FACTORS INFLUENCING PARENTAL COMPLIANCE WITH THE PRESCHOOL CHILDREN'S IMMUNIZATION SCHEDULE

by

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ABSTRACT

FACTORS INFLUENCING PARENTAL COMPLIANCE

WITH THE PRESCHOOL CHILDREN'S IMMUNIZATION SCHEDULE

The control of communicable diseases in children is an important public health role. With the availability of effective vaccines, the conquest of many childhood diseases is possible. However, the success of the present immunization programs rests ultimately with the parents, who are responsible for ensuring that their children's immunization status is complete. Many factors can influence this parental compliance.

The parents of kindergarten students in two suburban communities completed a questionnaire on immunizations and family characteristics. The questionnaire was constructed using items submitted from a panel of public health nurses and from the literature. A pretest was conducted. The total number of questionnaires returned by the deadline was 376. Data on preschool children's immunization status were also collected from health unit records.

Analyses of the data included frequency distributions, contingency table analyses, factor analysis, and discriminant analysis. The major findings of the study were:

1. There was a difference between preschool children's recorded immunization status according to health unit statistics and the national standard.

2. There was a discrepancy between preschool children's immunization status as reported by parents and as recorded in health unit statistics.

3. There was not a significant relationship between parental education level, family mobility, family socio-economic level, family composition, or parental knowledge of immunizations and preschool children's reported immunization status.

4. There was a significant relationship between a positive parental attitude toward immunization and completed preschool children's reported immunization status.

5. There was a significant relationship amongst the variables. High family mobility, a low educational level for the father, an incomplete parental immunization status, and a feeling of lack of knowledge about immunizations were discriminatory for a reported incomplete immunization status. As well mobility, education-income, family composition and attitude best accounted for the relationship amongst the variables on factor analysis.

Implications for nursing practise are discussed and recommendations for further research are suggested.

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CHAPTER I

INTRODUCTION TO THE STUDY

INTRODUCTION

At present, it is possible to immunize against and prevent many common childhood diseases. Despite this, many children have an incomplete immunization status. They are, then, at risk for, or suffer from diseases which are preventable. Morbidity and mortality from vaccine-preventable diseases continue.

Interest in children's immunizations peaked during the United States poliomyelitis vaccination trials in the mid 1950's. The overwhelming success of these trials, as well as the occasional failure, was widely examined and publicized.[1] Following this, despite the availability of other effective immunizations, public and medical interest appeared to wane. The conquest of many childhood diseases was thought to be imminent.[2] When the predicted eradication of these diseases did not occur, medical interest was rekindled; however, public interest in many areas remained dormant. Unfortunately "advances in the technology of vaccine delivery systems have lagged far behind the technology of developing new vaccines".[3]

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[1]Monroe Sirken, "National Participation Trends 1955-61 in the Poliomyelitis Vaccination Program", Public Health Reports, Vol. 77, No. 8 (August, 1962) 661.

[2]Herbert Schreier "On the Failure to Eradicate Measles" New England Journal of Medicine Vol. 290, No. 14, (April, 1974) 803.

[3]J. Witte, "Recent Advances in Public Health", American Journal of Public Health, Vol. 64 (1974) 939.

As a result, the development of improved delivery systems is needed - especially for the young.[4]

Immunizations are provided for the preschool child in the Province of British Columbia at both private physicians' offices and community health centres at no direct cost to the family. The schedule of immunizations is prescribed by the British Columbia Government, Department of Health. Records are kept by the physician or health centre staff as each immunization is given. There is, however, no centralized system for insuring that each preschool child's immunizations are kept up to date. That responsibility lies with the parents. They must actively comply with the prescribed immunization schedule in order to ensure maximum protection from disease for their child. Studies have demonstrated that a number of factors can influence this compliance. These include internal factors such as educational level, socio-economic status, knowledge, and attitudes as well as external factors such as family composition and mobility.[5]

When a child enters the school system, the public health nurse examines each medical record and immunizes as necessary to complete the schedule. During the school years, immunizations are normally continued

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[4]Robert Markland and Douglas Durand, "An Investigation of Socio-Psychological Factors Affecting Infant Immunization" American Journal of Public Health, Vol. 66, No. 2, (Feb, 1976) 168.

