various stages in this study, at the beginning only 44 of some 600 students agreed to participate, and ultimately only 36 did. Apathy was demonstrated by their lack of knowledge and interest about immunizations for themselves and their families. Apathy was also demonstrated by their lack of knowledge and interest in vaccine-preventable diseases. This could be a red flag warning of potential problems with young adults not believing that immunization is still a necessary practice. It is time to address these issues and present solutions before a crisis ensues.

So addressing the original question, do young Canadian adults feel immunizations are important? And do they think much about it? The informants seemed to think overall, yes, they do; however it is not a primary concern and they will do very little to address it. It does not consume their everyday lives, but then again, why should it if they are immunized and feeling healthy?

The objectives of this thesis were met:

- a. The theological construct of young adults who refused or delayed immunization among their children or future children for religious beliefs was only found in one

informant. This was a Jehovah Witness and scripture was noted as the determining factor to refuse any immunization derived from blood products. To the informant's personal knowledge all the standard immunizations she had received were free of blood products. Some informants served as secondary sources revealing additional religious groups who they perceived do not immunize. These groups were identified as the Dutch Reformed, Mexican (Kanadier) Mennonites, Mormons, Hindus or Muslims and Jehovah Witnesses. Further study of these groups from primary sources should be sought to gain a deeper understanding.

- b. The beliefs of young adults who engaged in alternative health practices and refused or delayed their children's or future children's immunizations were determined to be influenced, to a certain degree, by fear of side effects and the matter of choice. Contrary to previous studies, the sole factor of using alternative health practices did not necessarily contribute to the parents' non-immunizing beliefs. It had to be combined with other barriers to immunization to be negatively influencing them.
- c. It was determined that young adults (non-parents) were not generally thinking ahead regarding immunization. This notion was supported since many informants revealed that they would address that situation when presented with it. Additionally, few young adults thought about their own personal maintenance immunization schedule like getting annual influenza immunizations or updating

tetanus immunizations every ten years (or the newly incorporated single adult dT booster after grade 9) or could even reliably recount their own personal immunization status.

- d. No gender differences between perspectives regarding immunization were determined. There was, however, gender differences between immunization behaviors with more females being responsible for immunizing children than males. Other gender differences came from the sample itself as there were three times as many female informants as males.
- e. Vocational/academic differences between groups regarding immunization were determined. Nursing student informants had more information regarding their personal immunization status as well as generally more information regarding immunizations and disease. Both groups generally had positive attitudes. The nursing student informants also had more concerns regarding the information they received from their local health authority while being immunized.
- f. Common factors between various groups who do not immunize regarding their decision making were determined to be apathy towards immunization and fear of side effects and lack of fear of disease. Apathy was demonstrated by most informants' by their lack of interest in their own personal immunization status or that of their family, and also the lack of interest in knowing about immunizations, the immune system and vaccine-preventable diseases.

Immunization is a basic public health practice to address communicable and vaccine-preventable disease within society. Why is it that the two groups (nursing and non-nursing students) noted here have concerns and difficulties in accepting this practice? Like other rural populations, the groups discussed here have barriers to immunization based on their belief systems (Kulig, Meyer, Hill, Handley, Litchenberger & Myck, 2001; in press) regarding how to achieve health for themselves and their children (or future children). More specifically, the risks of the vaccines outweigh the benefits reiterating the juxtaposition of science versus alternative health and the concern with challenging God's will as in the case of the Jehovah Witnesses.

