AN INTERVENTION STUDY TO EVALUATE THE EFFECT OF PROVIDING HEALTH INFORMATION AND AN ON-SITE INFLUENZA IMMUNIZATION CLINIC TO SENIORS IN ELDERLY PERSONS' HOUSING UNITS

By: Gwendolyn D. Howe

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ABSTRACT

Annual influenza immunization is recommended for persons who are sixty-five years of age, or older, a growing segment of the population. Immunization rates in seniors living in the inner City of Winnipeg are believed to be low, because of the poor socio-economic circumstances of many of these residents. The City Health Department undertook a study to measure and/or improve influenza immunization rates in seniors living in elderly persons' housing units.

Four elderly persons' housing units (EPHs) in the core area of Winnipeg (from a total of 58) were randomized to be the study population. The sample population consisted of 410 seniors in 4 EPHs; with 209 seniors in the control EPHs, and 201 seniors in the intervention EPHs. The intervention consisted of a health education campaign with posters, fact sheets, and an information session, followed by an on site immunization clinic. Control EPHs were offered immunization after the intervention and clinics at the intervention EPHs. A questionnaire was administered on site to residents of all four EPHs. Data collected included a demographic profile - age, sex, number and type of chronic health conditions - self perceived health status, mobility status, regular medical care provider and influenza immunization status. Analysis was done using SAS.

Data from the completed questionnaires (N=276) from intervention and non-intervention EPHs were compared. A univariate analysis was completed for all the variables. Immunization rates in the intervention group, 54.3%, were found to be significantly higher (by 30%) than that of the non-intervention group, 41.6%. Odds ratio of 1.67 of being immunized if in the intervention group rather than the non-intervention group ($p < .035$). Stepwise multiple logistic regression was completed to determine the variables that were most strongly associated with receipt of immunization: Past history of influenza immunization (OR 14.106); Physician visit within last year (OR 6.746); Receipt of Health Information that is Helpful in Decision-making (OR 2.775); and Intervention grouping (OR 2.077).

In particular, the intervention was most significantly associated with an increase in influenza immunization in relation to specific subgroups: those aged 85 and older (OR 18.7); those with 3 or more difficulties with IADL (OR 5.8); those who rate themselves as being in poor or bad health (OR 71.5); and those with no chronic health conditions (OR 2.5).

As well, immunization rates in the sample population were higher than anticipated. The results suggest other strategies that may be enhanced to further increase influenza immunization rates.

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CHAPTER 1

INTRODUCTION

Influenza viruses are the most important cause of acute respiratory illness.[1] They cause illness and death throughout the world. The Center for Disease Control (Atlanta) estimates that an average of 10,000 persons die from influenza each year in the U.S.A. alone.[2] Epidemics due to influenza occur annually, although they vary yearly in severity and intensity. Since influenza is spread via airborne transmission and droplet infection, it is most easily spread when people congregate. In temperate zones, this occurs in the winter months, when the majority of cases occur.

The influenza viruses are unusual in that the viral antigens change over time. This leads to renewed susceptibility in persons previously infected and thus is the major factor responsible for the recurring nature of influenza epidemics.[1] It is also both costly and difficult to make a vaccine for a constantly changing virus. A revised vaccine must be made annually to match the changed virus strains. These vaccines are 70 - 90% effective in healthy young adults in preventing infection and decreasing the severity of illness in infected individuals.[2] The vaccine itself may be somewhat

effective longer than a year but, since the antigen changes slightly every year, the vaccine must also be changed annually in order to be maximally effective against the new virus.

Influenza viruses can infect anyone who is not immune. However the severity of the illness is variable between individuals. Some people are more likely to have severe illness or death. This includes those with chronic cardiac or pulmonary diseases; those with chronic conditions like diabetes, cancer, immunodeficiencies or immunosuppression; those over age 65 years; and those who live in nursing homes or chronic care facilities. Individuals in the latter group are at higher risk than seniors living in the community since they have a poorer health status.[5, 87] Their close living conditions also increase their risk of acquiring communicable illnesses.[86] Of the excess deaths attributed to pneumonia and influenza during epidemics, approximately 80 - 90% have occurred in people 65 years and older.[3] Because of the increasing proportion of elderly persons in the North American population, and since age and its associated chronic diseases are risk factors for severe influenza illness, the future toll from influenza may increase, unless control measures are used more vigorously than in the past.[2]

The National Advisory Committee on Infectious Diseases (Canada) recommends vaccine protection for influenza for the

elderly (those over age 65) amongst other groups.[10] The groups recommended for vaccination are prioritized according to the highest need to ensure that those at greatest risk for complications of influenza are immunized. Administration of the vaccine should occur in the fall so as to prevent the individual from being infected by the virus when the influenza season is at its peak in December to March.

It is well documented that in the U.S.A. only 20% of those for whom the vaccine is recommended present themselves for immunization.[4] The Year 2000 National Health Objective for the U.S.A. is 60% immunization coverage among non-institutionalized persons aged 65 years and older.[4] Theoretically, if an 80% immunization rate is achieved in a population, then herd immunity has been established and this level of immunity can be considered as an effective control measure.[85] It should prevent influenza from circulating in the community and would thus provide protection to those who are not immunized. Strategies need to be aimed at increasing the up-take of vaccine in the target population in order to achieve this health objective.

During the last five years, the proportion of Canadians with high-risk conditions who are vaccinated annually has increased dramatically. However, during the fall and winter of 1990-91 the rise in acceptance accounts for only 45% of those

greater than or equal to 65 years of age receiving the vaccine.[65, 66] The Canadian Consensus Conference on Influenza held in February 1993 recommended that National Health Objectives for Canada include 70% coverage of persons aged 65 years and older and all persons with high-risk conditions by the 2000-01 influenza season.[65]

Successful immunization programs have combined education for health care workers, publicity and education targeted to potential recipients, a plan for identifying persons at high risk, and efforts to remove administrative and financial barriers that prevent persons from receiving the vaccine.[3] The 1993 Canadian Consensus Conference on Immunization recommended that research issues that need to be addressed include the effectiveness of alternative mechanisms for vaccine delivery to high risk patients in different settings.[69]

The present study evaluated the effectiveness of providing health education and an on-site influenza immunization clinic at the place of residence of higher risk persons in order to increase the number of non-institutionalized seniors who receive immunization against influenza.

CHAPTER 2

STUDY OBJECTIVES

2.0 General

The goal of this study was to evaluate a public health intervention on increasing influenza vaccine uptake in individuals over 65 years of age. If successful, illness and death possibly associated with influenza in this group would be avoided as will the further spread of the influenza virus.

The study goal, in keeping with National and International recommendations, was to attain a 60 - 80% coverage rate in a non-institutionalized senior population. The study intervention was deemed to be successful if the immunization rate of the intervention group was two fold that of the control group. All available information indicated that people in the target population were well below recommended immunization levels for influenza prior to the study.

2.1 Specific

The specific objectives of this study were:

2.1.1 To determine the influenza immunization rates in non-institutionalized seniors in specific Elderly Persons' Housing Units.

2.1.2 To determine whether specific health education interventions would increase influenza immunization rates in non-institutionalized seniors.

2.1.3 To determine whether the provision of an on-site influenza immunization clinic was effective in increasing the immunization rates in non-institutionalized seniors.

This study did not look specifically at morbidity and mortality related to influenza in the study population.

CHAPTER 3

LITERATURE REVIEW AND BACKGROUND INFORMATION

A review of the literature concerning influenza, its epidemiology, control strategies, the influenza vaccine, vaccine acceptance rates, recommendations regarding vaccine, and intervention strategies used to increase vaccine acceptance rates has been conducted. Specific areas pertinent to the present study will be discussed in detail.

3.0 Influenza - The Disease

Influenza is an acute, febrile, prostrating infection of sudden onset, associated with symptoms of myalgia and headache. It is accompanied by respiratory symptoms and signs including a non-productive cough, a runny nose, and a sore throat.[5] In uncomplicated cases the fever usually lasts 3-5 days and recovery is rapid. Gastrointestinal symptoms are very uncommon in adults, but are more frequent in children.[5] Serious illness and death from influenza are usually due to secondary bacterial pneumonia and/or complications related to other chronic underlying diseases.[6]

Three types of influenza viruses are recognized - A, B &

C. Subtypes of these three major virus strains are classified by the antigenic structure of the surface glycoproteins. Frequent mutations of the genes encoding these glycoproteins result in emergence of variants with new or altered antigenic structures. Minor antigenic changes (called antigenic drift) are responsible for the annual influenza outbreaks. Major antigenic changes known as antigenic shift occur rarely (at irregular intervals of 10-40 years), but can cause major pandemics of influenza (e.g. Spanish flu, 1918).[5] Other pandemics occurred in 1957 and 1968.[7]

3.1 Influenza - Epidemiology

Influenza is a disease which usually has a low case fatality rate overall (less than 0.1%).[5] In pandemics, however, fatality rates may be much higher. It is spread by airborne transmission and direct contact with respiratory droplets. It is a seasonal disease and spreads fastest when people congregate together for longer periods. Documented epidemics of influenza occur in the USA every year. [7] Similar disease trends occur in Canada.[10] Excess mortality from influenza is reported annually from many countries, as well as the World Health Organization. Type A influenza viruses cause most epidemics, while those caused by Influenza B occur once every 2-3 years. In temperate zones, epidemics occur in the winter but outbreaks or sporadic cases may occur in any month.

When a new subtype of virus appears, all people are susceptible except those who have been infected in earlier epidemics caused by a related subtype. Infection produces immunity to the specific infecting virus.[7]

Unfortunately, influenza disease can be confused with other illnesses occurring in winter, like colds, etc. Therefore, recognition of influenza disease in populations is commonly by epidemiologic characteristics. Sporadic cases can be identified only by laboratory testing to culture and identify the influenza virus,[7] or to demonstrate viral antigen in exfoliated cells or in respiratory secretions, or by an increase in specific antibody in the serum.[5]

Investigations of influenza outbreaks in nursing homes have demonstrated attack rates as high as 60% with case fatality rates of 30%. Retrospective studies suggest that chronic underlying diseases contribute more to severity of illness than age alone.

3.2 Influenza - Control Strategies

Influenza can be controlled by using a combination of public health strategies. Surveillance programs are implemented to identify the type of influenza infections present in the community and to collect baseline data to

monitor the extent and progress of outbreaks and evaluate the effectiveness of applied public health interventions.

Amantadine is a control measure that is effective for short term prevention and treatment of Influenza A. The most effective control measure is the use of vaccination both to prevent illness and to reduce the severity of the disease. These control measures are discussed further in more detail.

3.2.1 Influenza - Control Strategies - Surveillance Programs

Careful surveillance reveals that the influenza virus is present in the community every winter. In epidemic years there is an increase in excess mortality due to pneumonia secondary to the influenza infection. This is so characteristic of influenza that it has been used for years by epidemiologists as an indicator of influenza activity in the community.[5] Excess rates of hospitalization of adults with respiratory disease (pneumonia and influenza) of 79-86/100,000 or 270/100,000 have been found during influenza epidemics[5].

Hospitalization rates for acute respiratory disease during epidemics are highest in those under one year of age and those who are 65 years of age and older.[6, 73] Serologic studies have also contributed to epidemiologic assessments of

influenza by demonstration of a specific serologic response, an increase in specific antibody, in acute and convalescent sera.[5,7] The Laboratory Centre for Disease Control (Health Canada) measures antibody levels in Canadians each year, so that the potential impact of the new strain can be predicted.

Illnesses due to influenza are counted in a variety of ways. In the U.S.A. and Great Britain, sentinel physicians report numbers of influenza-like illnesses on a weekly basis.[1] The World Health Organization coordinates a network of laboratory surveillance for influenza. There are also specific studies of influenza trends. For example, Glezen analyzed the surveillance records of Harris County, Texas and found that each winter the peak of acute respiratory infection visits to the sentinel clinics coincided with the peak of the influenza epidemic defined by positive cultures.[73]

Since approximately one third of the population gets influenza every year,[8] school and industrial absenteeism and an increase in clinic visits are other surveillance measures of the impact of influenza in the community. Children experience the highest infection rates during the initial spread of influenza epidemics and are the most important route of transmission of the infection in the community.[6,73] As epidemics progress, increasing proportions of infections are seen in adults and pre-school children. Rates calculated from

surveillance of individuals with upper respiratory illness suggest that influenza is roughly responsible for approximately 10-20% of all respiratory illness in any given epidemic year.[9]

3.2.2 Influenza - Control Strategies - Amantadine

Only two drugs, Amantadine hydrochloride and its analogue, rimantadine, are effective against influenza A but they are ineffective for Type B or C. When administered prophylactically to healthy adults before and throughout the epidemic period, these drugs are 70-90% effective in preventing illness caused by Type A Influenza. These compounds are used for treatment and short term prevention of influenza in persons at high risk for complications and in closed populations such as nursing homes. Their usefulness is limited by cost, some mild side effects, and the development of resistant virus strains.[1] The 1993 Canadian Consensus Conference on Influenza recommends that use of Amantadine hydrochloride for the control of Influenza A should be encouraged as side effects are minimal with appropriate usage.[69] The population that is most suitable to receive Amantadine includes: high risk residents of institutions during an Influenza outbreak; high risk people during an outbreak when vaccine is unavailable or contraindicated; and as an adjunct to late vaccination of people at high risk.[10]

However, population-based control of influenza is not feasible using antiviral drugs. As well, Amantadine prophylaxis should not replace annual influenza vaccination in groups for whom vaccine is recommended.[10, 80]

3.2.3 Influenza - Control Strategies - Vaccine

For the community, target population-based influenza immunization programs are the only available strategy for prevention and control of influenza. Since 1964, annual influenza immunization has been recommended for persons at high risk of complications.[22] The recommendation is based upon immunization being the single most effective way to prevent influenza and or its complications in susceptible people.[23,24]

Influenza vaccine is made from highly purified, egg-grown viruses that have been rendered noninfectious (inactivated). Thus the vaccine cannot cause influenza.[3] All influenza vaccines are trivalent and contain antigens derived from the influenza B strain and two influenza A subtypes which are expected to circulate that year. The vaccines are standardized to contain 15 micrograms of each viral haemagglutonin antigen per 0.5 ml dose.[5,10] The preservative thimerosal is the only additive to the vaccine.

The trivalent influenza vaccine prepared for the 1992-93 season included: Influenza A/Texas/36/91-like (HINI), A/Beijing/353/89-like (H3N2), and B/Panama/45/90-like haemagglutonin antigens.[3,25] The vaccine is named by type of influenza virus / place of isolation of this virus / isolate number / and date of isolation of the subtype.[5,7] Purified vaccine was being used in Manitoba for both adults and children for the 1992-93 season,[25] as this vaccine is associated with fewer local and systemic side effects.

The recommended dose of an influenza vaccine is 0.5 ml. One study showed that 10 times the normal dose in the elderly is clinically more effective but it is not cost-effective.[26] A single dose is considered sufficient for those with prior exposure to A and B viruses (persons aged 12 years or older).[7] Two doses are required for those under age twelve. Vaccine is administered intramuscularly in the deltoid muscle in adults and in the anterior lateral thigh muscle in infants over 6 months old and toddlers. [10,25]

Serious side effects are very rare with the current purified vaccine. There are few common side effects other than a sore arm,[27] as well as local reactions to vaccine increasing with advancing age.

Other side effects may include fever, malaise and myalgia

for one to two days after immunization[10] particularly with the whole-virus vaccine. These symptoms simulate influenza without the respiratory symptoms.

In the 1989/90 influenza season, Al-Mazrou and colleagues used a recipient-blinded study to compare the adverse effects of whole-virion vaccine with split-virion (SVV) vaccine for influenza in 358 hospital personnel. During the 48 hours after vaccination, they found that 13% of the split-virion (purified) vaccine group reported generalized aching compared with 26% of the whole-virion vaccine group. Other side effects (local reactions and transient arm soreness) were similar in both groups. They concluded that SVV reduces the rate of the most objectionable of the common adverse effects of influenza vaccine and felt that this vaccine would be more easily accepted by the recipients.[28] The split-virus vaccine is the one of choice in most Canadian regions and is the only vaccine provided in Manitoba.[25]

Influenza vaccines are contraindicated in infants less than 6 months old. Persons with acute febrile illnesses should not be immunized. Allergic responses to the vaccine are rare and are probably a consequence of hypersensitivity to some vaccine component (egg protein).[3,10] Persons with known anaphylactic hypersensitivity to eggs or to other components of the influenza vaccine should not receive the vaccine.

Immunity develops 2-3 weeks after injection of the influenza vaccine and rarely lasts beyond one year.[5,29] Annual immunization using the current vaccine is necessary for two reasons:

1) Immunity for a person declines in the year following immunization.[3] The level of antibody falls by about 75% over 8 months after split-virus vaccine, by 50% over 6 months after whole virus vaccine and even less after natural infection.[24] Serologic tests for anti-body levels are measures to predict immunity to the viral antigen. Different vaccines have differing lengths of time that antibody levels remain high enough to sustain immunity.
2) The antigens and therefore the vaccine differ somewhat annually.[5]

Yearly recommendations for vaccine components are based on the viral strains currently circulating, as determined by international surveillance,[7,71] and must be decided by the WHO Committee of experts by February of each year in order for the manufacturer to have enough lead time to produce the vaccine and have it available by September of that year. The requirement for an annual influenza immunization is unique amongst all immunization procedures and makes compliance problematic.[30]

Vaccines work by producing serologic responses specific for the included viruses and elicit booster responses to related strains with which the individual has had prior experience.[7]

Assessment of actual immunity to influenza on the basis of humoral antibody levels is difficult since these levels vary according to whether antibody was acquired by natural infection or by vaccination.[5] Humoral antibody levels may reflect not only prior immunizing experience with the viral antigens, but also possible antigenic stimulation by cryptic infections subsequent to vaccination.[5]

Several studies have been done on the effectiveness of influenza vaccine. These studies used retrospective analysis or observational techniques. Only one major study of influenza vaccine effectiveness specifically in the elderly has been reported.[75,78] In 1990, Barker and Mullooly published a retrospective analysis of the effectiveness of two specific vaccines against two specific influenza viruses in reducing the incidence of pneumonia and influenza hospitalizations and deaths in an elderly population.[31] When the subtype of the vaccine did not match the virus, the vaccine was ineffective. However, when it did match there was a 72% estimated reduction in hospitalizations and an 87% reduction in mortality. This study supports the effectiveness of the vaccine. Patriarca

(1985) demonstrated 75% effectiveness in preventing illness in high risk older persons living in institutions.[15,32]

During the 1991-1992 influenza season in the Netherlands, Govaert, Thijs, Masurel et al used a randomized double-blind placebo - controlled trial to determine the efficacy of influenza vaccination in elderly people.[78] Individuals aged 60 years and older who were not known to belong to high risk groups were randomized into either the intervention group (N=927) and were immunized with purified split-virion vaccine; or into the control group (N=911) and were immunized with a placebo of saline solution. A stratified sampling approach was used to control for factors related to health conditions. All study participants were asked to complete follow-up questionnaires at two specific intervals to determine any influenza symptoms. As well, serology samples at specific intervals were taken to determine immunity. Factors that were considered in the analysis of vaccine efficacy were; age, sex, previous immunization status, and disease category. The study concluded that in the elderly, influenza immunization may halve the incidence of serological and clinical influenza. It further concludes that previously vaccinated participants acquire influenza less often. However, the results also suggest that the effectiveness of vaccination may decrease after age 70 years.[78]

Influenza vaccine in the elderly may induce a lower antibody response because the elderly do not respond as well to immunogens.[24] Confirmatory research evidence of this phenomenon is lacking.[75] It is only about 30-50% effective for preventing infection in the elderly, but it does modify the disease and reduce the frequency of complications like pneumonia that can lead to hospitalization and death.[5,7,26,33 78] Studies also show that chronic illnesses other than those compromising the immune system, do not have a major effect on the antibody response to trivalent influenza vaccine.[75] The vaccine is 70-90% effective in the younger age groups.[5]

Recent studies measuring cellular immunity suggest there may be differences in the responses of older people to the two types of vaccine, so that split virion vaccine is less effective in adults.[74] Currently, the National Advisory Committee on Infectious Diseases is not recommending different usages between split and whole-virus vaccines [69] since both provide adequate levels of immunity to last for that particular influenza season. Although split virus vaccine may be more easily accepted, both whole virion vaccine and SVV are efficacious in prompting immunity.