[5]Carol D'Onofrio, Reaching Our Hard to Reach, State of California, Department of Public Health, (1966) 11-15.

by the nurse in the school. A growing concern has been expressed by public health nurses regarding the incomplete immunization status of children entering school.

THE PROBLEM

Statement of the Problem

This study was designed to discover the status of children's immunizations and to determine the influence of selected factors on that status.

The specific questions investigated in this study were:

I. Are the recorded levels of preschool children's immunizations comparible to the national standard?

II. Is there a difference between children's immunization status as reported by parents and as recorded in health unit statistics?

III. Is there a relationship between one or more of the selected internal or external factors and preschool children's reported immunization status?

Significance of the Problem

The control of communicable diseases was the original mandate for the creation of public health services. Although today this scope has broadened greatly, the control of the spread of diseases is still of primary concern. Therefore, as the numbers of children at risk rise above acceptable levels, the control of disease, the responsibility of, and a major justification for public health services, is threatened.

Community health nurses, by virture of their role and number, are responsible for the implementation of the immunization program for those children who are not immunized by their private physician. Often pre-school immunization provides the only regular contact for young families with the community health centre.

During a visit for immunizations the community health nurse may also provide developmental screening examinations for the child and problem-solving opportunities, anticipatory guidance, and health teaching for the parent. In this way immunizations are integrated with the entire preventative health program and provide an opportunity for regular nurse-parent interchange. Failure to seek immunization may jeopardize this opportunity.

Despite the many advantages of seeking regular immunizations for their children, many parents do not. In this study, the factors influencing this compliance were examined. The results can then be used to develop health education programs to increase the children's level of immunization in the community. The identification of families at risk may help to define the emphasis and direction of these education programs, thereby assisting in the more efficient allocation of nursing resources.

For society as a whole, morbidity and mortality from communicable disease has the great significance of unnecessary loss of life and increased medical costs. For the individual children and family, prevention of these diseases reduces the risk of needless suffering,

disability, or death. In an ostensibly preventative health service, one of the major areas where primary prevention is essential, is that of assuring the optimal health of our children.

ASSUMPTIONS OF THE STUDY

1. Properly given at the specified age and time intervals, immunizations are effective against the specific diseases for which they have been developed.
2. The standard set for the minimum level of immunization in a population that is necessary to control each childhood disease is effective.

DEFINITIONS OF TERMS USED

Attitude. An individual's organization of psychological processes, as representative of previous experience. In this study attitude toward immunizations is operationally defined as a composite score derived in response to items 22 to 27 on the questionnaire.

Community Health Center. Center responsible for the administration of preventative health services in the community. Of primary concern to its multidisciplinary staff is the control of the spread of communicable disease. Also called the public health unit.

Compliance. The act of following a medical prescription. For the purpose of this study the medical prescription is the British Columbia Government Infant Immunization Schedule.

Entry to the School System. Children usually aged 5 or 6 who are registered to begin Grade I for the first time at the commencement of the school year.

Epidemic. The occurrence in a community of a disease in excess of normal expectancy, derived from a common source.

Factors. Variables which influence an individual's behaviour. For this study, education, income, knowledge, and attitude are considered internal and family composition and mobility are considered external.

Family Composition. The number of children in the family and the relative position of the child in the study.

Family Mobility Index. A composite score derived from the number of times a family has moved in the past five years, the length of time at the present address, and the distances involved in each move.

Immunization Status. The completeness of the prescribed immunization status for the age of the child. For this study, immunization status is considered complete,if up-to-date for age, or incomplete if not.

Kindergarten. An optional class for young children the year before they begin Grade I. In the municipality studied kindergarten classes are offered as a part of the public school system.