Originating from a few dozen books, anti-vaccine notoriety has spread to an overabundance of web sites. Contributing to this spread, self-proclaimed 'experts' use circumstantial evidence and plausible conjecture to augment their claims. The layperson reading this information is encouraged to make their own choices but is usually not equipped to separate fact from fiction, or correlation from causality. These books are easily found in the World Wide Web using searches by www.Google.com. They include the following:

- **Scheibner (1993), "Vaccination: 100 years of orthodox research shows that vaccines represented a medical assault on the immune system";**
- **Coulter and Fisher (1991), "A shot in the dark"; and,**
- **Mendelsohn (1993), "Immunizations: The terrible risks your children face that your doctor won't reveal."**

Another example of the negative literature identified during this study was that AIDS was manmade from the OPV vaccine. The source of this began from information in a book titled "The River" by Hooper (1999) and trickled down to popular magazines and web sites. This enormous book reads like a thriller and presents plausible scenarios of how things go wrong in research. The allegations made in the book were refuted in reputable scientific journals, such as "JAMA", "Nature" and "Science" (Plotkin, 2000; Clarke, 2001; Poinar, Kuch & Pääbo, 2001). However, the message did not reach to the popular press.

There are many more official sounding web sites with organizations like the:

- Association for Vaccine Damaged Children
(<http://www2.vpl.vancouver.bc.ca/dbs/cod/orgpgs/2/2312.html>)
- Eagle Foundation [run by 3 chiropractors in Winnipeg]
(www.eaglefoundation.net),
- Thinktwice Global Vaccine Institute (www.thinktwice.com),
- Home of Self Managed Care (www.healthy.net),
- Chiropractic Kinesiology Clinic of Charleston USA
(www.wellnesscharleston.com/Newsletters/Articles1-25-01/dispelling-vaccine-myths.html); and,
- National Vaccine Information Center (www.909shot.com).

These web sites encourage informed decision-making based on facts, not myths or marketing but are unable to provide a balanced perspective regarding immunization and undermine confidence about immunization.

To counter this, there are plenty of reliable web sites that are recommended by health officials. These include:

- Canadian Pediatric Society (www.cps.ca)
- American Association of Pediatrics (www.aap.org)
- Canadian Medical Association (www.cma.ca/cpgs/pediat.htm);
- Canadian Immunization Awareness Program (www.immunize.cpha.ca)
- Alberta Health (<http://www.health.gov.ab.ca/>), and;
- Health Canada (www.hc-sc.gc.ca).

This study supports the work by Asch, Baron, Hershey, Kunreuther, Meszaros, Ritov et al. (1994) regarding omission bias and immunization. Some informants rationalized that they or people close to them would feel more responsible for a death or adverse side effect caused by the decision to immunize rather than a death or adverse side effect caused by the decision to withhold immunization. Sometimes this was also motivated by religious reasons as in the Jehovah Witness and the use of blood products.

Both groups of informants (nursing and non-nursing students) used alternative health practices. For these people, such practices compliment their philosophy that good health is largely a result of a healthy lifestyle, natural healing supplements and natural foods. Thus, for some informants or people close to them, vaccines can potentially negatively affect the immune system raising their risk to disease. For most of the informants, however, the sole factor of alternative health practices was not a barrier to immunization. Just because the informants used alternative health practices did not

necessarily mean they would delay or refuse immunizations, however, coupled with other barriers, it was found to influence them as indicated by the questioning of the safety and efficacy of the vaccines.

Bogardus, Holmboe and Jekel (1999) addressed the issue of talking about medical risks. When discussing the medical risks of vaccines versus the risks of the disease, the researchers proposed that the health official should use a variety of quantitative, qualitative and graphic formats to communicate more effectively. They should also address common errors made by the public in risk estimation. These include ANCHORING BIAS (basing information on similar familiar events already known), AVAILABILITY BIAS (overestimating risks if it receives substantial notoriety), COMPRESSION (overestimating small risks and underestimating large risks) and MISCALIBRATION (being overly confident about current knowledge base). All of these errors were observed with the informants in this study and were illustrated in Chapter Four. Examples include:

1. ANCHORING BIAS was demonstrated by a 19-year old informant who assumed had the smallpox immunization based on familiar events already known “I guess like with vaccines like, yeah for like *smallpox*, measles and I did that Hep B one with the three stages just last year.”
2. AVAILABILITY BIAS was demonstrated by the response to what communicable diseases were “... a little more common than like if you go outside into another country”. Communicable diseases are often sensationalized as Third World problems in the media.