Routine immunization programs should be directed primarily at persons at the greatest risk of serious complications and those who might easily spread infection to

them.[7] The National Advisory Committee on Infectious Diseases recommends groups that should be priorized for receipt of influenza vaccine (Appendix 1). Achieving high immunization rates among closed populations can reduce the risk of outbreaks by inducing herd immunity.[3] Other indications for immunization include the strong desire of any person to avoid influenza infection, reduce the severity of disease, or reduce the chance of transmitting influenza to high risk persons with whom the individual has frequent contact.[3] The target groups for influenza and pneumococcal immunization overlap. These vaccines may both be given to the individual at the same time but at different sites. However, pneumococcal vaccine is given only once in a lifetime,[3] while influenza vaccine must be given annually to confer immunity.

Research is continuing on the development and licensure of an acceptable live attenuated influenza virus vaccine of type A and type B for use in humans [9], versus the inactivated vaccine that is currently in use. This vaccine may leave a longer period between the need for revaccination (3-5 years if no antigenic change has occurred in the virus). It must be stressed that this vaccine is still very much in the experimental stage of its development.[9]

3.2.3.0 Benefits Of Influenza Vaccine Program

Influenza immunization is highly cost-effective if given to high risk groups at times of annual physician contact.[3,17] In the U.S.A. pneumococcal vaccine has been covered by Medicare since 1981;[17] but influenza vaccine was not covered until May 1993.[64]

Ninety percent of the monetary costs each year due to the morbidity and mortality related to influenza is related to disease in the elderly population. Since vaccine modifies mortality and morbidity, it greatly reduces these costs.[26] Prophylaxis is likely to be the most cost-effective if those persons for whom infection may have the severest consequences are immunized.[35]

The economic impact of influenza includes not only the cost of medical care but also the loss of human productivity. For seniors, who are a vulnerable population for influenza, the impact is measured in potential years of life lost. Quality of life issues related to influenza infections in this group provide a less tangible basis to encourage immunization. Calculating the cost of influenza and the cost benefit of influenza vaccine is tempered by a lack of data on the prevalence and impact of influenza in both the general population and in high risk groups.[12, 75] The costs related to

influenza immunization programs are far less than the costs of most other preventive and therapeutic interventions used with older people and are thus considered the most cost-effective medical interventions available to the elderly.[75] Nichol et al in a large cohort study in Minneapolis, U.S.A. in 1994 demonstrated that influenza vaccine was effective in preventing defined outcomes such as hospitalizations for cardiac and respiratory disease, which thus expands the evidence of the value of the vaccine and adds to its cost-effectiveness.[82] Peter Patriarca has summarized the economic analyses to a cost benefit statement of: "influenza vaccine works, it's inexpensive, and it saves money".[79]

3.2.3.1 Administration Of Vaccine in Manitoba and Vaccine Rates

The number of doses of influenza vaccine distributed in Canada in 1990 was 107/1,000 population.[66] Provincial health departments pay for and distribute 89% of the vaccine.[10,11] Educational programs promote its use, and physicians are reimbursed for the costs of vaccinating their patients. Currently there is no reliable information on the amount of vaccine actually being administered or the proportion of the high risk population receiving it.[66]

Approximately 100,000 doses of influenza vaccine are

distributed annually in Manitoba. (In 1990/91, 107,200 doses were distributed and in 1991/92, 123,240 doses were distributed).[56,57] A specific monitoring system is not linked with the vaccine distribution, making it difficult to know who receives the vaccine, or even if all of these doses have actually been used. In Personal Care Homes in Manitoba, virtually 100% of the residents are immunized. This leaves an approximate influenza immunization rate of 20% in the remainder of the elderly in Manitoba. It is even more difficult to measure the immunization rates in the subpopulation of non-institutionalized seniors who are the study group. The population of non-institutionalized seniors are not a homogenous group. Those living in their own homes or with extended family may be different in health status than those who are living in elderly persons' housing or other apartment-like facilities. Generating information from this population would require using a mail-in survey with all the accompanying difficulties in getting an adequate sampling frame.

Laboratory confirmed cases of influenza begin to occur regularly in most regions in Canada in November. Usually the majority of cases occur in December or January. For example, in Manitoba in the winter of 1989/90, 182 cases of influenza were confirmed by laboratory testing. Many more cases than this likely occurred. The majority of these cases occurred

in Winnipeg in December with the next highest percentage occurring in November (Appendix 13). Of all laboratory confirmed cases of influenza, 34% were aged 65 years and older.[57]

Since development of immunity takes two to three weeks following immunization, immunization programs should begin well in advance of the influenza season. NACI (The National Advisory Committee on Immunization) recommends that the annual influenza immunization program should begin as soon as vaccine is available.[10] Optimal benefit of vaccine occurs when immunization precedes exposure by no more than 2-4 months.[5]

In Manitoba, the Department of Health recommends that influenza vaccine be given to the same risk groups as those recommended by the National Advisory Committee on Immunization (Appendix 2). Vaccine is provided free of cost for most of those individuals at risk of influenza, and is distributed through public health departments, physicians and nursing homes. A newsletter is sent to health care providers detailing the recommendations for the use of influenza vaccine. Vaccine is distributed in mid-September. Hospital physicians and private physicians may provide vaccine to the elderly that attend them during the fall and winter. Nursing home staff immunize most of their residents.

The City of Winnipeg Health Department has promoted the benefits of influenza immunization to the non-institutionalized seniors who receive public health nursing service. In the past, influenza immunization was provided by the City Health Department primarily through its community health centres. A few clinics have been held by special request at some seniors' residences. The City Health Department wanted to evaluate the effectiveness of this outreach strategy prior to becoming more proactive in promoting these services and expanding their service in the community.

3.3 The Elderly as a Risk Group

The National Advisory Committee on Immunization of Canada publishes annual recommendations on groups who should receive vaccine (Appendix 1). Elderly persons (those over age 65) and persons with underlying health problems are at increased risk for complications of an influenza infection and therefore should receive the vaccine.[3,10] If infected, they are more likely than the general population to require hospitalization both for secondary complications and for chronic cardio-pulmonary and other diseases that are exacerbated by the infection.[3] Most influenza-related deaths (80-90%) occur in persons older than 65 years of age and persons with chronic underlying disorders of the cardiovascular, pulmonary or renal

systems, as well as those with metabolic diseases (including diabetes mellitus), severe anaemia, or compromised immune function.[2,7,3,11,79] Almost two-thirds of the elderly have one or more chronic medical conditions.[12] These people are at increased risk for the complications and sequelae of influenza.[13] Age is an easy identifier of a risk factor[13] which makes targeting an immunization program for those aged 65 and over an easier administrative task. Inadequate nutrition which is often common in the elderly, is correlated with poor antibody response to influenza vaccine.[14]

In 1990, Nicholson and associates completed a prospective study in Leicester to assess the prevalence and impact of respiratory viral infections in a large, elderly, ambulatory population.[12,34] The use of influenza vaccine in eleven nursing homes for the elderly during the 1988-89 influenza season was compared to the incidence, etiology, morbidity and mortality of acute upper respiratory tract viral infections in ambulatory patients. They found that immunization rates were significantly influenced by the number and type of risk factors - the highest rates being in those with chest disease (77%) and heart disease (60%). Overall they were able to identify only five cases of influenza in those individuals with upper respiratory tract infection and these five occurred in homes with low immunization rates of 15, 33 and 42%. The authors also concluded that there is considerable potential

for influenza to be over diagnosed and accordingly the efficacy of the vaccine could be underestimated. This study population includes only those in nursing homes and highlights the poor immunization status of elderly residents in nursing homes in the United Kingdom which is not the case in North America where this population is well immunized.[34]

There have been several vaccine trials using the elderly population. In a three year study in Glamorgan, South Wales, Howells and associates noted a reduction of over 80% in the incidence of bronchopneumonia and mortality in immunized patients.[15] Patriarca and associates in 1988 showed that immunization of nursing home residents in Michigan reduced hospitalization by 50%, bronchopneumonia by 58%, and mortality by 76%. They retrospectively studied the impact of an influenza epidemic in a large ill-elderly population and compared respiratory illnesses to vaccine rates. Unimmunized residents had higher attack rates and were more likely to be hospitalized and/or develop pneumonia.[160] Many studies have led to the standard recommendation that influenza vaccine in the elderly is beneficial.

Over the last 15 years, immunization rates of the elderly in North America have remained essentially unchanged [17] and remains at about 20%-30%,[3] although some studies have the number as high as 37.7%.[17] In nursing homes, as many as 55-65%

of residents are immunized annually. Pearman in 1978 concluded that the elderly who have limited socioeconomic resources show the lowest annual immunization rates.[18] The at-risk population (65 years and older) have a poor acceptance rate of influenza vaccine due to many factors: lack of mobility to access the vaccine; personal beliefs about their own low risk of acquiring influenza and the "poor" effectiveness of the vaccine; inaccessibility to the vaccine providers (physicians, clinics); and lack of knowledge about influenza and its prevention.[18]

Fedson, Wajda, Roos et al (1992) reported a record linkage study using data from 1982-1983 in Manitoba to link influenza immunization rates with hospital discharges and influenza related deaths.[11] This research indicated that previous hospital care in addition to age and underlying conditions, may serve as a marker for persons at increased risk for influenza related illness and death. The study suggests that higher-risk patients (those that have been hospitalized) are less likely to have been immunized for influenza[19] than other elderly persons. Fedson et al suggest that efforts be focused on increasing immunization rates in such persons.[11] This study did not consider immunizations administered by public health nurses since these immunizations are not recorded in the medicare data base. This makes it difficult to interpret the study's results since there is a

bias as to the documentation of immunization status.

As the number of elderly in the population continues to increase, influenza presents a serious health problem.[20] Although influenza complication rates are lower in the healthy elderly, this population is of a sufficient size that the public health impact of a low immunization rate will be significant.[21]

3.4 Interventions to Increase Acceptance of Vaccine

As mentioned above, immunization rates in the elderly are poor. Several studies have been done in the last decade to determine reasons for poor immunization rates and to identify ways to increase the uptake of influenza vaccine in various risk groups. The interventions have focused on different areas: increasing awareness of the use and effectiveness of influenza vaccine, various reminder strategies (postcards, phone calls, personal reminders, letters, voice mail, computer-generated recall of patients) to either the individual or to the health care provider, and the provision of clinics at opportunistic times ie. during hospitalization.

A Canadian study was carried out in a community health clinic in Hamilton, Ontario in 1982. In a group of 273 well-elderly patients living independently, the demographic and

geographic characteristics and the health beliefs of those who either accepted or did not accept the influenza vaccine were compared. The previous rate of vaccine acceptance in this population was 17%. By providing a reminder letter and a follow-up telephone call, immunization rates increased to 43% and 55% respectively. However, many of those remaining unimmunized believed that the risks of the vaccine outweighed the benefits.[36] This study has major implications for developing new approaches to health care education and promotion among seniors to further increase vaccine acceptance. The population selected in that study is similar to that chosen for this current research.

Other studies related to determinants of acceptance of vaccine have been done within the American health care system. Factors like costs of medical care and immunization are very important to the individual and are major considerations as a determinant.

A self-administered survey in 1988 by Ganguly and associates was sent to 300 World War I veterans (aged 84 years and older) living in Florida to ask why they did not receive influenza immunization. The response rate was low (only 38%) so that results are difficult to interpret. The major reasons given for non- receipt of vaccine were: not aware that vaccine is required annually (48%); fear of needles or side effects

from vaccine (19%); lack of transportation to the physician/clinic to get the vaccine (12%); and no interest in immunization (11%). This data indicates that education about influenza, its risk factors, and vaccine efficacy and safety might improve vaccine rates in this group of elderly.[37] This study population is somewhat limited for comparison to the present research in that it includes only the older seniors.

Gillick and Ditzion in 1988 used a computer reminder system with 463 patients of a primary care centre to determine if there are different immunization rates depending upon the level of risk. They used regression analysis to assess the association of risk factors with influenza immunization acceptance and concluded that increasing age, number of risk factors (health conditions) present, and primary care visit frequency all were significantly associated with receipt of influenza vaccine. The highest immunization rates were found in the groups at highest risk for complications.[21] In a study in the Netherlands, where compliance with influenza immunization is low, the majority of those who had been immunized had received personal reminders from their physicians.[38]

Many studies demonstrate that patients and physicians generally feel that vaccines are safe and efficacious.[13] Bloom, Bloom, Krasnoff and Frank (1985) divided a specific

elderly hospitalized population into three groups to compare three different interventions on rates of acceptance of influenza vaccine. One group received information pamphlets about influenza vaccine, the second group received pamphlets plus nursing follow up to promote the vaccine, and the third group received pamphlets plus volunteer follow up to promote the vaccine. They found no significant differences between these groups in terms of diagnosis, age, sex, length of hospital stay and the receipt of influenza vaccine. They concluded that there was a significant but similar improvement in all three experimental groups related to acceptance of vaccine (78%) versus 0% immunization rates in the control group. Since they found no difference between the experimental and control groups in attitudes and beliefs about immunization, they concluded that a simple educational intervention followed by an offer of immunization before hospital discharge can dramatically increase influenza immunization rates among the elderly.[13]

Nichol, Lofgren, and Gapinski surveyed 500 outpatients at both the Minneapolis and Pittsburgh Veteran Affairs Medical Centres for the 1989-1990 influenza season to assess the differences between vaccine recipients and non-recipients. The groups were found to have similar knowledge about influenza and vaccine; but different attitudes about the "flu shots". Factors positively associated with immunization

behaviour were: the intention to follow nurse or physician recommendations regarding vaccine; and previous immunization behaviour. Factors that were negatively associated were difficulty in coming to the medical centre and previous side effects from the vaccine. These findings suggest that efforts to improve access to vaccine and educational interventions suitable to this population will increase influenza immunization rates.[39]

Fiebach and Viscoli conducted a survey to determine, in their patient population, the attitudes and beliefs that affect an individual's acceptance of influenza vaccine. Their methodology differed from most studies in that they prospectively assessed the characteristics of the study population that may be associated with non-vaccination. At the same time these researchers did a case-control study within their larger cohort study to retrospectively assess their patients' reasons for non-vaccination. Prospectively assessed characteristics that were associated with non-vaccination include: 1) not believing that the vaccine is effective; 2) no past history of receiving the influenza vaccine; and 3) feeling sick after previous immunization. The case control study identified the following attitudes which were associated with refusal of the vaccine; not believing that the vaccine works well; concern about a reaction; and a perception that a medical provider had not recommended the

vaccine.[40] These results have implications for strategies to improve acceptance of influenza vaccine. These results also suggest that seniors need correct information about influenza immunization and efforts should be made to encourage health care providers to recommend and provide influenza immunization.

In the mid 1970's, there was an outbreak of influenza in North America that was referred to as the "Swine flu epidemic." During this outbreak, after immunization with influenza vaccine, some individuals developed Guillain Barré syndrome which was attributed as a reaction to the vaccine. Although, this association was later determined to be unsubstantiated, the public may recall the initial news reports relating the two factors. This may have had an impact on acceptance rates of influenza vaccine. Since 1976, no statistically significant excess risk of Guillain - Barré syndrome has been observed after influenza immunization.[7,10]

Another study in London, Ontario considered the Health Belief Model in relation to influenza vaccine acceptance.[8] This study compared two different outreach strategies to increase influenza vaccine acceptance among patients in a physician's practice. In 1985, elderly clients were offered influenza vaccine and then mailed an information letter about the vaccine if they remained unimmunized one month later. The

following year, again the patients were offered influenza vaccine but if they remained unimmunized, 2 months later they were phoned by the nurse to promote the vaccine. Both outreach strategies were effective in increasing immunization rates but the researchers were unable to determine which was more effective, as the comparison groups were the same. Also a higher immunization rate was found among people who had previously been immunized which suggests that increased immunization rates can potentially be maintained over time. It also has implications for this study in that if people who have not previously received the vaccine are contacted and immunized, there is a greater likelihood that they will accept the vaccine in future years.

Spaulding and Kugler carried out a study in 1983 in a military and ex-military population to assess the effectiveness of postcard reminders to notify individuals that they are at high risk and need influenza vaccine.[41] They sent postcards to 519 of the 1,068 individuals involved, which resulted in a 25.2% vaccine rate as compared to a 9.1% rate in those in the control group. This study population included adults of all ages who were at risk for the complications of influenza. Non-instutionalized seniors aged 65 years or older who had no other risk factors were not included in the study population. The authors concluded that media attention and physician attention to compliance with influenza immunization

are usually focused on the elderly, especially the infirm and this accounts for the lower immunization rates in those at risk in the younger population. They also concluded that a reminder postcard is an effective intervention. Although interesting, this study excluded the population being studied in this current research.