Knowledge. An individual's range of information, awareness, or understanding of facts. In this study knowledge of immunizations is operationally defined as a composite score derived in response to items 13 to 20 on the questionnaire.

Preschool Child. A child between the ages of 15 months, when the initial childhood immunization program should be completed, and entry to the school system (age 5 - 6).

Prescribed Immunizations Schedule. B.C. Government, Department of Health Immunization Schedule. It is presented in Appendix C.

Recorded Immunization Status. Immunizations received according to health unit records.

Reported Immunization Status. The immunizations a child has received according to parental report.

Vaccine-Preventable Diseases. The communicable diseases for which the Government of British Columbia offers routine immunization to children. They are Rubella, Rubeola, Polio, Diphtheria, Pertussis, and Tetanus.

LIMITATIONS OF THE STUDY

1. The study was limited to a sample of kindergarten pre-schoolers and their parents in the municipalities of Surrey and White Rock, British Columbia.

2. The kindergartens chosen randomly for the study, were limited by approval from the principals. Of the 24 classes chosen, principals of four schools refused permission.

3. Accuracy and completeness of the questionnaires were dependent upon parental cooperation and recall.

4. Recorded immunization status was limited to those children who were immunized by the community health nurse.

HYPOTHESES TESTED

In relation to Question III, the seven null hypotheses tested were:

I There is no relationship between the reported immunization status of children and parental education.

II There is no relationship between the reported immunization status of children and family mobility.

III There is no relationship between the reported immunization status of children and family composition.

IV There is no relationship between the reported immunization status of children and family socio-economic status.

V There is no relationship between the reported immunization status of children and parental attitude toward immunization.

VI There is no relationship between the reported immunization status of children and parental knowledge of immunizations.

VII There is no relationship between the reported immunization status of children and two or more of the selected internal and external factors.

OVERVIEW OF THE REMAINDER OF THE STUDY

Chapter II contains a review of the literature under the following headings: Compliance with Medical Regimens, Factors Influencing Compliance, Immunization Status, and Immunization Standards.

Chapter III details the design and methodology used in the study.

Chapter IV contains an analysis of the data obtained in the study.

Chapter V is a summary of the findings of the study; the conclusions arrived at; implications; and recommendations for further research.

CHAPTER II

REVIEW OF THE LITERATURE

The literature reviewed is presented under the following subject headings:

1. Compliance with Medical Regimens
2. Factors Influencing Compliance with Immunization Schedules
   - A. Education of the Parents
   - B. Socio-Economic Level of the Family
   - C. Knowledge and Attitudes about Immunizations and the Communicable Diseases
   - D. Family Composition
   - E. Family Mobility
3. Immunization Status
4. Immunization Standards

During the initial search for relevant literature, the Medlar II Computer Service was utilized. Titles were retrieved under the headings "Immunization and Quality of Health Care" and "Education on Immunization".

COMPLIANCE WITH MEDICAL REGIMENS

During the past century modern technology has evolved highly effective, efficient medical regimens for the treatment and prevention of disease. Increasingly, the responsibility for seeking and maintaining these regimens rests with the public. It is with some concern that health care workers have studied how well the public have accepted this responsibility by monitoring their compliance with medical recommendations and prescriptions.

Few researchers have attempted to define a theoretical framework to explain compliant behaviour with preventative health prescriptions. However, in 1967, Davis examined compliance with reference to the dissonance theory. He hypothesized that a medical prescription exposes a person to information which may differ from existing patterns of daily living, tastes, and desires. This establishes a dissonant condition and a decision to comply (or not) results. In making this decision the patient attempts to establish an internal harmony, consistency, or congruity among his actions, attitudes and values. This is referred to as a drive toward consonance among cognitions.[1]

In a later study, Davis established a set of assumptions upon which he based his compliance research. These included:

a) that individuals differ more or less in their personal characteristics as they seek medical care;

b) that these personal characteristics are taken into account by the health care worker;

c) that discussion and assessment of the prescription occurs with other influential persons;

d) that these influences interact with the personal characteristics and the nature of the prescription, to produce patterns of compliance.[2]

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[1]Milton Davis, "Predicting Non-Compliant Behaviour", Journal of Health and Social Behaviour, Vol. 8, (Dec, 1967), 265.