3. **COMPRESSION** was demonstrated by underestimating the severity of measles
“Well I know it’s like mostly children get chickenpox, *like measles, um, it’s like a simple cold.*” Another non-nursing student also demonstrated this by the statement: “*so it’s a disease if you travel abroad. I’ve just never been immunized for it and never expect to get it.*”

4. **MISCALIBRATION** was demonstrated by the informant who lacked sufficient knowledge about the immune system yet confidently said:

“**Yes I do!** Parts of the body, hmm, well your blood is in it, and so I guess in what ever way your blood is like, well your whole body in a way in involved in it. And so when the disease is in you the immune system has to fight back, by defending itself against whatever it the disease is.”

Consequently, public health personnel need to utilize a variety of formats with the public to reduce such errors.

To encourage the concerned public to comply with vaccinations, Rosenstock, Strecher and Becker (1988) suggested health officials can incorporate the “Health Belief Model” and Bandura’s “Social Learning Theory” into existing health promotional activities. The Health Belief Model is a behavior change theory that involves five factors:

1. Perceived severity (the belief that a health problem is serious);
2. Perceived threat (the belief that one is susceptible to the problem);
3. Perceived benefit (the belief that changing one's behavior will reduce the threat);

4. **Perceived barriers (a perception of the obstacles to changing one's behavior);**
and,
5. **Self-efficacy (the belief that one has the ability to change one's behavior).**

Social Learning emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others. This is applied to health promotional activities and can be demonstrated when self-efficacy and locus of control measures are used. This can be achieved through more aggressive advertisements, more information on how to find reliable web sites, and open dialogue between health care workers and the public. The informants voiced a need for more interaction between the public and health officials. That concurred with the generalization that people need to interact more.

Rosenstock (1988) cautioned health officials not to impose an arbitrary set of values on people regarding personal health issues as long as they do not have deleterious effects on others. As immunization does have vast public health effects and not immunizing does decrease herd immunity (putting a deleterious risk on others), health officials have the social responsibility to better promote and educate the public to increase compliance.

Recommendations

From this study's findings, the following recommendations are presented. These findings cannot and must not be generalized beyond this sample.

1. **Increase educational activities in high school during immunization campaigns using a variety of health promotion methods. Positive framing techniques for risk communication, the health belief model and social learning theory could be used.**
2. **Encourage more questions and dialogue between PHN and clients during immunization campaigns. A general information session in the classrooms given by the PHN before the campaign would increase interest and maintain student confidence.**
3. **Promote reliable information sources on the Internet, i.e., Health Canada, Alberta Health and Wellness, Canadian Pediatric Society et al. to the public, educators and health care workers.**
4. **Policy implications for immunization recommendations need to be explored. Can budgets allow for more educational and health promotion activities? Should legislatures mandate compulsory immunization? How can immunization be regulated efficiently? Is voluntary immunization still an option? Are other options more feasible or desirable to maintain a safe level of immunity?**
5. **Future research should explore the theological bases for delay or refusal of immunizations based on the emergence of secondary information (i.e. Mormons, Muslims, Hindus etc.) gathered from this study.**

Conclusions

Many young Canadian adults have little knowledge and/or interest about the immune system and immunizations. Understanding the differences between real risks and benefits of immunization is paramount. This apathy combined with known barriers to immunization like adherence to religious or philosophical beliefs and negative influences from people close to them may present a challenge to health care workers and future policy-makers. Policy recommendations designed to facilitate health care professionals were presented and include improved educational strategies.

The goal of this thesis was to understand why young adults as parents or future parents make the decisions they do and how they came about those decisions. The common theme that emerged from the data was apathy. This study's findings cannot and must not be generalized beyond this sample. Various *tiles* of information were presented illustrate the *mosaic* complexity of studying immunization and peoples' beliefs, perceptions and attitudes towards it. It was hoped by the author that this work would contribute to the body of knowledge of public health care.