In a study in 1986 and 1987 in the West Lothian Health Centre, Wakefield sent out appointments for administration of influenza vaccine to those at risk for complications and those over aged 65 years.[42] The non-responders were sent a letter to explore the reason for non-attendance. It was found that a previous "bad" reaction or a fear of needles were the main reasons for non-acceptance. The following year a more comprehensive immunization letter was sent explaining reasons for immunizations and possible side effects. The uptake of vaccine was 70.4% in the first year and 60.6% in the second year from which they concluded that provision of educational material about risks and benefits was not effective in increasing vaccine uptake. Many studies have been done that support the use of education of individuals at increased risk about their risks, influenza illness and its prevention. Such educational strategies increase compliance rates for acceptance of vaccine [29] and need to be included with other strategies to increase the acceptance of vaccine. The results of this study are not in keeping with results of other health

education intervention studies. This may be due to the particular nature of the population served or the strategies used.

Several studies have used a variety of reminder strategies as a way to improve compliance and have included a form of cost analysis to determine which is the most effective. In a randomized trial of over 900 patients aged 65 and older, McDowell, Rosser and Newell used three reminder systems: a personal reminder by the physician; a telephone reminder by the nurse; and reminder by mail. All of these were successful in increasing immunization rates (45.1%, 43.5%, 35.1% respectively) compared to 9.8% before intervention. They found that the telephone reminder was the most cost-effective. These authors suggested that staged interventions may be effective. A general reminder to all of the elderly such as a statement included with the Old Age Security cheques may also be effective.[43] The latter strategy is currently used in Canada.

These same researchers did a follow up study to assess the long term effect of reminders on receipt of influenza vaccine and found that their use had both positive and negative effects and fostered some dependency especially with the older patients.[44] They recommend that a reminder system assists the health care provider and supports the involvement

of patients in their care. Reminders could be expanded to educate as well as remind. The strategy for this current research focuses on the education. McDowell and colleagues document the necessity for a good immunization program to include an educational component. National reminder strategies used in Canada include the television and radio advertisements reminding people that it is time to get their "flu shots" as well as an insert in the Old Age Security cheques.

Hutchison and Shannon did a similar study in 1987 with 394 elderly patients from a family medical centre to assess the effect of repeated annual reminders on influenza immunization. They concluded that the usefulness of mailed reminders is limited in that repeated mailings did not significantly increase the number of people immunized. Thus alternate strategies are needed to improve vaccine coverage for persons who do not respond to a first or second mailing.[49] Mailed reminders have a varied success rate in other studies, from 20% to 43% to 80%[44] depending on the actual method of reminder used, and the population with which it was used.

Grabenstein and colleagues assessed the cost-effectiveness of using mail-outs from community pharmacists to those individuals aged 64 years and over who were on certain medications related to heart and respiratory problems.[50] They found this strategy increased vaccine acceptance by 10.3% in

their sample population. The study shows that the strategy is cost-effective. This particular intervention has not been applied in Manitoba, but would have a limited effect since many persons over age 65 years do not have heart or respiratory problems.

Buchner, Larson and White (1987) studied an elderly population in Seattle receiving private medical care from three different community physicians.[45] The three sites were chosen for their different patient demographic mixes and past history of the use of cues to receive influenza immunization. The 655 patients in the study population were randomly assigned to either experimental or control groups. Postcard reminders were sent to those in the experimental groups one month after influenza vaccine became available for administration. Follow-up questionnaires were mailed to all patients randomized into the cue study to estimate influenza vaccine acceptance. Seventy-seven percent of the questionnaires were returned. The immunization rates in the experimental group (55%) and the control group (54%) were not significantly different. Upon further analysis the authors concluded that the actual baseline immunization rate in this study population which had been exposed to mass media reminders was 54%, rather than the estimated baseline rate of 20%. They also found that direct patient/physician contact increased immunization rates. Most notably, they concluded

that the study cue (postcard) was not effective in increasing immunization rates above the baseline in this study group. They hypothesize that a "ceiling effect" occurs since other studies using reminders have found a similar plateauing of the vaccine acceptance rates.[45,46] This suggests that reminders must be combined with other strategies to maximize immunization rates. This study also validates the role of the physician in both promoting and administering the vaccine.

Leirer, Morrow and colleagues examined the use of voice mail as a strategy to increase influenza vaccine acceptance.[47] They selected 320 elderly people of lower socio-economic status who ate at least semi-regularly at a community based lunch program in a seniors centre. As mentioned previously, lower income and poor nutrition increase the risk of this group of elderly for serious complications secondary to an influenza infection. The sample population was divided into four intervention groups. Immunization rates after the intervention were: 1) Control group (1.5%); 2) Voice-mail to notify individuals about the cost, time and location of an influenza vaccine clinic (11.8%); 3) Posted and verbal announcements regarding clinic location (7.4%); and 4) Voice-mail, posted and verbal announcements (37.5%). The authors conclude that voice-mail is effective in increasing vaccine acceptance both alone and in conjunction with other verbal announcements. Voice-mail alone increased acceptance rates;

however, announcements alone did not show a similar increase.[47] In order to use the reminder strategy of voice-mail, a phone is critical. Some of the poorer elderly can not afford a telephone and thus would require other reminder mechanisms. The study population chosen here is similar to the sample selected for this research. It may have implications for personal contact as a motivater for people to be immunized.

During the 1984/85 influenza season, Brimberry compared the use of two different reminder systems (letter and telephone) with a control group of no reminders to determine the most effective strategy among the high risk population of a university based family practice. The results showed a 9.7% immunization rate in those who received a mail-reminder; a 9.3% rate in those who were telephoned; and a 3.8% rate in the control group. Both reminder systems were effective in increasing the immunization rates; however, neither strategy increased the rate up to the national baseline rate of 20%.[48] This suggests that reminder systems alone may not be effective in increasing immunization rates.

One study by Ohrt and McKinney in the 1990-1991 influenza season looked at increasing vaccine acceptance by 442 medical house staff and students.[30] After all of the study population received an educational memo about the influenza vaccine, only 20% accepted immunization. Half of those unimmunized received

a personal letter while half received a telephone call. Vaccine was offered directly on site in a mobile facility to those still unimmunized. This was found to be 90% effective in achieving immunization. Thus providing a direct clinic service was highly effective in increasing immunization rates.[30] This current research will use the same intervention of providing education about influenza vaccine, and then providing an on-site immunization clinic to give direct service to the target population.

An analogy can be drawn by considering studies in which reminder strategies were used with different populations than that considered for influenza and with different immunizing agents. In Finland, a very large study was undertaken nationally from November 1982 to June 1986 to increase acceptance of measles, mumps and rubella vaccine in children.[51] The study found that mass media campaigns had little effect on increasing vaccine compliance. However, it was noted that these can be a useful forerunner to an effective immunization campaign.[51] The experience in Finland indicated that a mass media campaign had an immediate but short term effect (about one week) in increasing vaccine compliance with some of the population. The combined strategy of a personal notification to both the parent of the non-immunized child and the health care provider was very effective in increasing vaccine acceptance (coverage over 96%). This study, unlike the

previous ones highlighted, involved a national approach rather than a localized approach. Also the immunization service occurred in the public health units rather than physicians' offices, hospitals, or medical clinics. This study was done with children rather than adults which may be very different in determining strategies that are effective.

Another large study used as an analogy for this research was in the Ottawa Hospital Family Medicine Centre, (undertaken by Rosser and associates) using 5589 patients 20 years or older to assess the effect of three reminder strategies in achieving compliance with tetanus immunization. Patients were assigned to four groups: control; telephone reminder; letter reminder; and a reminder to the physician. Following intervention, the rates of tetanus immunization were 3.2%; 20.8%; 27.4%; and 19.6% in the respective groups. As vaccination for tetanus is effective and is recommended for the entire population, these rates are not sufficient to achieve complete population coverage. However, tetanus is a rare disease and further intervention may not be cost effective.[52] The increase in rates after some of the reminder strategies is similar to rates found in other intervention studies involving adults.

Another strategy to increase vaccine acceptance was studied in a long term care facility in Ontario in 1990.

Influenza immunization rates among the elderly residents had been 85-90%. but only 10% among the caregivers. Interventions included sending brochures promoting immunization to all staff, provision of posters on each floor, publication of health information in an employees' newsletter and a competition between staff areas to have the most people immunized. Ribbons were also given to those receiving vaccine. These interventions were somewhat effective in increasing rates. A questionnaire was administered to determine reasons for non-response. Twenty-two percent of the questionnaires were returned and a variety of reasons for non-compliance were identified. These included medical exceptions, unawareness of vaccine availability, times for immunization inconvenient, and a belief that the vaccine causes influenza symptoms. The intervention resulted in maintaining the immunization rates amongst the residents and increasing the rates amongst the staff to 34 - 41%.[23] Although still too low to provide herd immunity, these rates are three to four fold higher than the rates prior to intervention. This study targeted a very different population than that of this current research. Young adult health care workers have different attitudes and beliefs than non-institutionalized seniors and thus cannot be compared to the present study population.

Stehr-Green and associates analyzed data from 9851

persons aged 65 years and older who had participated in the 1987 U.S.A. National Behaviour Risk Factor Surveillance System. They used multivariate logistic regression to determine whether each of the various demographic and behavioural factors was significantly associated with the likelihood of receiving influenza vaccine. The strongest association was found with knowledge and utilization of health care services. Of note, 99% of the population in this large scale study knew whether or not they had received an influenza immunization in the last year. This study again concludes that knowledge is an important factor in increasing the number of people receiving the vaccine.[53] It also supports the premise that most people in the present study population will be able to recall if they have been immunized for influenza in the past.

In 1988, the Health Care Financing Administration and the Centers for Disease Control in the U.S.A. began a congressionally mandated four year demonstration project to evaluate the cost-effectiveness of providing influenza vaccine under Medicare. The project involved approximately two million Medicare recipients divided into intervention and control groups in nine states. Interventions included information about influenza vaccine sent to all Medicare beneficiaries in the intervention groups, information regarding influenza sent as an insert with telephone bills, free provision of the

vaccine to health care providers and monetary bonuses given to physicians who immunized 70% or more of their target populations. Other motivational techniques were used to encourage nurses and physicians to promote the vaccine. Each influenza season, a sample of the intervention and the control groups in each state were surveyed to estimate the rate of vaccine coverage. For the 1990-91 influenza season, the survey indicated that six of the ten intervention groups exceeded 50% coverage and two sites exceeded 60%. The control sites that were surveyed showed on average a 40% vaccine coverage rate. By the last year of the project, influenza vaccination levels exceeded 60% in four of ten intervention sites and overall levels were 59%. Results of this large influenza study demonstrate that provision of influenza vaccine can be increased among medicare beneficiaries. Analysis of the cost-effectiveness of influenza immunization was completed,[4] and because of the favourable results, (i.e. over 40% immunization rate shown to incur zero net costs), influenza vaccine was made a covered benefit for all Medicare, Part B beneficiaries in the U.S.A. on May 1, 1993.[64]

3.5 Current Public Health Interventions

The Edmonton Board of Health carried out a pilot project evaluating the effectiveness of providing Fast Flow Drop-In Influenza Clinics to the elderly in October, 1990. These

clinics were held in seniors' community facilities centrally located in four geographic areas of Edmonton. A total of 2,323 clients attended the drop-in clinics with 84% of age 65 years or older. Approximately one third of these received the influenza vaccine for the first time. This project was developed to assess if fast flow clinics could provide efficient and high quality immunization services to those at risk for influenza and its complications. This strategy used a one week period for immunization versus nine weeks used in another area that provided clinics with scheduled appointments. Nurse staffing days used in the two interventions were similar (33 compared to 38) for a similar number of clients immunized (2,323 compared to 2,241). The Edmonton Board of Health also provides some outreach immunization service to lodges, residences, etc (about 3,500 potential recipients or 20% of the influenza immunizations that are given by the Health Department). Actual influenza immunization rates in the population that the Edmonton Board of Health is serving have not been determined. The Edmonton Board of Health concluded that fast flow clinics are cost-effective and time-efficient and planned to increase this service in the 91/92 and 92/93 influenza season.[54]

The Calgary Health Department also piloted using Drop-In clinics for influenza immunization scheduled primarily for a number of days in October and November at the public health

district offices. In the 1990-91 influenza season, approximately 30% of the elderly in Calgary were immunized; 25% of these were immunized in physicians' offices and the remainder in seniors' institutions. In the fall of 1991 public health nurses administered influenza vaccine on a large scale for the first time. Influenza immunization clinics were held in three Health Department district offices and in some seniors' clubs, lodges and apartment complexes. These were found to be effective in increasing the number of people immunized.[55] Unlike Manitoba, in Alberta almost all immunizations are provided by the public health system rather than by private physicians. In both provinces, the Provincial Department of Health purchases and supplies the influenza vaccine for persons at increased risk for the complications of influenza to the providers.

These two cities in Alberta have developed influenza immunization outreach services for seniors which have been deemed successful in increasing immunization rates in this population. This research is looking at a different outreach strategy, that of providing the immunization clinic right at the site of residence for high risk seniors and evaluating the effectiveness of this strategy.

CHAPTER 4

METHODOLOGY

4.0 Hypothesis

The null hypothesis for this study is that the provision of health education and an on-site influenza immunization clinic will have no effect on increasing the immunization rates in non-institutionalized seniors living in Elderly Persons' Housing Units or retirement housing.

This was tested by designating a control group and an intervention group, providing the intervention, and then measuring the effect of this intervention on the outcome (i.e. on immunization rates). The intervention would be considered successful if the immunization rates for the intervention group were double those of the control group.

4.1 Overview and Conceptual Framework

The literature shows that many of the non-institutionalized elderly in the target population remain unimmunized for influenza. This could be due to one or more of the following reasons: belief that one is not at risk for influenza; belief that influenza vaccine is not effective;

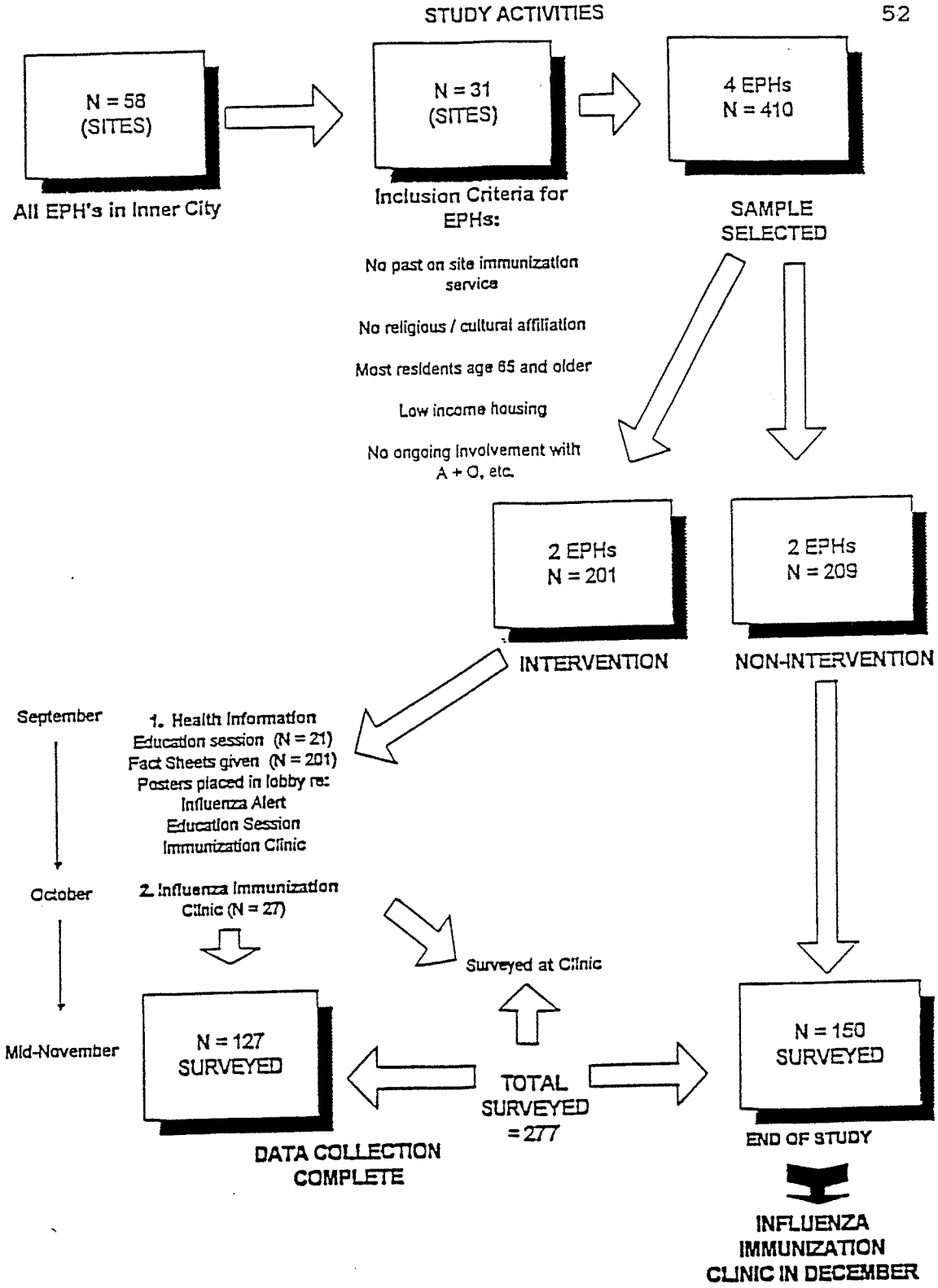
fear of side effects/reaction to the vaccine; lack of awareness of vaccine availability; lack of access to the vaccine related to mobility, transportation problems, or no family physician. Seniors are a growing segment of the population. Influenza vaccine is effective in maintaining a higher quality of life for these individuals by preventing the serious complications related to an influenza infection.

A review of the literature has shown that few studies have assessed the provision of influenza immunization services by the public health system. Provision of outreach services in the community has been a public health practice for many years; however, these have not been formally evaluated with respect to influenza immunization.

In Winnipeg, The City of Winnipeg Health Department provides service to the inner city (core area). These inner city residents including seniors, have a higher proportion of the needier population i.e. low income, poorer health and nutrition, and a lack of resources compared to the suburbs.[77] This increases the likelihood of complications from influenza among its residents since an infection further compromises their decreased health status.[86] The Health Department wanted to measure and increase the influenza immunization rates in this high need population. This intervention study was designed to meet this goal.

Within the study, four inner city elderly persons' housing units were selected, half of which then received interventions to increase influenza immunization rates. This study compared the intervention and non-intervention groups for the variables of age, sex, number of chronic health conditions, self-perceived health status, mobility status, regular medical care provider and immunization rates. The intervention included health promotion activities including: posters about the influenza alert and the vaccine; a fact sheet information page; a health information session prior to the immunization clinic which allowed an opportunity for the residents to ask any questions; and on-site influenza immunization clinics. The current study met the ethical requirements that were approved by the University of Manitoba - Ethics Committee.