[2]Milton Davis, "Variations in Patients' Compliance with Doctor's Advice: An Emperical Analysis of Patterns of Communication", American Journal of Public Health, Vol. 58, No. 2, (Feb, 1968), 274.

Davis and many others have used a wide range of methods to measure and collect their data. Marston, in her review of the current literature on compliance, summarized the five major methods that have been used to measure compliance, including drug excretion tests, pill counts, direct observation, remaining under medical supervision, and follow through of referrals. She noted that the research settings for most of these studies were outpatient hospital clinics or physicians' offices.

> "Nearly all the research to date has been conducted by physicians or behavioural scientists. Problems of motivating essentially well people to utilize preventative health measures and early diagnostic services,... are appropriately of concern to nursing."[3]

The research has also revealed variations in the rate of compliant behaviour. Davis reported that the literature disclosed a non-compliancy range varying from 15 to 93 percent.

> "This wide range is not surprising when the variety of populations, the various methods of data collection, and the different medical problems investigated are considered... Regardless of the differences, at least a third of the patients in most studies failed to comply with doctor's orders."[4]

The variables studied by each researcher also varied widely. Marston concluded from the literature that a clear picture did not emerge concerning the determinant factors of compliance. She recommends that

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[3]Mary-Vesta Marston, "Compliance with Medical Regimens" A Review of the Literature", Nursing Research, Vol. 19, No. 4, 312.

[4]Davis, op. cit. (1968) 274.

future studies investigate the role of multiple variables simultaneously. "A better understanding of the roles of these variables is needed in order to know how best to assist patients in caring for their own health."[5]

FACTORS INFLUENCING COMPLIANCE

A number of studies have focused on the patient characteristics associated with compliance. Investigated were demographic, physical, and psychological factors.[6,7,8,9,10,11] Both Marston and Davis, in their review, reported that much of the literature revealed inconsistent results. "Therefore, it is only possible to cull some impressions about which patient characteristics influence non-complaint behaviour."[12]

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[5]Marston, op. cit., 321.

[6]Mary-Vesta Marston, op. cit., 313.

[7]Milton S. Davis, op. cit., 274.

[8]Milton S. Davis, "Predicting Non Compliant Behaviour", Journal of Health and Social Behaviour, Vol. 8, (Dec, 1967), 265.

[9]Martha C. Hardy, "Psychological Aspects of Pediatrics", Journal of Pediatrics, Vol. 48, (Jan, 1956), 104.

[10]Carol D'Onofrio, Reaching Our Hard to Reach, State of California, Department of Public Health, 1966.

[11]William G. Mather et al., "Social and Economic Factors Related to Correction of School-Discovered Medical and Dental Defects", The Pennsylvania Medical Journal, (Oct, 1974), 983.

[12]Davis, op. cit., (1967), 275.

However, both reviewers were primarily concerned with research examining treatment oriented compliance. The major findings exploring preventative-oriented compliance (especially immunization) are presented in the following sections including education, socio-economic level, knowledge, attitudes, family composition, and mobility.

A. Education of the Parents

The educational level attained by the parents, measured by the number of years of completed schooling, was a factor examined in many studies. Mather et al., in a project to determine factors influencing corrective action following school health examinations, found education ranked second in significance for medical problems and fourth for dental problems.[13] In contrast, Davis, in a study of lifestyle modification among farm-based cardiac patients, reported that tests of the significance of the point correlations between fifteen variables (including education) and compliance showed that not a single factor was significantly correlated with compliance.[14] Marston's literature review cited ten articles showing education having little association with compliance, four articles demonstrating a significant association and five articles relating increased education to non-compliant behaviour.[15] However, in

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[13]Mather et al., op. cit., 983.