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APPENDICES

Appendix A: Consent Form

You are invited to participate in a study about beliefs about delaying immunization and choosing not to immunize. This study will help us learn more about the beliefs that people hold about immunization and how this affects their decision to delay or refuse immunization or choose not to immunize their children. Only specific groups of people are included in the study.

If you decide to participate, the study will involve an interview at the university that will last no longer than 1.5 hours at a time of your convenience. The interview will be audio-taped and transcribed and later analyzed. You may request that the interview not be audio-taped, in this case, the investigator will take detailed notes during the interviews. The audio-tapes will be coded with a number so that no names or other information which could identify you will appear on the transcriptions. Both the audio-tapes and a list of code numbers and names will be kept in a locked cupboard, available only to the research personnel. The audio-tapes will be erased and all other material will be destroyed after seven years. No risks or discomforts are expected to result from the interviews. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.

You are under no obligation to participate in this study. No employee of the University of Lethbridge or the Chinook Health Region will be aware whether you have agreed or not to participate in this study. Your decision whether or not to participate will not affect your future relations with the University of Lethbridge or the Chinook Health Region. If you decide to participate, you are free to discontinue participation at any time. The information you provide may assist public health nurses to appropriately discuss immunizations with individuals. The study has no direct benefit to you and you not receive compensation for your participation. You will be given a copy of this form to keep.

If you have any questions now or at any time during this study, please feel free to ask the principal investigator. You may contact the principal investigator, Cathy Meyer, H. B.Sc., Dip.Ed. at 403-329-2738 or cathy.meyer@uleth.ca or School of Health Sciences, University of Lethbridge, 4401 University Drive, Lethbridge, Alberta, T1K 3M4. You may also speak to the ethics review boards by contacting Dennis Fitzpatrick, Ph.D., 403-329-2214, Research Services, 4401 University Drive, Lethbridge, Alberta, T1K 3M4, or Judith Kulig, RN, DNSc, at 403-382-7110 or School of Health Sciences, University of Lethbridge, 4401 University Drive, Lethbridge, Alberta, T1K 3M4.

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have decided to participate. You may withdraw at any time without prejudice after signing this form, should you choose to discontinue participation in this study.

Signature of Participant

Date

Signature of Investigator or Designate

Date

Appendix B: Demographic Profile Form

PARTICIPANT PROFILE

Participant #: _____

Gender: Female Male

Category: Religious reasons

Alternative health

Vaccine concerns

Major: Science Arts Management Nursing

other _____

Age: 18-19 20-21 22-23 24-25

26-27 28-29 30+

Marital Status: _____ Education level (specify): _____

Religious Affiliation (specify): _____

Self immunized? _____ if applicable, is spouse immunized? _____

With full series: _____ with partial series: _____

If applicable, number of children: _____

If applicable, number of children immunized (complete for each child)
Specify which immunizations have been taken)

With full series: _____ with partial series: _____

Which ones? (specify): _____

If applicable, specify length of time in Canada: _____

If applicable, specify country of origin: _____

Appendix C: Interview Guiding Questions

Guiding Questions

For Parents/Future Parents who engage in Alternate Health Practices:

1. What do you know about communicable diseases? Probe: How do people get these diseases? Do you know how diseases spread? If so, how do they spread?
2. What do you know about how immunizations work? What do they do in the body?
3. Are you immunized? If so, which immunizations have you received? Why were these ones received? If not immunized, why not? Is your spouse immunized? If so, which immunizations has he/she received? Why were these ones received? Are your parents immunized? If so, which immunizations did they receive? Why these ones? If not immunized, why not? Are your spouses' parents immunized? If so, which immunizations did they receive? Why these ones? If not immunized why not?
4. If applicable: Have you immunized any of your children? If not, why not? Did you make this decision with anyone? If so, who? Do you and your spouse agree on choosing not to immunize? What were all the reasons you decided not to immunize your children?

If applicable: Did you and your spouse agree on delaying immunization? What were all the reasons for delaying immunization? Are some types of immunization more acceptable than others? If so, which types?