Included here is an overview of the Study Activities.


STUDY ACTIVITIES
N = 58
(SITES)
All EPH's in Inner City
N = 31
(SITES)
Inclusion Criteria for EPHs:
No past on site immunization service
No religious / cultural affiliation
Most residents age 65 and older
Low income housing
No ongoing involvement with A + O, etc.
4 EPHs
N = 410
SAMPLE SELECTED
2 EPHs
N = 201
INTERVENTION
2 EPHs
N = 209
NON-INTERVENTION
September
1. Health Information
Education session (N = 21)
Fact Sheets given (N = 201)
Posters placed in lobby re:
Influenza Alert
Education Session
Immunization Clinic
October
2. Influenza Immunization Clinic (N = 27)
Surveyed at Clinic
Mid-November
N = 127
SURVEYED
TOTAL SURVEYED = 277
N = 150
SURVEYED
DATA COLLECTION COMPLETE
END OF STUDY
INFLUENZA IMMUNIZATION CLINIC IN DECEMBER

4.2 Study Population

People aged 65 or over constitute 13% of the Manitoba, population. Statistics from the Manitoba Health Services Commission for 1990 indicate that the total population in Manitoba is 1,130,845. Of this total, 145,303 are people age 65 and older.[58] There are 8,351 people living in Personal Care Homes in Manitoba.[59] The remainder, 136,952 are therefore seniors living in elderly person's housing, with relatives, or in their own homes (a very small number of these may be in hospital awaiting placement in nursing homes). The Manitoba Health Department is only able to give the number of doses of influenza vaccine distributed (at a maximum). In 1990, it paid for 107,200 doses. If all of the vaccine was given to seniors, this would lead to an immunization rate of 73%. However it is known that many of these doses are given to young adults or children with risk factors; some to health care workers, and some is wasted. It is also known that immunization rates in nursing homes are very high (almost 100% in Manitoba), which leaves a smaller proportion of vaccine available for non-institutionalized seniors.

The population of Winnipeg is 634,936.[61] This includes 81,550 people 65 years or older of which 4,591 are in personal care homes.[61] The City of Winnipeg Health Department provides

service to the inner city (core area) of Winnipeg (Appendix 12). This includes 199,586 individuals of whom 17% (or 33,268) are aged 65 or older.[61] Some of these are living in nursing homes and are not a target group for City Health since they are well immunized and they have direct nursing and medical services.

Within the City Health Department catchment area there are fifty-eight Elderly Persons Housing units. Non-institutionalized seniors, defined as people aged 65 years or older who are able to live independently outside of nursing care institutions, are considered in the literature as a risk group who are recommended to receive influenza vaccine. Elderly Persons' Housing Units house a population that is considered more at risk for institutionalization than those living in their own houses,[63] but in better health (and therefore lower risk) than those living in nursing homes. Thus this population is at higher risk for mortality and morbidity due to influenza and is a target for City Health Department outreach services.

Elderly persons living in their own homes, in family situations and in institutions like nursing homes were not included as a part of the study population. Those living in the latter situation are fairly well immunized in Manitoba since it is an accepted practise for nursing home staff to

provide influenza immunization in these settings. Seniors living in their own or family residential settings are not a current practicable target for on site clinic services since this would entail a nurse visiting the home of every senior in Winnipeg for the purpose of providing an immunization.

4.3 Study Sample

Elderly Persons' Housing Units are apartment buildings that have been specifically designed to house seniors living in self-contained units. They are managed either independently or by the Manitoba Housing authority and have structural supports like wheelchair access, gathering rooms, an on-site manager and some group facilities. The City Health Department selected this target population for potential influenza immunization outreach since it included easy access points to a high risk population, and the buildings lent themselves to setting up health information sessions and immunization clinics. The buildings had a "common room" or gathering area as well as some type of resource worker or manager who could help facilitate an outreach clinic. City of Winnipeg public health nurses are assigned to geographic neighbourhoods, within which they provide comprehensive needs-based services. The public health nurses assigned to each geographic neigh-bourhood were felt to be the best source of information about the people living in these buildings. They

were asked to complete a questionnaire about the various Elderly Persons' Housing Units (EPHs) in their neighbourhoods (Appendix 5). This tool was developed as a mechanism to gather consistent information about each of the potential units in the research in order to reduce potential biases in the study. Characteristics assessed included: age range of residents (under 65 years, 65-74 years, 75-84 years, and over 85 years); number of residents per building; existence of a religious or cultural affiliation; current involvement with the public health nurse, and involvement with other agencies or medical personnel. This information was then compiled and analyzed.

Buildings that had a strong religious or cultural affiliation (e.g. building only with residents of Chinese origin) were excluded as this could influence the receptivity of immunization and appropriateness of health promotion materials, and severely limit the generalizability of the results. Buildings that had involvement with either a public health nurse, other medical personnel, or The Age and Opportunity Association were also excluded since these individuals had greater access to immunization as well as higher awareness and motivation to receive influenza immunization. Buildings that already have a process to provide on-site influenza immunization were excluded.

In total, 31 units of the 58 available (a total of 3,700

people) were eligible for an on-site influenza immunization intervention. Criteria for inclusion were: services not already provided by private physicians or community clinics, a majority of residents in the housing aged 65 years or older, and residence in low income housing. Low income housing was selected as a criteria for two reasons. First, the initiative targeted the higher risk individuals who through low income often have adverse health factors such as poorer nutrition and therefore, may have increased susceptibility to diseases and more likelihood of serious sequelae.[14, 86] Also, these individuals have less resources to access transportation, medical services, etc. Secondly, selecting only low income housing removed income as a confounding factor in comparing the intervention and non-intervention groups. However, this population may be less amenable to educational interventions.[77]

Information that was collected on each EPH to determine the sampling frame is included in Appendix 5 - Summary Of Elderly Persons' Housing Units - Sample Selection. Of the thirty-one units considered eligible for the study, seventeen were located within the service boundaries of one health office in downtown Winnipeg. A total of four EPHs were randomly selected from the eligible pool of EPHs.

Information obtained from the Manitoba Housing Authority that directly manages most of the units in this area indicated

that these four EPHs are similar in age of building, age distribution of residents, economic and social characteristics of the residents, and types of support staff in the buildings - a part time tenant resource worker and/or site manager.

Two buildings served as an intervention group and two were designated as the non-intervention group. The intervention group was randomly selected by a coin toss. The intervention group consisted of 201 individuals and the non-intervention group of 209 individuals for a total sample size of 410 in four EPHS. Based on the changes that were being looked for in this study, the sample size was determined to be about 200 individuals in each group and therefore, two EPHs per group was required. Thus, the sample selected was over 10% of the target population of 3,700 people. With 200 people in each group, intervention and non-intervention, there is a 100% chance of detecting a difference of 30%; that is, from the hypothesized immunization rate of 30% in the non-intervention group to a hypothesized immunization rate of 60% in the intervention group, at the 0.05 level of significance.

At the 0.05 level of significance with the actual sample population of 276 individuals, with about 130 in each group, the study would be 94% certain to be able to detect a significant difference in immunization rate between the two groups with a 30% rate in the non-intervention group and an

assumed rate of only 50% in the intervention group.

4.4 Study Interventions

The first interventions described are not particular to this study and are available to all seniors. The second are interventions selected specifically for this research.

4.4.1 General Information Available to all Seniors

Two national health promotion messages about influenza vaccine occurred in the fall. These were not specific interventions of this research but are factors that may affect the immunization rate of the sample population. The intervention and non-intervention groups had equal opportunity to receive these messages. A mass media campaign was launched September 22, 1992 (through television and radio) targeted to the general public in Manitoba. It informed people about influenza, who is at risk, and advised people to obtain the fall 'flu shot'. This was done to increase public awareness.

The second broad-based information campaign about influenza vaccine is the message from Health and Welfare Canada stating "VACCINATE NOW ! FLU SEASON IS COMING . . ." which is mailed out to all seniors as an insert in the Old Age Security cheques in mid October of each year (Appendix 9).

This is to increase awareness of influenza and the availability of vaccine for the high-risk group.

4.4.2 Study Interventions

The study interventions included health information about influenza infection, risk-groups, and immunization. The information provided a basis for seniors to make an informed decision on whether or not to receive the influenza vaccine. Strategies that were used included:

(1) A health information group session provided by the public health nurse which was advertised and open for all residents of the building to attend (Appendix 8).

(2) A fact sheet on influenza vaccine which was printed in large print on buff-coloured paper and in simple language (Grade V reading level) for ease of reading. It was placed under the suite door of all residents in the intervention group (Appendix 6) the day following the information session.

(3) Posters were placed in the main lobby, and on every floor of the buildings to increase awareness of influenza immunization (Appendix 7) and to tell

residents the location and date of the on-site influenza immunization clinic one week prior to the planned date.

Two Public Health Nurses were trained to provide the health information sessions. They were given an outline of the information that was to be presented at the one-hour group session and the content was reviewed by the Communicable Disease Co-ordinator for the City of Winnipeg Health Department. (See Appendix 8 for Content of Presentation). All Public Health Nurses' receive and use standard information about influenza and the vaccine in working with their seniors population.

The public health nurse giving the session advertised it to the residents of the buildings by talking to the Tenant Resource Worker in the building and asking her to talk about it to the residents, as well as putting up posters to advertise the date, time and location of the session one week prior to the scheduled session. Information sessions were held in the intervention buildings at the end of September. This coincided with the launching of the Manitoba media campaign about influenza. At this time, attendees were told of the date and time of the immunization clinic planned for a week later.

4.4.2.1 Influenza Immunization Clinic

An influenza immunization clinic was held in the intervention buildings for one day (morning and afternoon) approximately one week after the information session. The clinics were held at the beginning of October once the influenza vaccine became available and after the health promotion interventions had occurred. The date selected was planned in conjunction with the tenant resource worker to facilitate as many residents attending as possible. These clinics were staffed by four public health nurses (two to interview the individuals, and two to immunize), as well as the Resource Worker who helped co-ordinate movement of individuals through the clinics. Participants could either sign-up ahead for a scheduled time or drop-in at their convenience.

At the immunization clinic the seniors received:

- the influenza immunization.
- a sticker to promote awareness of influenza vaccine to others.
- a health card to inform their own physician of receipt of influenza vaccine (Appendix 11).

A Health Department record on each resident immunized was also kept for future influenza immunization clinics.

4.5 Data Collection

A client survey was designed as the method of data collection. An interview format was used since some seniors may have difficulty reading. Public Health nurses were selected as interviewers because of their health knowledge, their oral communication skills, their experience in approaching individuals and building rapport, and the increased comfort level of the seniors in talking with a health professional. They also were known to the community.

It is recognized that there may be a recall bias in response to the questionnaire since the answers rely on memory and reporting ability of the individual. However, these factors were equally likely in residents of both the intervention and non-intervention EPHs and were potentially equal for all participants.

For this study, the age criteria of over 65 years is used to more accurately target those for whom influenza immunization is recommended. Age was determined by asking the individual.

After the data was collected by the public health nurses, all survey forms and client registries were returned to the researcher. Data was entered into an IBM personal computer by

one clerk using the Paradox program. Editing was done by this researcher to identify and correct invalid or inconsistent information.

4.5.1 The Survey Tool

"The Flu Vaccine Client Survey" was developed to gather information from all study participants. It also served a secondary purpose as a tool to gain consent from the individual in order to be immunized. Informed consent from the individual is required prior to any immunization being given in the public health system of the City of Winnipeg.

The information collected from the individual Client Survey was grouped into six areas: 1) demographics 2) health status of the individual 3) influenza vaccine contraindications 4) history of influenza immunization 5) sources of information about influenza vaccine 6) status of the individual's ability to perform the Activities of Daily Living. Questions used in this last area have been validated by the Aging in Manitoba study done in 1983. These questions relate to the individual's mobility and are relevant to his/her ability to attend his/her own physician or a clinic setting to receive the influenza vaccine.

Questions in the first four areas are routinely asked

before public health nurses provide an influenza immunization in public health settings. Questions asked in the last two areas relate directly to the independent variables that were analyzed in the study results.

The introduction to the Flu Vaccine Client Survey was kept brief, concise and simple so as to be easily understood by the study participants. Residence location by building address and an individual identification number (entered in numerical order for each site) from one to the total number of residents at that site were recorded onto the survey form. The unique identifier allowed maintenance of confidentiality and allowed tracking of specific data in the computer.

Age categories were divided into five year groupings. A category of under 65 years was selected as individuals less than this do not fit the criteria for influenza immunization and were not part of the target population. A category of 85 and older was formed since these are older seniors and are more likely to be at higher risk.

4.5.2 Testing the Tool

Five public health nurses were trained as interviewers in order to standardize the health promotion intervention. The questionnaire was pilot tested with a similar group of non-

institutionalized seniors. Interviewers were asked to read the introduction to each study participant in a given order to standardize their approach and be consistent in gaining consent. They were instructed to read the questions exactly as written and note the response they were given as accurately and completely as possible. Any questions that individuals did not wish to answer were left blank. Interviewers were to record the response exactly as given, as far as possible. Individuals who were taking medication regularly were prompted to provide further information, ie. "pills, inhalers?"

For questions where multiple answers were possible, (eg.#5 - sources of information about influenza vaccine) interviewers were instructed to ask all parts of the question and to check all that were identified as applicable.

In the question asking for a self-rating of health, interviewers were asked to read all of the answers first and then ask the respondent to rate him/herself.

The site of the pilot test was an elderly persons' housing unit. It was also in downtown Winnipeg and had a similar population to the study EPHS, but was excluded since it had held on-site influenza clinics in the past. The nurses went to the site on an afternoon when several seniors attended their regular weekly drop-in session to discuss

health concerns with the nurse. Each public health nurse used the tool to interview two seniors. Each was asked if they would be willing to participate in a questionnaire about influenza. This researcher observed all interactions and noted length of time of the interview, uniformity of approach in following the format as well as the directions, and any questions or wording that caused difficulty in order to modify the survey tool and methodology. The interviewers were also observed for interrater reliability.

After observing ten of these interviews, this researcher analyzed the encounters and made further modifications to the instructions for completion of the survey. Because the reporting of illnesses is critical in determining if the individual fits additional criteria for immunization, the public health nurses were instructed to return to question #2 and check-off any condition the individual subsequently indicated they had if it was one of the diseases of interest. Interviewers were advised only to check the diseases, in particular cancer, if the respondent currently <u>had</u> the condition and not if they only had a history of the disease and it was resolved. Interviewers were also asked to approximate the date if the respondent was vague eg. a response of "fall 91" - should be reported as 'fall 91' and then changed to 'Oct. 91' Interviewers were reminded to prompt the individual when the survey stated "prompt".

4.6 Survey Process

Public health nurses using the Client Survey interviewed all individuals attending the influenza immunization clinic prior to their receipt of vaccine. Vaccine receipt, however, did not depend on responding to the survey. In mid-November, six weeks after the study intervention had been applied, the questionnaire was administered to the remainder of the people in the intervention EPHS who had not yet been surveyed as well as those in the non-intervention EPH's. Mid-November was selected as the survey period since the intervention had already occurred, and individuals should have been immunized by this time if they were to have increased their immunity before the seasonal influenza epidemic which usually appears in December or January.

Five public health nurses working in teams went door-to-door in each EPH. Only one nurse would interview at each suite. All interviews were completed in a one week period in mid-November 1992. Individuals who stated they planned to be immunized were told they would be recontacted by a nurse in January to see if this had occurred.

Interviewers kept a registry by name, address and suite number of all individuals interviewed (Appendix 4), those declining, and those not found (Appendix 4). A maximum of

three attempts in three different half-day periods were made to interview each individual prior to being classified as not found. Translation services were not provided for individuals who spoke no English. If language was a barrier for completing the survey, this was documented on the population registry.

The last step of data collection occurred at the end of January 1993. At that time, the majority of influenza immunizations already would have been administered. Two interviewers recontacted all individuals who had stated in November that they had not received influenza vaccine but planned to do so, to verify that they had indeed been immunized. Of the 38 individuals recontacted, 15 had completed their influenza immunization.

4.6.1 Follow-up of Non-Intervention Groups

After the interviews at all sites were completed, at the end of November, a health information session about influenza was offered to residents of the non-intervention buildings. They were then scheduled for an immunization clinic. This was not included as a part of the research; however, it ensured that those individuals received the same services as the intervention group and complied with the specifics of our ethics approval for this research.

4.7 Confidentiality

No information regarding names was kept, nor is this type of information included in the final data set. Residents and their responses were coded once data collection was complete. Information linking names and codes were only used by the interviewers to monitor and track the individuals who had been contacted. It was also used for follow up of those individuals who planned to receive the influenza vaccine at a later date and to enter this updated data into the computer. This population registry record was later destroyed.

Individual health records for those attending the immunization clinics were maintained in the Health Department files. These health records do not contain any information related directly to this study, i.e., the questionnaires were not linked to these records.

4.8 Data Analysis and Statistical Methods

Data from all survey participants (N=277) was grouped according to a number of variables that were considered related to whether or not an individual received influenza immunization. The intervention and non-intervention groups were compared using the following variables: age groupings, gender, number and type of health conditions, sources of

information about influenza and vaccine, history of influenza immunization, mobility status (measured by difficulties with activities of daily living, and instrumental activities of daily living), rating of own health status, and degree of contact with medical care (those who have a regular physician, number of times visited the doctor in the last year). The intervention and non-intervention groups were also compared for their past and current immunization rates.

'Activities of Daily Living' responses were used to identify two groups; people with no problems with ADL (Activities of Daily Living); and those with one or more problems with ADL. The self-perceived rating of health status was grouped according to: Group 1 - Excellent or Good, Group 2 - Fair, Group 3 - Poor or Bad. The grouping for responses to the IADL (Instrumental Activities of Daily Living) were determined after a blinded review of the frequency of specific answers. This is a technique of post hoc analysis used to determine groupings. These groupings were 0, 1, 2, 3 and more difficulties with performing IADL. Data was analyzed using the SAS program and in consultation with the University of Manitoba Biostatistical Consulting Unit.

A univariate analysis was completed using the Mantel-Heinzel chi-square test to test for significant differences between the individuals who are immunized as reported on the

survey and those who are not immunized for each variable. An odds ratio was calculated to predict the odds of an individual being immunized for influenza related to specific variables. Relative odds were used to describe differences in the relative likelihood of immunization receipt for people in two categories. Odds ratios were calculated from two by two tables.