[14]Davis, op. cit. (1967), 275.

[15]Marston, op. cit., 313.

their research related directly to immunization programs, Clausen, Merrill et al., and D'Onofrio reported that educational level generally bears a direct relationship to immunization status.[16,17,18]

A study done in California in 1956 determined that the mother's education was the single most important factor related to the immunization status of her children.[19] However, in an earlier study Winkelstein et al. found that in New York when parental education was correlated with socio-economic level, the education factor disappeared in the lower half of the economic scale.[20] "These variations in the association of education and vaccine acceptance, along with the observation of Clausen et al. that marked differences in educational levels were associated with many differences in belief and attitude, indicate the need to look deeper into the dynamics involved."[21]

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[16]John A. Clausen et al., "Parent Attitudes Toward Participation of Their Children in Polio Vaccine Trials", American Journal of Public Health, Vol. 44, (Dec, 1954), 1526.

[17]Malcolm H. Merrill, "Attitudes of Californians Toward Poliomelitis Vaccination", American Journal of Public Health, Vol. 48, No. 2, (Feb, 1958), 146.

[18]D'Onofrio, op. cit., 12.

[19]A.C. Hollister et al., California Health Survey, Part I, State of California, Department of Public Health, Berkley, California (1958).

[20]Francis A. Ianni, "Age, Social, and Demographic Factors in Acceptance of Polio Vaccination", Public Health Reports, Vol. 75, No. 6, (June, 1960), 545.

[21]D'Onofrio, op. cit., 12.

B. Socio-Economic Level of the Family

The literature describing the influence of socio-economic status on compliance was equivocal. Marston's literature review stated "For the most part, socio-economic status has not been found to be related to compliance"[22] (17 studies showed no relationship and 8 studies showed a positive relationship). However, Davis cited seven studies relating a lower socio-economic status and non-compliance.[23] Mather et al. in a school based study found family income was ranked seventh in importance for medical problems and first for dental problems.[24]

The literature concerned specifically with immunization and socio-economic status is more conclusive. Most studies demonstrated

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[22]Marston, op. cit., 317.

[23]Davis, op. cit., (1968) 275.

[24]Mather, op. cit., 983.

a consistent relationship between socio-economic status and low immunization levels.[25,26,27,28,29,30] In the California study, Hollister et al. presented evidence that persons of lower socio-economic status had lower levels of immunization for polio, diphtheria, pertussis, and tetanus.[31] D'Onofrio noted that:

> "Patterns of poliomyelitis outbreaks before and after the advent of the polio vaccines also dramatize socio-economic differences in immunization levels. Prior to 1956, cases of polio were scattered throughout all socio-economic areas, but after this time, they were concentrated in the lower socio-economic areas, indicating that the unimmunized i.e. susceptible populations were located there."[32]

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[25] Merrill, op. cit., 146.

[26] Warren Winkelstein and Saxon Graham, "Factors in Participation in the 1954 Poliomyelitis Vaccine Field Trials, Erie County, New York" American Journal of Public Health, Vol. 49, No. 11, 1454.

[27] Francis Ianni, et al., "Age, Social, and Demographic Factors in Acceptance of Polio Vaccination", Public Health Reports, Vol. 75, No. 6, 545.

[28] Thomas Francis, "Symposium on Controlled Vaccine Field Trials Poliomyelitis", American Journal of Public Health, Vol. 47, (March 1957), 283.

[29] Robert Serfling et al., "The CDC Quota Sampling Technic With Results of 1959 Poliomyelitis Vaccination Surveys", American Journal of Public Health, Vol. 50, No. 11, 1847.

[30] R.E. Markland and D.E. Durand, "Applications and Implementation, Socio-Psychological Determinants of Infant Immunization", Decision Sciences, Vol. 6 (1957), 284.

[31] Hollister, op. cit.

[32] D'Onofrio, op. cit., 11.