5. What do you think are the basis for the beliefs held by others that immunization is acceptable? How does their choice to accept immunization influence your, or your family's health, if at all?
6. What type(s) of alternative health practices do you currently engage in (i.e., in the last 12 months)? How long have you been doing this? (obtain information about each practice).
7. Tell me about the benefits of these practices for your health. Tell me about the reasons you used these practices.
8. Have you stopped any practices? If so, what were they? What was the reason(s) for doing so?
9. Do you feel you have enough information from the health authority regarding this decision? If yes, no further question. If no, What questions are still unanswered for you?

Guiding Questions

For Parents/Future Parents who adhere to specific religious beliefs:

1. You indicated that you belong to the _____ church. How long have you been a member of this church? Do you participate as a family?
2. What do you know about communicable diseases? Probe: How do people get these diseases? Do you know how diseases spread? If so, how do they spread?
3. What do you know about how immunizations work? What do they do in the body?
4. Are you immunized? If so, which immunizations have you received? Why were these ones received? If not immunized, why not? Is your spouse immunized? If so, which immunizations has he/she received? Why were these ones received? Are your parents immunized? If so, which immunizations did they receive? Why these ones? If not immunized, why not? Are your spouses' parents immunized? If so, which immunizations did they receive? Why these ones? If not immunized why not?
5. If applicable: Have you immunized any of your children? If not, why not? Did you make this decision with anyone? If so, who? Do you and your spouse agree on choosing not to immunize? What were all the reasons you decided not to immunize your children?

If applicable: Did you and your spouse agree on delaying immunization? What were all the reasons for delaying immunization? Are some types of immunization more acceptable than others? If so, which types?
6. What do you think are the basis for the beliefs held by others that immunization is acceptable? How does their choice to accept immunization influence your, or your family's health, if at all?
7. What ideas does your church hold regarding health? Probe: Are health promotion and education activities acceptable?
8. What ideas does your church hold regarding illness? Probe: Why do people become ill? Does the church specify what healing practices can be engaged in?
9. What specific ideas does the church hold about communicable diseases? Probe: measles, diphtheria, polio, tetanus, pertussis. Do you believe that these diseases spread? If so, how do they spread?
10. What specific ideas does the church hold regarding immunization? Probe: How do immunizations work?
11. if applicable: What type(s) of alternative health practices do you currently engage in (i.e., in the last 12 months)? How long have you been doing this? (obtain information about each practice).

12. Tell me about the benefits of these practices for your health. Tell me about the reasons you used these practices.

13. Have you stopped any practices? If so, what were they? What was the reason(s) for doing so?

14. Do you feel you have enough information from the health authority regarding this decision? If yes, no further question. If no, What questions are still unanswered for you?

Guiding Questions

For Parents/Future Parents who are concerned about vaccine safety:

1. What do you know about communicable diseases? Probe: How do people get these diseases? Do you know how diseases spread? If so, how do they spread?

2. What do you know about how immunizations work? What do they do in the body?

3. Are you immunized? If so, which immunizations have you received? Why were these ones received? If not immunized, why not? Is your spouse immunized? If so, which immunizations has he/she received? Why were these ones received? Are your parents immunized? If so, which immunizations did they receive?

Why these ones? If not immunized, why not? Are your spouses' parents immunized? If so, which immunizations did they receive? Why these ones? If not immunized why not?

4. If applicable: Have you immunized any of your children? If not, why not? Did you make this decision with anyone? If so, who? Do you and your spouse agree on choosing not to immunize? What were all the reasons you decided not to immunize your children?

If applicable: Did you and your spouse agree on delaying immunization? What were all the reasons for delaying immunization? Are some types of immunization more acceptable than others? If so, which types?

5. What do you think are the basis for the beliefs held by others that immunization is acceptable? How does their choice to accept immunization influence your, or your family's health, if at all?

6. If applicable: What type(s) of alternative health practices do you currently engage in (i.e., in the last 12 months)? How long have you been doing this? (obtain information about each practice).