Following examination of a univariate analysis between key variables and the outcome in the separate groups, a stepwise multiple logistic regression analysis was performed. Controlling for several potential confounders simultaneously, this analysis evaluated the impact that several variables had on receiving an influenza immunization during the fall/winter 1992 season. Predictive variables included in the model were as follows; age, sex, ADL status, IADL status, self-rated health status, receipt of health information about vaccine, number and type of chronic health conditions, past receipt of influenza immunization, medication usage, regular physician, intervention or non-intervention group. Independent variables were treated as dichotomous variables (recorded as 0 and 1).

Stepwise multiple logistic regression was used to determine each variable that contributes the most to the receipt of an influenza immunization in a sequential order. The final model includes only those variables that

significantly contribute to receipt of influenza immunization. Conclusions as to the effectiveness of the intervention were then drawn.

CHAPTER 5

RESULTS

5.0 Demographics of the Study Population

Age and sex of the survey participants were compared between intervention and non-intervention groups. Cells were collapsed into 10 year age groups rather than 5 year groups since the numbers in some cells were so small that statistically valid comparisons could not be undertaken. Individuals under age 65 years were grouped together since they were not a target population for influenza immunizations. Those over aged 85 years were grouped together as they comprise a very small number in the study sample. These individuals are referred to as the older seniors in the literature.[87,89]

Age and Sex Distribution in Intervention and Non-Intervention Groups is presented in Table 1.

TABLE 1 Age and Sex of Study Participants by Intervention Group

	INTERVENTION SITES			NON-INTERVENTION SITES		
EPHs	1	2	1 + 2	3	4	3 + 4
N=277	N=53	N=74	N=127	N=86	N=64	N= 150
< 65 yrs						
Male	28.30% (15)	28.37% (21)	28.35% (36)	15.12% (13)	28.13% (18)	20.67% (31)
Female	15.09% (8)	8.11% (6)	11.02% (14)	23.26% (20)	20.31% (13)	22.00% (33)
65-74 yrs						
Male	7.55% (4)	14.86% (11)	11.81% (15)	4.65% (4)	14.06% (9)	8.67% (13)
Female	15.09% (8)	14.86% (11)	14.96% (19)	19.77% (17)	17.19% (11)	18.67% (28)
75-84 yrs						
Male	7.55% (4)	13.51% (10)	11.02% (14)	0% (0)	6.25% (4)	2.67% (4)
Female	24.52% (13)	6.76% (5)	14.17% (18)	27.91% (24)	14.06% (9)	22.00% (33)
85+ yrs						
Male	0% (0)	1.35% (1)	.79% (1)	1.16% (1)	0% (0)	.67% (1)
Female	1.89% (1)	12.16% (9)	7.87% (10)	8.14% (7)	0% (0)	4.67% (7)

There is a higher percentage of men in the intervention buildings (52%) compared to 32.7% of male residents in the non-intervention buildings.

Age distribution between intervention and non-intervention groups are fairly similar.

5.1 Study Interventions

5.1.0 Posters

Posters were displayed in the main lobby and on each floor of the intervention sites in order to disseminate the infor-mation to all of the study population designated as the intervention group. Whether or not the individuals in these sites actually saw the posters was not verified in the client survey.

5.1.1 Information Delivered - Fact Sheet

Data were not collected specifically as to the number of individuals who read the fact sheet that had been distributed under their door. One follow-up question was asked to determine the type and variety of health information that the individual encountered and if it was helpful. However, since this response was not directly linked back to each type of health information no conclusions as to the effectiveness of the fact sheet could be drawn.

5.1.2 Health Information Session

The health information session was a one hour talk given by a public health nurse to any seniors who chose to attend.

Intervention Sites	#1	#2	Total
No. Attending Session	12	9	21

This represents 10.45% of the population eligible to attend.

5.1.3 On-site Influenza Immunization Clinic

The clinics at the two intervention sites provided influenza immunization for fifteen residents from one building and twelve individuals from the other. Vaccine recipients had surveys completed at the time of intervention.

Although the clinics had only been advertised within the intervention buildings, one individual attended who lived elsewhere, but had visited the building and had seen the poster.

5.2 Response Rate

The proportion of individuals located was 75.62% (152 of 201) in the intervention group; 82.3% (172 of 209) in the non-intervention group; with an overall contact rate of 79.2% for

the study. Table 2 presents the percentages of individuals found in the study population. Reasons for non-response included some individuals who were known to be in the hospital or away on vacation, while others were excluded when not found after three visits by the nurse. Interviews on average took 15 minutes although this varied according to the questions and discussions initiated by the seniors.

TABLE 2 Study Population - Percentage of Individuals Found

STUDY POPULATION	INTERVENTION N=201	NON-INTERVENTION N=209	TOTAL N=410
Percent Located	75.62% (152)	82.30% (172)	79.02% (324)
Percent with Language Difficulties	1.32% (2)	0% (0)	.49% (2)
Percent Responses Surveys Complete	63.18% (12)	71.77% (150)	67.56% (277)
Percent Refusal	15.13% (23)	12.79% (22)	13.89% (45)

In the study population (N=410), the overall response rate was 67.56%; with a 63.18% response rate in the intervention group and a 71.77% response rate in the non-intervention group. The refusal rate for those individuals choosing not to participate in the survey was 15.13% in the intervention group compared to 12.79% in the non-intervention group; with a overall refusal rate of 13.89%. Of note, two individuals in the intervention group had a language barrier that prevented the survey from being done since no interpreter

services were provided; while there were no individuals in the non-intervention group who had language barriers.

TABLE 3 Study Population - Percentage Located by Site

	INTERVENTION SITES			NON-INTERVENTION SITES		
	#1	#2	Total 1 + 2	#3	#4	Total 3 + 4
Site Population	N=70	N=131	N=201	N=120	N=89	N=209
No. Surveys Completed	75.71% (53)	56.49% (74)	63.18% (127)	71.67% (86)	71.91% (64)	71.77% (150)
No. Not Found	12.86% (9)	30.53% (40)	24.38% (49)	17.50% (21)	17.98% (16)	17.70% (37)
No. Refused	10.0% (7)	12.21% (16)	11.44% (23)	10.83% (13)	10.11% (9)	10.53% (22)
No. Language Difficulties	1.43% (1)	.77% (1)	1.32% (2)	0	0	0

5.3 Survey Results

Responses to each question asked on the survey were tabulated and grouped within the intervention and non-intervention sites. In total, 277 individuals completed the survey, 127 in the intervention group and 150 in the non-intervention group. Results will be presented and discussed within the broader categories of health status indicators; influenza vaccine contraindications; history of influenza immunization; knowledge and sources of information about influenza vaccine; and status of mobility as measured by ADL

and IADL indicators.

Current immunization status of the individuals was assessed. As immunization status is the outcome variable of the research, it was important to determine this to evaluate if the intervention was effective. As well, this information provided a measure of the immunization rates of the study population.

5.3.1 Health Status of Study Participants

Table 4 presents the independent variables that are related to an individual's health status summarized according to intervention group.

TABLE 4 Independent Variables Related to the Health Status of Individuals

INDEPENDENT VARIABLES	INTERVENTION	NON-INTERVENTION	TOTAL (N)
No. of Chronic Health Conditions			
None	53.5% (68)	49.3% (74)	142
One	34.6% (44)	30.7% (46)	90
More Than One	11.8% (15)	20.0% (30)	45
Use of Medications - Yes	74.0% (94)	72.7% (109)	203
- No	25.2% (32)	27.3% (41)	73
Continuity of Care: Regular Physician			
- Yes	84.3% (107)	85.3% (128)	235
- No	15.7% (20)	13.3% (20)	40
Self-Rated Health Status			
- Excellent and Good	56.7% (72)	42.0% (63)	135
- Fair	33.1% (42)	46.0% (69)	111
- Poor and Bad	9.4% (12)	10.0% (15)	27

The non-intervention group had a higher percentage of individuals with more than one of the chronic health conditions considered as a risk factor for influenza infection, 20% versus 11.8% in the intervention buildings. Therefore, the non-intervention group can be considered to be in poorer health and have less people immunized.

Both groups had similar percentages of individuals who stated that they use medication.

Both groups had similar percentages who identified as having a regular physician. When asked if they had a regular doctor; 235 of 275 (85.5%) said "yes"; only 40 said "no" - 20 from each group. Thus, most individuals feel they have access to a physician, 72% of individuals stated they had seen their physician two or more times within the last year. More than half (51.3%) had seen their doctor up to four times within the last year. The majority, 93% had seen a physician at least once and as many as twelve times in the past year.

A greater percentage of individuals in the intervention groups (56.7%) rated themselves as being in excellent or good health than did those in the non-intervention buildings. (42.0%). The two groupings were similar in percentages of individuals that rated themselves in poor or bad health. In general the non-intervention group rated themselves in poorer health overall.

5.3.2 Influenza Vaccine Contraindications

Individuals were asked if they were able to eat eggs and to state the reason why not. Responses given in the negative were examined to confirm that no individuals had an allergy to eggs which would have been a true contraindication to the receipt of influenza vaccine.

5.3.3 History of Influenza Immunization

Table 5 shows the responses to the query about past experience with influenza immunization. One individual did not respond.

TABLE 5 Past Receipt of Influenza Immunization by Intervention Group

INDEPENDENT VARIABLES	INTERVENTION	NON-INTERVENTION	TOTAL N
Past Receipt of Influenza			
Immunization			
- Yes	55.1% (70)	59.3% (89)	159
- No	44.1% (56)	40.0% (60)	116

The percentage of people in the non-intervention sites who had a past history of receipt of influenza immunization was 59.3% in the non-intervention group, compared to 55% in the intervention group. Although more than half of each group stated they had received an influenza vaccine in the past, the overall current immunization rate was only 47.29%.

Of those 159 who said "yes" and were prompted as to where it was given:

- 131 (82.4%) stated at a physician's office
- 10 (6.3%) stated at a hospital
- 8 (5%) stated Community Health Centre
- 10 (6.3%) gave no response

As anticipated, most received the immunization from the doctor's office. None selected public health nurses as the service provider.

Individuals were then asked if they had a reaction to the vaccine. Thirty-two (19.4%) stated "yes"; 11 in the intervention; 21 in the non-intervention group. Reactions that were described were fairly minor. Of these thirty-two individuals, 13 (40.6%) received an immunization this year (5 intervention; 8 non-intervention) while 19 (59.4%) did not get a vaccine this year.

5.3.4 Knowledge and Sources of Information Regarding Influenza and Vaccine

Table 6 summarizes the responses to whether or not the person had information about influenza vaccine.

TABLE 6 Health Information by Intervention Group

INDEPENDENT VARIABLE Knowledge Re: Influenza & Immunization	INTERVENTION	NON-INTERVENTION	TOTAL (N)
- Yes	85.0% (108)	65.3% (98)	206
- No	15.0% (19)	34.0% (51)	70

The intervention buildings had a much greater percentage of individuals who had information about influenza and immunization, 85% in intervention sites but only 65.3% in non-intervention sites. Since health information regarding influenza was included as part of the intervention, this may explain this difference.

Of those who had information (74.6% overall), the majority stated they had it from their own physician; 56.31% (116 of 206). In addition, the following were identified as other sources of information; radio (6), television (34), newspaper (8), health professional (4).

When the individual was asked if the information they had received was helpful; 131 (47.3%) stated "yes"; 74 intervention, 57 non-intervention; 83 (38.8%) stated "no." The slightly higher number in the intervention group who stated "yes" may be attributed to getting some information through the interventions provided on-site.

5.3.5 Mobility Status

This was indicated by two separate measures, ADL and IADL. The majority of respondents, 95.6% (263) had no difficulties performing any activities of daily living, although;

- 9 had 1 difficulty (3.3%)
- 2 had 2 difficulties (0.7%)
- 1 individual (4.7%) stated he had difficulty with all 5 of the activities.

However, only 141 (or 51.3%) stated they had no difficulty with Instrumental Activities of Daily Living.

- 82% had difficulties with 2 or less of the ten activities measured in IADL.
- 2 individuals (.7%) had difficulties with all ten activities.

5.3.6 Outcome Measure of Study - Vaccine Receipt - Current Immunization Status

A total of 131 people (47.5%) received influenza immunization this year: 69 (54.3%) in the Intervention group; 62 (41.6%) in the Non Intervention. A total of 145 individuals or 52.5%, (58 Intervention, 87 Non Intervention) were not immunized for influenza, with 66 individuals stating that they planned to be immunized. Follow-up showed that 42.4% did indeed get immunized after the study had been completed. This result was not a part of the current research.

Of all those who stated they had received an influenza immunization this year (N=131), the location where immunization occurred was: 67.9% (89) at the physician's

office; 4.6% (6) at the Community Health Clinic; .8% (1) by the Public Health Nurse; 5.3% (7) at the Hospital; and 20.6% (27) by Intervention clinic.

Of those who stated they did not receive an influenza vaccine this year (N=145), 13.1% (19) individuals stated a reason as to why not. Eight people declined related to a previous bad reaction to the last vaccine, four people believed that it either was unnecessary or not helpful, and one person stated they had not been able to attend the doctor's office yet. This last person did plan to receive the vaccine whereas the other eighteen individuals had no intention to be vaccinated.

5.4 Current Immunization Rates

Table 7 shows the immunization status by intervention group.

Immunization rates were calculated and found to be significantly different, with a 30% increase in immunization at the intervention sites as compared to the non-intervention sites (p value = <.035).

TABLE 7 Immunization Status by Intervention Group

	Immunized	Not Immunized
Intervention	54.33% (69)*	45.67% (58)
Non-Intervention	41.61% (62)	58.39% (87)

$x^2 = 4.433$, $p < .035$ OR 1.67 (95% CI 1.036, 2.690)

* one individual was dropped from the original count as he was not a resident of the study buildings (N=276).

The overall immunization rate for the study population (N=277) is 47.29%.

An odds ratio was calculated to show an odds of 1.67 for receipt of influenza immunization associated with the intervention group with a probability of $p < .035$.

5.5 Univariate Analysis

Statistical tests were completed to compare those that were immunized with those that are not immunized. Table 8 presents each independent variable as associated with receipt of influenza immunization.

TABLE 8 Independent Variables Associated With Receipt of Immunization

Independent Variables	Immunized	Not Immunized	x^2	p value
Age			**2.831**	**.726**
< 65 years	42.98% (49)	57.02% (65)	.33	.567
65-74 years	54.67% (41)	45.33% (34)	2.50	.114
75-84 years	47.06% (32)	52.94% (36)	.21	.649
> 85 years	47.87% (9)	52.63% (10)	6.38	.012*
Gender			**2.236**	**.135**
Male	42.11% (48)	57.89% (66)	.72	.398
Female	51.23% (83)	48.77% (79)	6.28	.012*
No. Chronic Health Conditions			**8.078**	**.004****
None	37.59% (53)	62.41% (88)	6.65	.010*
1	58.89% (53)	41.11% (37)	.000	.970
2 or more	55.56% (25)	44.44% (20)	1.10	.294
Medication Usage			**15.693**	**.000****
Yes	54.46%(110)	45.54% (92)		
No	27.40% (20)	72.60% (53)		
Health Information Received			**15.459**	**.000****
Yes	53.70%(116)	46.30% (100)	2.15	.143
No	25.00% (15)	75.00% (45)	.15	.702
Health Information Helpful			**19.184**	**.000****
Yes	65.65% (86)	34.35% (45)	.02	.877
No	34.94% (29)	65.06% (54)	1.45	.299

Independent Variables	Immunized	Not Immunized	x^2	p value
Past Receipt of Influenza Immunization			**89.893**	**.000****
Yes	71.70%(114)	28.30% (45)	4.22	.040*
No	13.79% (16)	86.21% (100)	5.26	.022*
Problems with ADL			**.028**	**.867**
None	47.53% (125)	52.47% (138)	4.45	.035*
1 or more	50.00% (6)	50.00% (6)	.00	1.00
Problems with IADL			**5.876**	**.015***
None	39.0% (55)	60.99% (86)	2.35	.126
1	56.14% (32)	43.86% (25)	.20	.655
2	60.17% (17)	39.29% (11)	.05	.826
3	55.10% (27)	44.90% (22)	7.77	.005**
Self-Rated Health Status			**.822**	**.365**
Excellent and Good	45.93% (62)	54.07% (73)	.44	.505
Fair	50.45% (56)	49.55% (55)	.50	.480
Poor and Bad	48.15% (13)	51.85% (14)	15.78	.000**
Attendance at a Regular Physician			**14.280**	**.000****
Yes	52.34% (123)	47.66% (112)	4.38	.036*
No	20.00% (8)	80.00% (32)	.61	.435

* Denotes statistically significant
** Denotes highly statistically significant

Several of the independent variables were found not to be significantly associated with the receipt of influenza immunization. These include: gender ($x^2 = 2.236$, $p < .135$); age of the individual ($x^2 = 2.831$, $p < .726$); ability to complete activities of daily living ($x^2 = 0.28$, $p < .867$); individual's rating of own health status ($x^2 = .822$, $p < .365$).

5.5.1 Independent Variables Associated with Receipt of Immunization

In reviewing the results in Section 5.5 Univariate Analysis, several independent variables are significantly related to whether or not an individual receives influenza immunization.

These include:

No. of Chronic Health Conditions	$x^2 = 8.078$, $p < .004$
Use of Medications	$x^2 = 15.693$, $p < .000$ OR 3.17, CI 1.79, 5.61
Receipt of Health Information	$x^2 = 15.459$, $p < .000$ OR 3.48, CI 1.87, 6.48
Health Information - Helpful*	$x^2 = 19.184$, $p < .000$ OR 3.559 CI 2.016, 6.28
Past History of Influenza Immunization	$x^2 = 89.893$, $p < .000$ OR 15.83, CI 8.95, 28.03
Problems with IADL	$x^2 = 5.876$, $p < .015$

Attending a Regular Physician	$x^2 = 14.280$ $p < .000$ OR 4.39, CI 2.039, 9.47
Being in the Intervention Group	$x^2 = 4.433$ $p < .035$ OR 1.67, CI 1.036,2.69

Note: * 23% Blank Response

The significant factors will each be highlighted.

The number of specific health conditions which an individual has very significantly effects whether or not he/she receives influenza immunization. That is, individuals who have <u>any</u> of the health conditions considered as an indication for immunization are eight times as likely to be immunized compared to those having no health conditions.

5.5.1.0 Chronic Health Conditions

Odds Ratio for Number of Chronic Health Conditions

1 versus 0 - 2.38	(95% CI 1.38, 4.08)
2 + versus 0 -2.08	(95% CI 1.06, 4.08)
2 + versus 1 -.87	(95% CI .42, 1.8)
1 + versus 0 - 2.27	(95% CI 1.4, 3.7)

Past receipt of influenza immunization is significantly associated with receipt of influenza immunization, $x^2 = 89.89$, $p < .000$.