C. Knowledge and Attitudes About Immunizations and Communicable Diseases

Certain specific knowledge and attitudes must be present for a person to seek immunization. According to Rosenstock: "He must perceive that he personally is susceptible to the disease, that the illness, if contacted would be serious, and that the vaccine is safe and effective in reducing susceptibility and seriousness."[33]

D'Onofrio notes that knowledge about immunization does not insure that the individual will believe that the risk is a personal one. However, she states that:

> "...we can still assume that the information he possesses on these points is related to his attitudes and beliefs about them, not only because what he knows helps shape his attitudes, but also because his existing attitudes influence what information filters through his perception and becomes 'knowledge' to him."[34]

The extent of this perceived susceptibility to a disease was also described by Rosenstock. He noted that "...72 percent of the young adult sample believed that poliomyelitis had been nearly brought under control."[35] He hypothesized that these kinds of beliefs could reduce the public's feeling of susceptibility and create a laissez-faire attitude toward immunization.

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[33]I.M. Rosenstock, "Why Pople Fail to Seek Polio Vaccination", Public Health Reports, Vol. 74, No. 2, (Feb, 1959), 98.

[34]D'Onofrio, op. cit., 20.

[35]Rosenstock, op. cit.

Other factors which may influence perceived susceptibility have been studied. These include incorrect knowledge of the immunization procedure e.g. multiple versus single injections, as well as the necessity of periodic boosters.[36]

Information about the seriousness of communicable diseases has been demonstrated to affect immunization behaviour. In 1954, Clausen, Sudenfeld, and Deasy, in a study of mothers of Grade 2 children, noted that more than four-fifths agreed that "more people worry about polio than about any other disease that strikes children."[37] D'Onofrio suggested that this accent on polio may have served to de-emphasize the other communicable diseases. She also notes that the public attitude toward the so-called childhood diseases as "something all kids get" and "nothing to worry about", combined with the lack of knowledge of the potential seriousness of these diseases may adversely affect immunization behaviour.[38]

Attitudes toward immunization have been a recurring theme in the literature. The California Health Study determined that over 90 percent of the respondents had a favourable attitude toward the immunization of children.[39] D'Onofrio noted that most of the mothers studied agreed

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[36]D'Onofrio, op. cit., 22.

[37]Clausen et al., op. cit., 1526.

[38]D'Onofrio, op. cit., 24.

[39]Hollister, op. cit.

that their children should receive immunization, but few could name the diseases involved.[40] Merrill et al. found that 81 percent of mothers questioned in California were in favour of polio vaccines for their children.[41] Similar results are recorded by Glasser in a nationwide study.[42]

D. Family Composition

The family frequently has an influence on the immunization status of its individual members, according to the literature. Guthrie found that first born are more often immunized than are successive children.[43] The California Health Survey concluded that families with two children from 0 - 14 years of age were most often protected against polio. Those households with larger numbers of children were less likely to have been vaccinated.[44] Markland and Durand found that parental age was also a factor, older age levels being associated with adequate immunization

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[40] D'Onofrio, op. cit., 25.

[41] Merrill, op. cit., 147.

[42] Melvin Glasser, "A Study of the Public's Acceptance of the Salk Vaccine Program", American Journal of Public Health, (Feb, 1958) 144.

[43] N. Guthrie, "Immunization Status of Two-Year-Old Infants in Memphis and Shelby County, Tennessee", Public Health Reports, Vol. 98, No. 5, (May, 1963), 443.

[44] Hollister, op. cit.

and younger age levels with inadequate immunization.[45] This was in direct contrast to the findings of Guthrie who found the reverse to be true.[46]

The parent who makes the decision about taking a child for immunizations also is reported to have an effect. Schonfield et al. found that when the father is involved in the decision it is more often against immunization than when the mother alone decides.[47]

E. Family Mobility

There is little mention of the effect of mobility on immunization in the literature. However, a study done in 1973 which looked at Health Unit utilization in the Boundary area, indicated that 20.2 percent of the residents sampled had lived in their present home less than one year.

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[45] Markland, op. cit.

[46] Guthrie, op. cit., 446.