7. Tell me about the benefits of these practices for your health. Tell me about the reasons you used these practices.

8. Have you stopped any practices? If so, what were they? What was the reason(s) for doing so?

9. Do you feel you have enough information from the health authority regarding this decision? If yes, no further question. If no, What questions are still unanswered for you?

Appendix D: Recruitment Letters

These letters were bulk e-mailed to the respective first year psychology students as part of the recruitment process.

Psychology Students:

I am looking for students who are willing to participate in a study relating to immunization beliefs and perspectives. The study will involve privately talking about your perspectives with me regarding immunization for yourself and or your family. This study will be of interest to those wanting to learn more about health, immunization and vaccines. This interview will require approximately 1 to 1 ½ hours of your time, here at the university at your convenience. If you are interested in participating or would like more information, please email me at cathy.meyer@uleth.ca. It will be entirely confidential.

Thank you,
Cathy Meyer
(M.Sc. Student in Health Science)
AH167, ph. 329-2738
p.s. PLEASE DO NOT hit reply, that will send your message to the wrong address.

Dear Psychology Students:

I am still looking for more informants in my Immunization Perspectives Study. I am asking for about 40 minutes of your time to tell me about your thoughts or concerns about vaccination. You need not be a parent or know a lot about science. It would be of great help to me. For those who have already participated, a heartfelt, thank you.

Please email to cathy.meyer@uleth.ca or phone at 329-2738 to arrange a time that is convenient for you. I'm in Anderson Hall 167.
p.s. do not hit the reply button here as the message will not get to me.

Appendix E: Ethical Approval Letters



**The
University of
Lethbridge**

OFFICE OF THE ASSOCIATE VICE-PRESIDENT (RESEARCH)

4401 University Drive

Lethbridge, Alberta, Canada T1K 3M4

Phone - 403-329-2747

FAX - 403-382-7185

January 15, 2001

Cathy J. Meyer
School of Health Sciences
University of Lethbridge
4401 University Drive
Lethbridge, AB
T1K 3M4

Dear Cathy:

Your Master's human subject research protocol entitled, "Understanding perspectives amongst young adults regarding immunization in the Chinook Health Region" has been approved on behalf of the University of Lethbridge Human Subject Research Committee.

Sincerely


Margaret McKeen
Research Services

mm



Institutional Planning and Reporting Services

Telephone: (403) 320-3268
Fax: (403) 329-0530
Leslie.Vaala@Lethbridgecollege.ab.ca
3000 College Drive South
Lethbridge, AB T1K 1L6

January 3, 2001

Ms Cathy J Meyer
School of Health Sciences, University of Lethbridge
4401 University Drive
Lethbridge, AB T1K 3M4

Dear Ms Meyer:

Re: Your Request to Conduct Research at Lethbridge Community College

Your request to conduct research at Lethbridge Community College related to "Understanding perspectives amongst young adults regarding immunization in the Chinook Health Region" has been reviewed and approved subject to the following conditions:

1. No Lethbridge Community College records containing personal information will be used in this research,
2. All schedules for conducting research activities at Lethbridge Community College will be arranged through and approved by Ms Tina Huckabay (320-3469, T.Huckabay@LethbridgeCollege.ab.ca)
3. Research activities conducted at Lethbridge Community College will be completed by December 31, 2001, and
4. A final copy of the research product will be provided to Lethbridge Community College.

Please notify me about any changes to your research design or methodology as this may necessitate a review of our approval conditions. We are pleased that you have included Lethbridge Community College in your study and wish you every success in this undertaking.

Sincerely,

A handwritten signature in black ink, appearing to read 'Leslie Vaala'.

Leslie Vaala, PhD
Information and Privacy Coordinator

cc J. Kulig - UofL School of Health Sciences
T. Huckabay - LCC Nursing
I. Thumlert - LCC Centre for Health and Human Services

Appendix F: Fact Sheet on Selected Vaccine-Preventable Diseases

Directly quoted from the Saskatchewan Health Website:
(http://www.health.gov.sk.ca/rr_measle_mump_rubella.html)

“Immunization

Why do we need to have the measles, mumps and rubella (MMR) vaccination?