The odds ratio for being immunized for those having a previous influenza vaccine is almost sixteen times as likely as those individuals who have no past experience with the immunization (CI 8.95,28.03).

Having one or more difficulties with managing the instrumental activities of daily living is significantly associated with the receipt of influenza immunization, $x^2 = 5.876$, $p < .015$. The issue of an individual's ability to care for himself and having chronic health problems, as well as being 65 years or older, are included as the recommended criteria for receipt of influenza immunization.

Individuals who have a regular physician are 4.39 times the as likely to be immunized for influenza compared to those who do not have a regular physician (95% CI 2.04, 9.47). In addition, eighty percent of individuals who do not have a regular physician are also not immunized.

The relative odds of those using medication being immunized is 3.17 times as likely as those individuals not using medication being immunized (95% CI 1.79, 5.6). Medication usage is somewhat associated with chronic health conditions and thus may be a confounding factor.

Being in the intervention group is statistically

significant in increasing the odds of being immunized with an odds ratio of 1.67 (95% CI 1.036, 2.690).

Receipt of health information about influenza and immunization significantly increases the chance of being immunized. The relative odds of being immunized for the group that received some health information is 3.48 times as likely as those who received no information (CI 1.87, 6.5). This validates the use of health education or promotion strategies, but this study does not evaluate the actual health education materials used.

Receipt of health information that is considered helpful is significantly associated with receipt of influenza immunization, $x^2 = 19.184$, $p < .000$. The odds ratio for being immunized for those receiving helpful health information is 3.56 times as likely as those receiving information not considered to be helpful (CI 2.02, 6.28).

5.5.1.1 Sources of Health Information

Table 9 shows the specific sources of health information in relation to intervention group and immunization status.

TABLE 9 Health Information Sources by Immunization and Intervention Groups

		Intervention		Non-Intervention			
Health Information Sources	N=206	N	Per Cent Immunized	N	Per Cent Immunized	OR	95% CI
Fact Sheet	26.70%	47	68.09	8	50.0	2.20	1.14, 4.27
Information Session	9.22% (19)	18	83.33	1	0	3.84	1.26, 11.68
Posters	44.17% (91)	68	61.76	23	34.78	1.32	.76, 2.29
Regular Physician	56.3% (116)	51	80.39	65	66.15	6.84	4.05, 11.56
Family and Friends	24.76% (51)	28	64.29	23	34.78	1.13	.61, 2.1
Other	31.07% (64)	29	58.62	35	40.0	1.06	.59, 1.87

Note: Respondents could select as many from list as appropriate. Total ≠ 100%.

Fact sheets had a significant effect on the odds of an individual getting immunized, about 2 times as likely as the non-intervention group, $x^2 = 5.50$, $p < 0.019$.

Attendance at an information session greatly affected the immunization rate with a likelihood of almost four times of being immunized if in the intervention group, $x^2 = 5.62$, $p < 0.018$ as compared to the non-intervention group. Both of these

health information sources were a part of the intervention. However, this is somewhat limited since there were a small number of individuals that actually attended the information session.

Posters did not significantly affect immunization rates related to intervention groups, $x^2 = .959$, $p < 0.327$ n.s.

Information from physicians is a significant factor in increasing immunization in both groups; and the odds of being immunized if in the intervention group is almost seven times as likely compared to the non-intervention group, $x^2 = 51.53$, $p < 0.000$.

Information from family and friends does not significantly affect immunization status, $x^2 = .145$, $p < .703$ n.s.

Information from all other sources does not appear to affect immunization rates, $x^2 = .038$, $p < .845$ n.s.

Note: The specific interventions of this study included 55 who said they had seen a fact sheet on influenza (26.70%) and 19 of 206 (9.22%) who stated they had attended an information session. Of particular interest, eight individuals in the non-intervention group reported reading a fact sheet (8%) and one

of this group reported attending an information session.

5.5.1.2 Specific Categories of Independent Variables Significantly Associated with Influenza Immunization

A further analysis was done to note statistically significant relationships in the groups within the particular independent variable.

In completing a univariate analysis using the Mantel-Heinzel chi-square test for significant differences to consider which independent variables are associated with whether or not an individual is immunized, the following specific variables are significant at $p < 0.05$.

• Age - if older than 85 years	$x^2 = 6.38$, $p < .012$
• Gender - if female	$x^2 = 6.28$, $p < .012$
• Those with no chronic health conditions (related to influenza criteria)	$x^2 = 6.65$, $p < .010$
• Past History of Receipt of Influenza Immunization	$x^2 = 4.22$, $p < .040$
• Having a regular physician and attendance in last year	$x^2 = 4.38$, $p < .036$
• Self-Rated Health Status - Poor or Bad	$x^2 = 15.78$ $p < .000$
• Those with No Difficulty with Activities of Daily Living	$x^2 = 4.45$, $p < .035$
• Those with 3 or more Difficulties with Instrumental Activities of Daily Living	$x^2 = 7.77$, $p < .005$

The univariate analysis provides direction in highlighting the variables that are significantly associated with immunization. Within an individual, more than one independent variable may be present, each of which may not be equally significant in relation to immunization status. For example, self-rated health status is associated with the usage of medication, the number and type of chronic health conditions present, and the person's ability to maintain self-care i.e. perform activities of daily living. Hence, a multivariate analysis is required to determine which variables are more relevant in contributing to the outcome measure of immunization receipt.

5.6 MULTIVARIATE ANALYSIS

A multivariate analysis was completed by considering the contribution in the statistical model of the intervention group, the immunization status, and controlling for each of the independent variables previously considered.

5.6.1 Independent Variables Controlled for in Determining Outcome of Immunization by Intervention Group

In analysing the immunization status within the

intervention groups and controlling for each independent variable, an odds ratio can be determined to predict the likelihood of receipt of influenza immunization if in the intervention group. In combination with the chi-squared test for significance and p value, specific factors are determined to be significantly associated with influenza immunization as later summarized in Table 14.

Females are almost twice as likely to be immunized if in the intervention groups as compared to the non-intervention group, $x^2 = 6.227$, $p < .012$ (OR 2.296, 95% CI 1.14, 4.417).

TABLE 10 Percentage Immunized by Age and Intervention Group

Age Grouping	N	Percent Immunized Overall	Proportion Immunized		p value	OR
			Intervention	Non-Intervention		
< 65 yrs	114	43.0	46.0%	40.6%	.567	1.3
65-69 yrs	37	54.0	66.7%	45.5%	.210	2.4
70-74 yrs	38	55.3	63.2 %	47.7%	.334	1.9
75-79 yrs	40	50.0	43.7%	54.2%	.524	.7
80-84 yrs	28	42.9	56.3%	25.0%	.104	3.8
85 yrs and older	19	47.4	72.7%	12.5%	.012*	18.7

* Denotes statistically significant

M-H summary $x_2 = 1.68$, $p < .03$

The immunization rates in each age category are fairly similar.

Although there are some differences in immunization rates between intervention and non-intervention groups the only age grouping where this is statistically significant is the last one. In the age group of 85 years and older the intervention had a very significant effect of increasing the odds of individuals being immunized by 18.7 times as likely as the chances of being immunized if not in the intervention group. However, there are very few individuals in this age group in the study population.

For self-rated health status, there is a highly significant difference between the groupings, $x^2 = 12.672$, $p < .002$, thus each group needs to be reported separately, as in Table 11.

TABLE 11 Percentage Immunized by Self-Rated Health Status and Intervention Group

Health Status	N	Percent Immunized	Proportion Immunized		p value	OR
			Intervention	Non-Intervention		
Excellent and Good	135	45.9	48.6%	42.9%	.505	1.26
Fair	111	50.4	54.8%	47.8%	.480	1.32
Poor and Bad	27	48.1	91.7%	13.3%	.0001*	71.5

* Denotes statistically significant

MH Summary $x^2 = 1.68$, $p < .028$

The rate of vaccination across the different categories of health statuses are fairly similar.

The intervention had a very significant effect on increasing the odds of being immunized for those who rated their own health as being poor and bad. People who are in fair to excellent health are not significantly different from each other and have only a slightly higher than even chance of being immunized if in the intervention group. This is not significantly different than that of being immunized if in the non-intervention group.

With those individuals who report poor or bad health and controlling for this factor, the odds of being immunized if in the intervention group are 71.5 times as likely as those in the non-intervention group. Thus the outcome of increasing immunization uptake by applying the intervention is highly significant for those in poorer health. Also, this is a target group of individuals who are at increased risk of influenza morbidity.

TABLE 12 Percentage Immunized Related to Number of Chronic Health Conditions and Intervention Group

No. of Chronic Health Conditions	N	Overall Percent Immunized	Proportion Immunized		p value	OR
			Intervention	Non-Intervention		
0	141	37.6%	48.5%	27.4%	.010*	2.5
1	90	58.9%	59.1%	58.7%	.970	1.0
≥2	45	55.6%	66.7%	50.0%	.294	2.0

* Denotes statistically significant

M-H $x^2 = 1.76$, $p < .023$

The overall percentage immunized indicates a higher immuni-zation rate for individuals who have some chronic health conditions or risk factors as compared to those with no risk factors. In effect, for both groups, as the number of health conditions increased the more likely individuals are to be immunized. In general, immunization rates in all categories of the intervention group related to number of chronic health conditions are higher than in the comparable non-intervention group. However, only in individuals with no chronic health conditions is this considered to be statistically significant.

TABLE 13 Percentage Immunized By Number Of Difficulties With IADL and Intervention Group

No. of Difficulties with IADL	N	Percent Immunized Overall	Proportion Immunized Intervention	Non-Intervention	p value	OR
0	141	39.0	46.0%	33.3%	.126	1.7
1	57	56.14	53.3%	59.3%	.655	.8
2	28	60.17	58.3%	62.5%	.826	.8
3 or more	49	55.17	77.3%	37.0%	.005	5.8

M H $x^2 = 1.629$, $p < .045$

Individuals with no difficulties with IADL have the lowest overall immunization rate, 39%, as compared to individuals with some difficulties with IADL. The intervention is most significantly associated with individuals with three or more difficulties with IADL receiving the immunization.

In summary, the multivariate technique of analysis further validates that the following variables are significantly associated with influenza immunization in factoring in the intervention grouping: number of chronic health conditions; receipt of health information; attendance at a regular physician; self-rated health status of poor or bad; difficulties with IADL; past receipt of influenza immunization; and meeting the eligibility criteria to receive influenza immunization. Table 14 presents the overall results

of the multivariate analysis. The most significant categories of independent variables that have subgrouping have previously been highlighted.

Next a multiple regression analysis is used to factor in the weighting of the specific variables.

TABLE 14 Overall Results of the Independent Variables Controlled for in Determining Outcome of Immunization by Intervention Group

INDEPENDENT VARIABLES	X^2	P VALUE	OR	95% CI
Age Distribution	8.322	.139	1.679	1.044, 2.701
Gender	.969	.325	1.854	1.134, 3.032
Number of Chronic Health Conditions	5.172	.023*	1.764	1.08, 2.88
Receipt of Health Information	4.890	.043*	1.122	.66, 1.89
Past Receipt of Influenza Immunization				
- No	5.260	.022*	2.523	1.37, 4.64
- Yes	4.220	.040*		
Attendance at a Regular Physician	4.983	.026*	1.755	1.071, 2.875
Self-Rated Health Status			1.683	1.057, 2.671
- Excellent and Good	.445	.505	1.261	.64, 2.49
- Fair	.498	.480	1.321	.61, 2.85
- Poor and Bad	15.779	.000*	71.500	5.69, 898.64
Difficulties with ADL	.000	1.000	1.656	1.026, 2.674
Difficulties with IADL	4.009	.045*	1.629	1.01, 2.63
Eligibility for Vaccine: ≥ 65 years +/or ≥ 1 Health Condition	4.750	.029*	1.720	1.056, 2.803

* Denotes statistically significant

5.7 Multiple Regression Analysis

Stepwise multiple regression analysis was then performed in order to develop a model to show those variables that contribute the most to whether or not an individual receives influenza immunization. This analysis was completed using 273 surveys since four had at least one blank response in the independent variable categories. Each independent variable was entered into the equation in descending order of the amount of chi-square (x^2) variance that it contributed to immunization status. Variables were only entered into the equation if they were significant at the 0.05 level. The model and significant variables are shown in Table 15.

Another variable (the receipt of health information that was helpful) which had not reached the p value of .05 of significance was then forced into the computer analysis to determine the final multiple regression model. The 'receipt of health information' was a variable that had already been factored in; however, some individuals stated that it was helpful in deciding to get immunized, while others stated it was not helpful. The latter group did receive the information and although they considered it not helpful, it still was additional knowledge they were able to use.

Thus the final model of independent variables that

predict the likelihood of receipt of influenza immunization is:

TABLE 15 Logistic Regression Model

Variable	b	se	p value	OR	95% CI
Intercept	- 4.336	0.790	.000	.013	.003, .06
Receipt of Health Information:					
•Helpful	- 1.021	.437	.019	2.775	1.18, 6.55
•Not Helpful	- 0.045	.473	.925	.955	.38, 2.42
Past Influenza Immunization/ No History	2.647	.357	.000	14.106	7.03, 28.5
Visit to Dr. this year / No Physician	1.909	.691	.006	6.746	1.75, 26.1
Being in Intervention Group / Non-Intervention	.731	.346	.035	2.077	1.05, 4.09

In the regression model shown above, four variables significantly contribute to an individual's receipt of influenza immunization. A past history of influenza immunization most significantly predicts the receipt of influenza immunization by more than fourteen times as likely as individuals who have no history. A visit to the physician this year predicts that individuals are almost seven times as likely to be immunized as those who have not seen their physician. Receipt of health information considered to be helpful makes an individual almost three times as likely to be

immunized; while being a part of the intervention group leads to about double the likelihood of immunization than those individuals not given the intervention.

A sub-analysis was also completed with the survey responses only within the intervention sites. A total of 125 responses were used, as two had blank responses in questions relating to the independent variables. In this model only two variables remain significantly associated with the receipt of influenza immunization. These are:

Past History of Influenza Immunization OR 13.942 $p < .001$

Receipt of Health Information - Helpful OR 3.111 $p < .0139$.

The past receipt of an influenza immunization remains the most significant independent variable in predicting the likelihood of individuals being immunized. Those who have a past history of receipt of immunization are almost fourteen times as likely to be immunized than individuals with no history of influenza immunization (OR 13.841). Those who receive health information which they consider helpful are three times as likely to be immunized as those that deem the information not to be helpful. Table 16 depicts the final model for the intervention group.

TABLE 16 Stepwise Multiple Logistic Regression Model:

Impact of Independent Variables on Receiving an Influenza Immunization During Fall 1992 at Intervention Sites

Variable	b	se	p value	OR	95% CI
Intercept	-2.544	.977	.009	.08	.01, .54
Receipt of Health Information / No Information That Was:					
• Helpful	1.744	.980	.075	5.72	.84, 38.86
• Not Helpful	.718	1.005	.475	2.05	.29, 14.56
Past History of Influenza Immunization/ No History	2.628	.459	.000	13.84	5.64, 34.12

As noted above, in the intervention group, the only independent variable that significantly predicts receipt of influenza immunization once all variables are looked at together, is that of past history of an influenza vaccine.

CHAPTER 6

DISCUSSION

6.0 Study Population

Although the distribution of age and sex groupings between the two intervention groups are not similar, when using the Mantel-Heinzel chi-square test to look at significant variation, only the age grouping of 85 years and older is considered to be statistically significantly different. There were more people aged 85 years and older surveyed in the intervention sites, and a greater percentage of these (72%) were immunized at the intervention site compared to only 12% in the non-intervention site. Since the cell size is very small in this category; one does not want to overinterpret this finding.

These more elderly seniors are at the most risk for serious sequelae related to influenza infection and are also the most difficult to access the immunization as often their physical and health status does not allow them to get out to health care providers' offices easily.[89] One study supporting this observation was reported by Ganguly in 1988 who surveyed World War I veterans,aged 84 years and older. Of the respondents to his survey, 12% cited a lack of ability to go

to a physician or clinic as the reason for non-receipt of influenza vaccine.

The subject location rate of 79.2% in the study population vindicates the selected methodology. Having PHNs visit in seniors' own suites in mid-November in Winnipeg has a high probability of finding individuals at home. However, not all individuals were interested in completing a survey. Actual refusal rates were similar so it appears that more individuals were less easily located at one site than the other.

The overall response rate of 67.5% is reasonable. It is noteworthy that there was almost a 13% higher response rate in the non-intervention group (71.77%) as compared to the intervention group (63.18%) for which there is no obvious explanation.

Other analyses of the survey indicate that no individuals have any contraindications to influenza vaccine. Allergies to eggs or the preservative in the vaccine are rare, so that this result was not surprising. Also, it was not surprising to note that although some individuals described a reaction to the vaccine, these were minor. A few of these individuals chose not to receive any further vaccines. A component of any effective health education strategy is to advise individuals

that they may have a reaction to the vaccine, describe the symptoms one may expect and then remind them that minor reactions are common and that future immunization is still strongly encouraged as the reaction does not indicate decreased immunity.[5]

6.1 Study Design

In reviewing the literature, Pearman in 1978 concluded that seniors who have limited socioeconomic resources have the lowest annual immunization rates.[18] This factor was partially controlled for in our sample selection by choosing a population that all lived in the inner city and that all lived in housing managed by Manitoba Housing ie. all lower income residents.

In the non-intervention group, eight individuals reported reading a fact sheet and one person reported attending an information session whereas, in fact, these were interventions that occurred only at the intervention sites. This may indicate a confounding factor and may reflect some interaction between the two groups. This can not be controlled for in the real-life situation since all study sites were in Downtown Winnipeg ie. in relatively close proximity to each other. The effect of this confounder is not known; however, the intervention has still achieved

statistical significance in its association with receipt of immunization.

Medication usage is another variable that is linked with an individual's health conditions; and for some people, this too, may trigger self-acceptance of immunization. Thus two of the variables in this study, use of medications and presence of any chronic health conditions may have an interactive effect in the actual analysis. This researcher did not test for interactive effects between the variables in determining the relationship to immunization. Further research could be done to consider this factor.

6.2 Outcome of the Study (Major Findings)

The number of individuals who chose to attend the health information sessions and the on-site immunization clinics was lower than anticipated.

One study that used a similar strategy of an on-site immunization clinic but with a different population, that of hospital medical staff and students, was highly effective in increasing immunization rates.[30] The provision of direct clinic services may be an effective strategy, however, other factors need to be considered when considering expansion of this intervention as a public health service.