The MMR vaccine provides protection against measles, mumps and rubella. People who are infected with measles, mumps or rubella spread these diseases when they cough or sneeze. There is no treatment for measles, mumps or rubella.

Measles cause a red blotchy rash, fever, red eyes, runny nose and cough. It usually lasts one to two weeks. The disease can be quite severe in some people. Complications such as infection of the middle ear or pneumonia occur in about 10 per cent of cases. Measles encephalitis (inflammation of the brain) occurs in approximately 1 of every 1,000 reported cases and can result in permanent brain damage. Very rarely, prior measles infection is associated with a subacute sclerosing panencephalitis (inflammation of the brain) which is fatal. People of any age who are not protected can get the disease. Protection (immunity) comes from having had the disease or by immunization.

Mumps can cause painful swollen saliva glands (usually in the cheeks) and fever. Painful inflammation of the testicles occurs in about 25 per cent of boys beyond puberty, and painful inflammation of the ovaries in about five per cent of girls beyond puberty. Inflammation of the brain and spinal cord (meningitis) occurs in 10 to 30 % of

cases. Usually there are no long lasting problems from mumps meningitis. Deafness, inflammation of the brain and death occur rarely.

Rubella (German Measles) is a serious disease to avoid during pregnancy because it can cause damage to the unborn baby. Up to 90 per cent of babies born to women infected with rubella during the first three months of pregnancy will be affected. Babies can be born with brain damage, abnormally small heads, deafness, heart defects, blindness, small eyes and diabetes. Some babies die. Therefore, protection at an early age for all children is important to avoid either getting the disease later in life, or giving it to a pregnant woman.

In children and adults, rubella can cause a red rash, fever, sore throat, headache, swollen lymph glands, and pain in the joints. The joint pain and swelling can take up to a month to disappear. Rarely, long-lasting inflammation of the brain or joints can occur.

What is the MMR vaccine made of?

The vaccine is made of weakened forms of the three viruses along with a small amount of neomycin (an antibiotic) and sorbitol and gelatin (stabilizers).

How effective is the vaccine?

The vaccine is highly effective. About 94 per cent of children immunized with rubella, 81 per cent of those immunized with mumps, and 88 per cent of those

immunized with one dose of measles develop protective antibodies. After two doses of measles vaccine, 99 per cent of children are protected. Protection against all three viruses is expected to last for life in most people.”

Additional Information About Vaccine- Preventable Diseases

Directly quoted from Alberta Health and Wellness

(<http://www.health.gov.ab.ca/informat/pubimm.html>)

“ **DIPHTHERIA:** Diphtheria is a very serious disease. It can cause an infection in the nose and throat which makes breathing difficult. It can also cause an infection of the skin. Before vaccines were available, diphtheria frequently caused heart failure, paralysis and death.

PERTUSSIS: Pertussis (whooping cough) causes severe coughing spells which can make breathing difficult. It often causes pneumonia, convulsions and sometimes brain damage or death. Pertussis is very infectious and continues to cause school outbreaks in Alberta.

TETANUS: Tetanus (lockjaw) is a disease which results when wounds are infected with tetanus bacteria which live in the soil. The bacteria in the wound make a poison which causes the muscles to go into spasm. The breathing muscles may be affected and deaths are fairly common.

POLIO: Polio is a viral disease that often causes permanent paralysis or crippling. Polio can also cause death.

HAEMOPHILUS INFLUENZAE TYPE B - (HIB DISEASE): Hib causes pneumonia, bacterial infections, infections of the throat, blood, joints, bone, soft tissue and the outer covering of the heart. Hib also causes meningitis, an infection of the covering of the brain, which often results in brain damage and/or death. Hib vaccine has worked very well to reduce meningitis in children.”