Immunization rates in both the intervention and non-intervention groups were higher than anticipated after reviewing the literature about known immunization rates in North America[4], which state a 20-30% rate up to as high as 40%. The overall immunization rate for the study population was found to be 47.29%. This rate can be generalizable to other seniors living in Elderly Person's Housing Units. In Manitoba, it is surmised that the rates of immunization in seniors in nursing homes is closer to 80 - 100%, while rates of seniors living independently in their own homes or apartments is unknown but assumed to be much lower.

The calculated odds ratio of 1.67 for the likelihood of receipt of immunization if in the intervention group predicts that the study intervention is significantly associated with the number of people who receive influenza immunization. As will be later discussed, the odds of immunization are significantly increased in the most at risk groups of individuals; those over 85 years, those with 3 or more difficulties with IADL, and those who feel they are in poor or bad health.

In assessing the relationship of the variable of the number of chronic health conditions which affect an individual to immunization receipt, having any chronic health conditions that are indicators for influenza immunization is

significantly associated with immunization receipt (x^2 = 11.407, $p < .003$). This, as well as the age factor, are criteria that are widely advertised as indicators for receiving immunization. Continuing to promote these known risk factors to the population as reasons for vaccine receipt would increase awareness of the population and encourage those individuals who can self-identify for these conditions, to accept immunization.

A study in 1986 in Barcelona, Spain by Genè, Espinola and colleagues looked at the factors related to compliance with receipt of influenza immunization in a lower class population where 25% of the population was over aged 65 years. They did a telephone survey of 190 people to look at knowledge and attitudes about influenza and immunization and its affect on the likelihood of obtaining immunization. They found that modifiable factors that predict immunization are self-identification as high-risk, belief that the immunization will not cause discomfort, intention to be immunized and physician assigned.[68] Those who consider themselves at risk are more receptive to immunization than those who do not consider themselves susceptible. Thus health education that is aimed at increasing self-recognition of belonging to a high risk group changes peoples' attitudes and behaviours with regards to influenza immunization.[68]

One of the major criteria used to recommend individuals for immunization is an age of over 65 years. Immunization needs to be promoted among healthy seniors over aged 65 years as a strategy to maintain health and prevent illness. This is a different approach to changing peoples' perceptions of their need to receive influenza immunization and changes the focus from targeting "ill" individuals as particular risk to a focus of immunization for seniors in order to keep them healthy. This has implications for marketing of influenza immunization and necessitates a two-pronged approach in health education strategies in order to increase influenza immunization acceptance by the entire senior population. Tailoring health education strategies to the two distinct approaches of keeping seniors healthy; and preventing further illness in a more at-risk group may be more effective in getting seniors to identify their own need for influenza immunization and thereby increase immunization uptake.

The overall rate of vaccination across the different categories of health statuses are fairly similar. The most significant finding is that those who rate their own health as poor or bad have far higher odds of being immunized if in the intervention group (Odds Ratio of 71.5 times greater) compared to the non-intervention group.

Similar to this study, Gillick and Ditzion used regression analysis to assess the association of risk factors with influenza immunization acceptance and concluded that increasing numbers of health conditions present and primary care visit frequency are significantly associated with receipt of influenza vaccine. This study concurs with the finding that the latter two factors are significantly associated with immunization status. Likewise, MacIntyre, Carnie and Plant in Australia used a telephone survey to determine the rates of influenza immunization in Victoria, Australia and found that immunization rates are higher in the elderly with chronic disease who are at higher risk than healthy seniors.[90]

The intervention group showed increased immunization rates as the number of chronic health conditions increased. One finding of significance in this study is that the intervention had the most significant effect (of increasing the immunization rates) in those individuals who had no self-identified chronic health conditions and therefore, did not see themselves as belonging to the high risk group. This may indicate that either the health education available or the direct clinic on-site made people think about immunization.

Overall, lack of mobility to access the vaccine and inaccessibility to vaccine providers are well-documented factors in the literature related to the poor acceptance rate

of vaccine in the high risk population of seniors.[18] In reviewing our study sample of EPHs this population is primarily composed of individuals who can manage the basic activities of daily living, which is a criteria for selecting this living arrangement. Thus this could explain why the variable of ADL is not significant when comparing those who are immunized versus those who are not.

The intervention was most significantly associated with increased immunization rates in individuals who had three or more difficulties performing IADL. These are individuals who would have the most problems with mobility and getting out to their health provider's office. In this group, those who receive the intervention have almost six times the odds of being immunized compared to that of the non-intervention group ($p < .005$). In the final regression model, the variable of having difficulties with IADL did not show up as being significant in the amount of variation this contributed. Likely, it is the clustering of characteristics i.e. older seniors, more difficulty with IADL, more health problems that is within the variable of being in the intervention group and is significantly associated with immunization.

The variable of receipt of health information is significantly associated with the immunization status. Health information may serve as new information to allow the

individual to make better choices about his health-related behaviours. It may also serve as a reminder or reinforcer approach to encourage receipt of immunization. A 1982 Canadian Study on a similar population to that of this research found that, in that group of 273 well-elderly living independently, the intervention of a reminder letter and a follow-up telephone call significantly increased the immunization rates.[36] Here the intervention may have provided a reminder effect as well as the direct effect of providing immunization. This is consistent with the overall objectives of the study since the intent was to increase influenza immunization rates.

Health information that reaches seniors and is understood and used by them is critical in effecting their receipt of immunization. The National Vaccine Advisory Committee in the U.S.A. recommends educational programs and media campaigns for adult immunization, especially those that are linked to announcements routinely directed to targeted populations by government agencies and community organizations.[83] A study done by Duclos and Hatcher in Canada in 1991 found that current influenza immunization promotion strategies, including pension cheque mailings and posters for the public may have limited benefits.[66] The present study concludes that seniors that receive health information about influenza and immunization which they value as being helpful, have two and

one-half times the odds of receiving an influenza vaccine compared to those who receive no information.

Since the majority of participants stated the information they had about influenza was from their own physician (56.7%); other information sources need to be enhanced. Only 55 individuals stated they had seen a fact sheet, when the 127 respondents in the intervention group had the potential to see and read this. Perhaps the strategy of distribution under the door equated it with junk mail, or perhaps written information is not the most effective way to educate seniors. Only a small percentage, (14.2%) of participants attended an information session that was advertised and located on-site. Perhaps this approach only reaches individuals who are already thinking about influenza immunization and then choose to attend the session. Other strategies could be: linking this information with a fun activity, eg. craft sale, rummy or bingo game, etc., where there are more individuals already gathered. Other education strategies could be evaluated such as video tapes or peer education. These could lead to future research questions.

The fact that physicians were reported as a main source of information may indicate that physicians are more likely to promote influenza immunization or may serve as both a reminder and a provider to the individual. It may also reflect

Manitoba's current health care system in which the physician is the primary access point. The literature has shown that influenza immunization is highly cost-effective if given to high risk groups at the time of annual physician contact.[3,17] Another significant finding is that individuals who visit a physician within the past year have almost seven times the likelihood of receiving an influenza immunization compared to those who do not see a physician.

Eighty percent of the individuals who do not have a regular physician, are also not immunized. This may be an issue related again to access to the health system; but it also may reflect the type of sources of information about the influenza immunization. As well, it may show a bias related to IADL status. Rather than individuals being able to get immunized in their own homes they must get out to the physician's office. This finding may strengthen the basic belief that outreach services need to be directed for those with no physicians. Also, this may reflect the value that seniors place on the role of the physician in providing medical care and immunization services in the present health system in Manitoba. On the other hand, this statement could reflect a health belief model in that individuals who do not have regular physicians also may not value preventive health care such as immunization services.

One somewhat surprising finding is the high percentage of individuals who stated they did have a regular physician. This population was selected as the more difficult to access, but in fact, 85% of them identified a regular physician and 87.8% had seen their doctor at least once in the past year. More than half (51.3%) had attended their doctor between one and four times in the past year which would have given them an opportunity to hear about and possibly receive the influenza vaccine. This study promoted the acceptance of influenza vaccine from any health care provider and thus may have been successful in encouraging residents of the intervention EPHs to attend their own physician.

The variable of past history of receiving an influenza immunization is most significantly associated with immunization status. Past experience provides a context for the individual to make a further decision about being immunized. Other factors such as: receipt of health information; attending a physician who recommends vaccine, can enhance or reinforce an individual's past decision to accept vaccination. Of the list of variables that are individually considered and associated significantly with immunization; past experience with immunization predicts the highest odds of an individual being immunized again (OR = 15.87, 95% CI .036, .112). The literature review cites several studies where previous experience with influenza immunization is

significantly associated with current immunization behaviours.[39,40,84] One of these studies that evaluated the senior influenza immunization program in a group health cooperative of Puget Sound used regression analysis to show that the previous number of vaccinations was the single most important variable associated with current immunization status with an odds ratio of 504.5[84] ($p < .05$).

Looking at longer term outcomes, this research shows that once an individual receives immunization, he/she has fourteen times the likelihood of being immunized again. Studies have shown that increased immunization rates can be maintained over time.[8] However, individuals in poor and bad health are still likely to find it difficult to get out; and therefore may need continued access to outreach immunization clinics.

When outreach immunization clinics are provided, one approach could be to ask individuals to rate their own health as an additional question to the standard consent questions. This would provide data to evaluate if the particular clinic is reaching the needier population, rather than using totals of the numbers of people immunized to try to evaluate the service delivery. Site locations where people were immunized who (a) had not been immunized before or (b) were considered to be in poor or bad health, could then be priorized for continued service delivery when determining effective public

health services within shrinking health care resources.

Although the number of individuals aged 85 years and older is very small in the study, this group is considered at increased risk and it is the group that was most significantly associated with increased immunization rates after the intervention. These seniors are likely to have decreased mobility, more problems with IADL, and may have the most difficulty getting out to the physician's office. These older seniors have a decreased likelihood of being aware of the immunization and its indications. For all of these reasons, this group would be targeted for outreach public health immunization services. In Manitoba, there are over 16,000 individuals over aged 85 years of which more than 55% live in Winnipeg.[58]

A further significant finding is that people who received the intervention of health education and an on-site influenza immunization clinic have twice the odds of being immunized as those who received no intervention. This is significant at increasing the likelihood two-fold of someone getting immunized and then, once this happens, that individual has fourteen times the likelihood of being immunized again. Thus the importance of receiving the intervention is magnified or compounded and serves as an impetus at increasing immunization rates. This magnification effect can also occur in

combination with the other independent variables that predicted receipt of influenza immunization.

6.3 Study Limitations

A cost-benefit analysis of the involved public health nurses' time compared to the number benefitting by immunization was not a part of this study. However, just the interventions of the media campaign, the influenza fact sheets delivered to each door, and the posters used to advertise both the health information sessions and the immunization clinics, may have prompted some individuals to go to their physician for immunization - as a type of "reminder intervention". This was not reliably measured in the study survey and is a limitation of the study since all the effects related to the intervention were not measured.

This study has a limited generalizability to seniors who live in EPHs within Winnipeg. In particular, the group of individuals who have some difficulties with IADL or who are over aged 85 years are interesting groups and have significant findings in this study. However, both of these categories in the study sample are represented by fairly small numbers. Further research sampling these two groups and having a much larger sample size would enhance the evaluation of outreach services for these individuals. There may be other variations

within these characteristics that would not show relevant significance across the groups.

Within the study, some confounding has occurred since we are dealing with a mobile population in a close geographic site. The effect of this was unable to be measured and accounted for within the analysis.

The question can be posed as to if the intervention had been an on-site immunization clinic alone with no accompanying information provision, would we really be reaching people who had never before received influenza immunization, or would this be redirecting immunizations that would have happened at the physician's office anyways. Future research could answer this question.

From a retrospective point of view in considering the findings, one could have explored the interactions between the independent variables in greater detail to further refine the contribution of each variable to receipt of influenza immunization.

6.4 Implications

Separating each intervention and setting up different groups with different single interventions would be a future

study to determine the most effective intervention in increasing immunization rates. The multiple logistic regression model accounts for the probability that other variables are more effective in changing the immunization rate and is thus the best analytic method to predict what variables affect immunization status. In fact, the intervention itself is not the most powerful variable that contributes to the receipt of immunization. Other variables outside the control of the study are more highly significant.

More importantly, strategies to encourage physicians to recommend and give influenza vaccine would further enhance influenza immunization rates. The research completed by Duclos and Hatcher with a stratified sample population throughout Canada support targeting health care providers to increase influenza immunization rates. The researchers recommend that physicians and nurses promote the effectiveness of the vaccine and explain the risks associated with influenza.[66]

A study done by Pearson and Thompson in 1991 in Puget Sound also used logistic regression in the analysis to show that vaccine receipt was associated both with previous immunization and with a belief that the physician recommends immunization.[84] This study used a similar strategy of publicity, health education and a special immunization clinic

in churches and activity centres in the community. The methodology was different in that it used a mailed survey rather than an in-person interview and different education strategies - physician education and an article in a seniors' paper.[84] Multivariate analysis in this study showed previous number of vaccinations as the single most important variable associated with current immunization status, with an odds ratio of 504.5.[84]

Several implications can be drawn from this research:

6.4.1 Public Health System to continue to provide and develop further outreach immunization services to target the high-risk population that is in poorer health.

One specific strategy would be to collaborate more closely with Manitoba Housing Authority and other community groups to more completely access and identify the elderly persons' housing units where the most needy population resides. The City Health Department could then provide immunization clinics at these sites. The current approach of responding to community requests on a needs basis may not be reaching the most at-risk population; however, any intervention in getting more people immunized may impact their future behaviours such that "reminder systems" may then have a bigger impact with the particular populations. Also

providing immunization to health conscious seniors is still within the overall objectives of the research and of general health promotion practices.

It may be hypothesized that setting up clinics at places like seniors drop-in centres or recreational centres (rather than residential sites) would facilitate immunization for seniors who would most likely attend their physician anyways. Although recent studies in relation to childhood immunizations show that immunizations provided by nurses are more cost-effective to the health care system then those provided by physicians,[76] this strategy needs to be researched separately with different study objectives. The intervention of outreach services to residential settings targets people that find it too difficult to get out and helps them to receive their immunization. Other residential settings for high risk seniors such as inner city hotels, hostels and boarding houses may be considered for outreach immunization services.

6.4.2 Develop a data-base linkage network to be able to enter immunizations given by the Public Health System - in particular, influenza immunization - into the population - based health care administration data-base.

This would facilitate more accurate estimation of the immunization rates and demographics of the population that currently receives influenza immunization.[83,88] This data-base in Manitoba captures physician claims for immunization through the Manitoba Health Services Commission. It misses data on immunizations provided by salaried physicians, hospitals, and nursing home staff. In order to attain the National goal of a 60-80% influenza immunization rate, there needs to be a comprehensive system available to accurately measure actual immunization rates, be able to compare annual trends, and accurately measure the interventions that make a difference.

6.4.3 Develop a better system to enhance immunization monitoring by linking vaccine recipients with vaccine providers.

This would reflect who is receiving the publicly funded influenza immunization and again provide more complete data to support further analysis of immunization and health issues. Hard data needs to be collected and maintained in order to evaluate the effectiveness of any control strategies. As noted in the literature review, there is no reliable information currently available on the amount of vaccine being given or the high risk population receiving it.[66, 83]

6.4.4 Develop appropriate additional promotional material regarding influenza and plan for further strategies to use these materials eg. through physicians' offices, in seniors' newspapers, at seniors' recreation centres.

Other strategies in provision of health education could be considered eg. video taped health information sessions to other seniors' residences. Perhaps additional strategies like peer education, supported by nurse provided education, could be effective in promoting influenza vaccine.

Working with other agencies such as Age and Opportunity, experts in seniors' health issues, and seniors themselves to develop more easily read health promotion material about influenza vaccine and looking at different distribution approaches could support the health education provided by health care providers.

6.5 Summary

In summary and reflecting back to the specific objectives of the study, the key findings of the study are:

- The influenza immunization rates in non-institutionalized seniors living in Elderly Persons Housing Units in Winnipeg was determined. This can be used as a comparison basis to look at population health issues.

- The intervention of providing an on-site influenza immunization clinic in conjunction with health education strategies was effective in increasing immunization rates in this population.

- Specific health education information which was considered to be helpful was somewhat effective in increasing immunization rates.

CHAPTER 7

GENERAL REFLECTIONS

At the same time as this intervention study was being analyzed to show that the public health intervention of providing influenza immunization clinics to seniors at their residences was effective in increasing immunization rates, The Canadian Consensus Conference on Influenza recommended that:

> Non-institutionalized persons aged 65 years and older who are unlikely to visit their physician during the influenza immunization season should be offered immunization by public health units in a variety of community settings, such as shopping malls, senior citizen centres, and residences. [69]

This conference also concluded that strategies for health promotion and education that were used in the research be continued, namely immunization reminders to persons aged 65 years and older e.g. in Old Age Pension cheques, and a national and provincial media campaign launched on October 1 of each year. A further recommendation was to launch a second campaign in December if there was no significant influenza activity in the fall and vaccine remains in stock.[65]

This study effectively provided an intervention to increase influenza immunization in a targeted senior population. It did meet the needs of the most at-risk group; the seniors in poor and bad health, the more elderly seniors. The Public Health System needs to continue to access the high-risk, hard-to-reach population in order to prevent disease and promote health in the most vulnerable community.

Results of the current research can provide a basis for the City of Winnipeg Health Department to plan for future service delivery for the target population. This study evaluated the effectiveness of providing on-site influenza immunization clinics to Elderly Persons' Housing units as a positive strategy to increase the uptake of influenza vaccine in this high-risk population. In the literature, an important issue that was identified was whether the immunization programs actually reach people who are most likely to be hospitalized or die of influenza.[75, 81] This intervention was effective in increasing immunization rates in this high risk population.

This study also provided a model, framework and support systems to be implemented for future public health influenza immunization programs. It validated the provision of health information as a strategy to increase receptivity of immunization. It also assessed tools to help identify

individuals who are at highest risk. This occurred by providing information to seniors so they are able to identify themselves as high risk.

Studies show that influenza immunization of elderly persons have economic as well as health benefits. Fedson and Roos in the Manitoba Study of influenza immunization using the health administrative data-base, found that influenza immunization has clear health benefits for the population.[70]

Fedson believes that we need to develop an epidemiology of influenza immunization practices that is just as detailed as the epidemiology of the disease and its virus.[70] This study provides a beginning step in this direction by showing the effectiveness of a particular intervention in increasing influenza immunization and by highlighting variables that are the best predictors of future immunization behaviours. This study confirmed a finding that was repeatedly identified in the literature - if physicians and health care providers recommend influenza immunization, a high proportion of people will accept vaccination, regardless of their initial attitudes.[75]

Thus public health policy regarding influenza immunization and the effective organization of a targeted intervention of a preventive service effectively promotes the

health of the population. The effectiveness of influenza vaccine is well-documented and policy makers, health care providers, and seniors need to ensure that people at high risk are immunized annually.[82] Public health nurses can play an important role in maintaining and promoting the health of seniors by coordinating annual influenza immunization programs. The system of delivering available vaccine needs to progress in order for vaccine to be effective.[83]

CHAPTER 8

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CHAPTER 9

APPENDICES

APPENDIX 9.1

NACI Recommendations for Influenza Vaccine - 1991
(National Advisory Committee on Infectious Diseases)

A. People at High Risk:

Vaccination of people at high risk is the single most important measure for reducing the impact of influenza. Priority should be given to ensuring annual vaccination of people in the following groups:

1) **Adults and children with chronic cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis, and asthma) severe enough to require regular medical follow up or hospital care.**

Chronic cardiac and pulmonary disorders in people over the age of 45 are by far the most important risk factors for influenza-related death.

2) **Residents of any age of nursing homes and other chronic care facilities.**

Such residents generally have one or more of the medical conditions outlined in group 1. In addition, their institutional environment may promote spread of the disease. Recent studies have shown that the use of vaccine in this setting will decrease occurrence of illness and has an even greater impact in reducing the rates of hospitalization, pneumonia and death.

3) **People over 65 years of age.**

The risk of severe illness and death related to influenza is moderately increased in healthy people in this age group but is not nearly as great as in people with chronic underlying disease.

4) **Adults and children with chronic conditions such as diabetes and other metabolic diseases, cancer, immunodeficiency (including HIV infection), immunosuppression (including that of transplant recipients), renal disease, anemia, and hemoglobinopathy.**

The degree of risk associated with chronic renal and metabolic

diseases in children is uncertain but this uncertainty should not preclude consideration of vaccination.

5) **Children and adolescents treated for long periods with acetylsalicylic acid.**

This therapy might increase the risk of Reye syndrome after influenza infection.

B. Care Providers:

Care providers who are potentially capable of transmitting influenza to those at high risk should be considered for annual vaccination.

1) **Health care and other personnel who have extensive contact with people in the high-risk groups.**

The potential for infecting people at high risk outlined above, particularly those in institutions, may be reduced through vaccination programs for health care personnel.

2) **Household contacts (including children) of people at high risk.**

Because low antibody responses to influenza vaccine may occur in some people at high risk (e.g. the elderly, HIV infected, and transplant recipients), this strategy may reduce the chances that these people will be exposed to influenza.

C. Other Uses:

People who provide essential community services may be considered for vaccination to minimize disruption of routine activities in the epidemic setting. Influenza vaccine may also be administered to those who wish to reduce their chances of acquiring infection.

APPENDIX 9.2

MANITOBA RECOMMENDATIONS - INFLUENZA VACCINE 1992

Manitoba Health will provide influenza vaccine for the following people:

1) Adults with:
   - any chronic cardiac or pulmonary disorders severe enough to require regular medical or hospital care,
   - other chronic conditions which may predispose them to complications of influenza, such as immunodeficient conditions (HIV infection), immunosuppressed conditions (malignant tumors, chronic renal disease and chronic severe anemia).

2) Children with:
   - any chronic cardiac or pulmonary disorder severe enough to require medical or hospital care.
   - any chronic conditions such as immunodeficiency (HIV infection) immunosuppression (malignancies), severe chronic anemia.
   - conditions treated with ASA for long periods, since this might increase the risk of Reye's Syndrome after influenza.

3) Residents of nursing homes and other chronic care facilities.

4) Persons over age 65 who are otherwise well-such persons are at moderately increased risk of the complications of influenza.

Special efforts should be made to encourage persons with the above indications to receive influenza vaccine yearly, particularly those people in the first three groups.

Manitoba Health does not provide influenza vaccine for care providers or work places.

APPENDIX 9.3

FLU VACCINE CLIENT SURVEY

INTRODUCTION TO SURVEY

The Public Health Nurses working for the City of Winnipeg Health Department are doing a study to find ways to help people to get their flu shots. Your answers to all questions are confidential. Your name will not be recorded with the results. The questions will take about 10 minutes to complete. Please let the nurse know if there are any questions you don't want to answer.

Residence Location: _____ **I.D. No:** _____

Your Sex ___ **Male** ___ **Female**

Your age ___ Under 65 ___ 65 - 69 ___ 70 - 74
___ 75 - 79 ___ 80 - 84 ___ 85 and older

1. Do you have any of the following illnesses?

___ Heart Disease ___ Cancer
___ Chronic chest Condition ___ Chronic kidney disease
___ Diabetes ___ Severe Anemia (low blood)

2. Any other illnesses? _____

3. Do you take any medication regularly? ___ Yes ___ No
If Yes - What for? _____

4. Can you eat eggs? ___ Yes ___ No
If No - Why Not? _____
(allergy, reaction, describe)

5. Have you had any information about the flu shot? (prompt)

___ Yes Fact Sheet _____ Info Session _____ Posters _____
Own Doctor _____ Family/Friends _____
Other (Specify eg. T.V., Senior Ctr, etc)_____

___ No

6. If yes, did the information you received help you decide about getting the vaccine? ___ Yes ___ No

7. Have you ever received a flu shot before?

___ No Why Not? _____
___ Yes When?_____ Where? _____Dr's Office _____CHC _____PHN
(month, year) _____Hospital.

8. Did you have a reaction to the vaccine? ___ No ___ Yes
If Yes - Describe _____

FLU VACCINE CLIENT SURVEY

9. Did you receive a flu vaccine this year?

___ Yes Where? _____Dr's Office _____CHC _____PHN _____Hospital

___ No Why Not? _____

Are you going to get one? ___ Yes

___ No

10. **Next, I am going to read a list of everyday activities and I want you to tell me yes or no if you can do them. I am interested if you could do them, not whether or not you actually do them.**

A.	YES	NO
a) doing light housework (washing up, dusting, etc)	___	___
b) doing heavy housework (cleaning floors,windows, heating care, etc.)	___	___
c) making a cup of tea or coffee	___	___
d) preparing a hot meal	___	___
e) shopping	___	___
f) laundry (household & personal)	___	___
g) walking a city block	___	___
h) getting in and out of a car	___	___

B.	YES	NO
a) Going up and down the stairs	___	___
b) Getting around the house	___	___
c) Getting in and out of bed	___	___
d) Washing or bathing or grooming	___	___
e) Eating	___	___
f) Taking medication or treatment	___	___
g) Using the toilet	___	___

11. **How would you rate your own health?**

___ Excellent ___ Good ___ Fair ___ Poor ___ Bad

12. **Do you have a regular Doctor?** ___ Yes ___ No

13. **When did you last see the Doctor?** _____
(month, year)

14. **About how many times did you see a Doctor this year? (Since Christmas)**

_____

POPULATION REGISTRY

APPENDIX 9.4

Building Location: ______________________

Ste #	Resident's Name Last, First Name	ID #	Age Yrs	Sex	#Contacts 1	2	3	Survey Comp.	Survey Not Completed Not Found	Refused	Verbal Consent Obtained

APPENDIX 9.5

Elderly Person's Housing
Data Collection Tool

Name (if any):

Address:

Number of Residents:

Age range of residents: under 65 yrs
65 - 74 yrs
over 76 yrs

Is there a religious or cultural affiliation within the center that may influence receptivity to vaccination?

Do the residents of this complex fit any or all of the characteristics of the at-risk population listed on the proceeding page? (ie. poverty, nutritional issues, mobility problems, advanced age).

Please describe any current involvement with the public health nurse:

Please describe any existing support structures in place (ie tenant workers, A&O workers):

Are there any on-going health promotion activities in this block?

Does this center already have a structure in place to provide on-site flu vaccination? (ie. clinic or private doctor)

Would the existing structure lend itself to a collaborative approach with the PHN in offering a Flu vaccine clinic?

Flu Vaccine for the Elderly

The Nursing Division is considering a more proactive approach to the provision of flu vaccine for the well-elderly (over 65), within our catchment area.

In keeping with our inner city community, we are particularly concerned about the at-risk elderly who might not otherwise receive vaccine. Influenza is particularly devastating among those who live in poverty, have poor nutritional status, are less mobile and are of more advanced age.

In order to plan this initiative further information is required on the demographics of the population and the available sites for group based interventions.

Elderly persons housing complexes are being considered as an available venue to access the elderly for the fall of 1992.

Please provide the following information regarding the available complexes in your community.

1. Please provide a list of all the available sites in your community, including the names, addresses and number of residents.

2. Prepare an individual response on each of the centres identified above using the attached form.

APPENDIX 9.6

FLU (INFLUENZA) VACCINE

WHAT IS INFLUENZA

- Influenza (flu) is a virus (germ) which can cause serious illness.
- Influenza virus spreads easily from person to person.
- It can cause fever, cough, headache, muscle aches, stuffy nose, sore throat and weakness that lasts for several days.
- Influenza can lead to pneumonia.

THE VIRUS IS PRESENT IN THE COMMUNITY EVERY FALL AND WINTER

Can INFLUENZA be PREVENTED? YES! By getting the FLU SHOT every fall, it will be prevented for 75% of people. For the rest of the people vaccinated, influenza is much less serious.

YOU SHOULD HAVE THE FLU VACCINE IF:

- You are age 65 or over
- You have heart, kidney, chest or lung disease (such as asthma, emphysema) that requires regular medical care
- You have cancer, or chronic severe anaemia
- You have a condition which may lower your resistances in fighting other illnesses

WHAT ARE THE RISKS OF THE FLU VACCINE?

- The vaccine is very safe - most people have little or no reaction to the vaccine.
- The most common reaction to the vaccine is a slight soreness and tenderness where the needle is given.
- Other possible reactions are mild fever, muscle aches and tiredness.

YOU SHOULD NOT GET THE FLU VACCINE IF:

You have an allergy to eggs or egg products serious enough that you cannot eat eggs in custards or puddings.

REMEMBER, YOU CANNOT GET INFLUENZA FROM A FLU SHOT!

CONTACT YOUR PUBLIC HEALTH NURSE OR DOCTOR FOR MORE INFORMATION ABOUT THE FLU VACCINE.

HN1111: 92.07

CITY OF WINNIPEG HEALTH DEPARTMENT

APPENDIX 9.7

FLU ALERT®

FACTS

- *influenza is a serious respiratory illness*
- *high risk individuals should receive an influenza vaccine each fall*
- *if you have a long-term lung or heart condition, or if you are age 65 or older, you are at high risk*
- *most people have no side effects from the vaccine*
- *anyone can get influenza*

INFLUENZA VACCINE IS AVAILABLE

ASK YOUR HEALTH UNIT

A message from —

Manitoba Health

Manitoba Lung Association®

Manitoba Medical Association

FLU VACCINE NOW AVAILABLE!

INFLUENZA OUTREACH IMMUNIZATION CLINICS
GUIDELINES FOR HEALTH INFORMATION SESSION **APPENDIX 9.8**

Purpose:

To provide seniors with information abut influenza and the vaccine that would enable them to make an informed decision regarding their immunization.

A. **WHAT IS INFLUENZA?**

- Define "true" influenza versus cold.
  - compare symptoms of influenza versus cold.
  - virus
- Information regarding the importance of prevention of the disease (e.g. secondary complications such as pneumonia, decreased body resistance).

B. **HOW IS IT TRANSMITTED?**

- By coughing (droplet infection).

C. **WHO GETS INFLUENZA?**

D. **WHAT CAN WE DO TO PREVENT INFLUENZA? (CAN INFLUENZA BE PREVENTED?)**

- Information about the influenza vaccine, its risks, side effects.
- Who should receive the vaccine.
- Who should not receive the vaccine.
- When and where is influenza vaccine available (e.g. annually in the fall, CHC, outreach clinics, doctors office).

E. **MYTHS AND BELIEFS REGARDING INFLUENZA VACCINE.**
(See attached sheets for other examples of myths & beliefs.)

- "The flu vaccine made me sick immediately" (not true - this is an emotional/stress response).
- "I got the flu six months after I had the vaccine. It must have been a reaction!" (not true - reaction time is 6 - 24 hours. It is possibly a misdiagnosis, "another" virus or vaccine failure).
- "I had a reaction the first time. I'll never have it again!" (each reaction will be less than the one before).
- "I had the flu vaccine and I still got the flu. It doesn't work!" (not true - it is 70 - 90 % effective. If you do get "true" influenza, you will be less sick than if you did not have the vaccine).
- "I got the flu three weeks after the needle" (unlikely - possibly misdiagnosis, "another" virus or vaccine failure).

Resources available:

For community - fact sheets, posters, video.
For public health nurses/professional use - CDWR, MMR, brochures, pamphlets.

APPENDIX 9.9

A message from the Ministers of Health and Welfare Canada and State for Seniors.

Vaccinate now!
Flu season is coming...

The flu virus is a serious bug, especially if you're over 65. It can make you extremely ill, so protect yourself with a shot.

Each year, a new vaccine is developed to fight the particular flu that's going around. These vaccines are very safe, and help guard you against infection.

Visit your doctor or call your local public health office for information. Vaccine is now available, and you should be protected.

Benoît Bouchard
Minister of Health and
Welfare Canada

Monique Vézina
Minister of State
for Seniors

Canada

APPENDIX 9.10

CITY OF WINNIPEG HEALTH DEPARTMENT
280 William Avenue, Winnipeg, MB R3B 0R1

FLU IMMUNIZATION RECORD

NAME: _____ **DATE OF BIRTH:** _____
(Surname) (First Name) (Year) (Month) (Day)

ADDRESS: _____ **TELEPHONE:** _____

_____ **M.H.S.C. #:** _____
(if available)

PERSONAL HISTORY:

Date (Year/Month/Date)					
Allergy to eggs?					
Any serious/chronic health problems?					
Fever or illness in the past 24 hours?					

Fluzone 0.5 ml 1M Lot # _____ Given by: _____ Date: _____

Fluzone 0.5 ml 1M Lot # _____ Given by: _____ Date: _____

Fluzone 0.5 ml 1M Lot # _____ Given by: _____ Date: _____

Fluzone 0.5 ml 1M Lot # _____ Given by: _____ Date: _____

Fluzone 0.5 ml 1M Lot # _____ Given by: _____ Date: _____

Comments:

_____

_____

_____

_____

_____

_____

_____

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APPENDIX 9.11

CLIENT IMMUNIZATION RECORD

NAME: _____

ADDRESS: _____

_____

KEEP THIS RECORD IN A SAFE PLACE

FOLD HERE

TYPE OF IMMUNIZATION	DATE GIVEN YR	MO	DAY

REMEMBER: GET YOUR FLU SHOT EVERY FALL

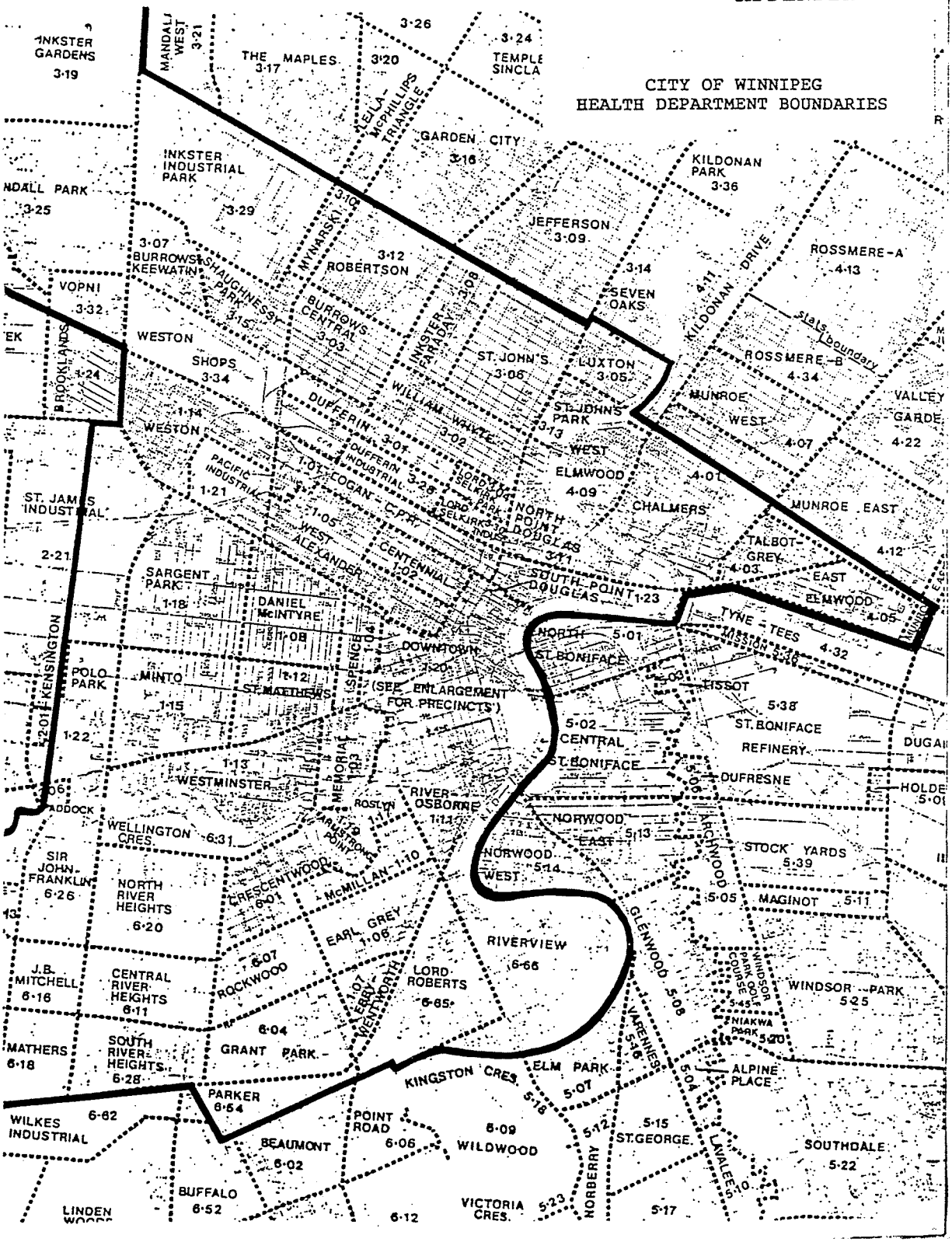
Td – Diphtheria & Tetanus Every 10 Years

CONTACT YOUR LOCAL PUBLIC HEALTH OFFICE, COMMUNITY HEALTH CENTRE, or FAMILY DOCTOR.

CITY OF WINNIPEG HEALTH DEPARTMENT

HN 1118 - 92 - 08

APPENDIX 9.12



APPENDIX 9.13

MANITOBA - INFLUENZA CASES