[47] Jacob Schonfield et al., "Medical Attitudes and Practices of Parents Toward a Mass Tuberculin-Testing Program", American Journal of Public Health, Vol. 53, No. 5, (May, 1963), 772.

When the years of residence were compared to the use of health unit services the following was observed:[48]

USE OF HEALTH UNIT SERVICES (in total) BY YEARS OF RESIDENCE

Years of Residence	Total	Number of Times Used				Percent Non Users
		Nil	Once	Twice	Three or More Times	
1	239	100	25	37	77	41.8
2	149	24	18	30	77	16.1
3	130	17	18	20	75	13.1
4	129	10	13	15	91	7.8
5	123	8	20	8	87	6.5
6	88	4	20	4	60	4.5
7	313	17	52	26	218	5.4
9	2	-	1	-	1	-
Total	1,173	180	167	140	686	15.3

D'Onofrio discussed the effect of a high proportion of mobile families in a community on immunization behaviour:

> "...when an individual changes his environment, he must pass through a process of physical and social adjustment to his new surroundings. The crux of this adjustment is the integration of the individual into a new social system... The greater the changes due to mobility and the more rapid and important the shifts in social orientation, the more difficult it becomes for individuals to know what to expect in their new environment."[49]

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[48] Boundary Health Unit, Utilization Survey, Special Report No. 141. Division of Vital Statistics, Department of Health, Province of British Columbia, (1975).

[49] D'Onofrio, op. cit., 147.

According to D'Onofrio, this social disorientation resulted in sporadic or reduced contact with local health authorities and therefore reduced immunization levels.

IMMUNIZATION STATUS

The incidence of the common childhood communicable diseases is a recorded statistic in most provinces and states. Best noted that in 1975, despite an immunization rate of 71.1 percent for the children entering school, there were 3,626 reported cases of measles in Ontario. As these figures represent only the number of cases reported by physicians, Best states they represent just the "tip of the iceberg!" He notes that in 1974 the estimated cost of providing care for those hospitalized in Ontario with acute measles was $227,576.00. In the same study the recorded immunization status of school enterers from 1972-75 for measles, mumps and rubella was as follows:[50]

TABLE I

IMMUNIZATION STATUS OF SCHOOL ENTERERS 1972-1975

YEAR	Health Units Reporting	MEASLES % of Total School Enterers	MUMPS % of Total School Enterers	RUBELLA % of Total School Enterers
1972	37	58.6	-	19.8
1973	34	62.2	-	32.3
1974	37	65.9	-	41.6
1975	35	71.1	23.7	55.8

[50] E.W. Best, "Measles, Mumps, and Rubella: Epidemiologic Considerations", Ontario Ministry of Health, 1976, 10.

The reported cases and rates of the same three diseases from 1972-75 were recorded as follows:[51]

TABLE II

RATE OF MEASLES, MUMPS AND RUBELLA 1972-75

YEAR	MEASLES		MUMPS		RUBELLA	
	Cases	Rate per 100,000	Cases	Rate per 100,000	Cases	Rate per 100,000
1972	899	12	3,035	39	675	9
1973	2,829	36	10,456	132	604	8
1974	4,333	54	12,526	155	2,600	32
1975	3,626	44	5,352	65	3,459	42

In Ottawa in 1972, Furesz assayed antibody levels in blood samples of school children aged six to nine. Fifty-five percent of the children studied had received live virus vaccine for rubeola and 27 percent had received mumps vaccinations. Similarly, seventy-four percent were susceptible to rubella.[52] Other Canadian studies have reported similar results.[53,54] Witte, of the Center for Disease Control, Atlanta, noted that similar trends are occurring in the United States.[55]

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[51] Ibid

[52] J. Furesz "An Antibody Survey of Children in an Ottawa Public School" Canadian Journal of Public Health, Vol. 64, (July/Aug, 1973), 401.

[53] A. Chagnon et al., "Rubella Antibody Studies in the Inhabitants of Montreal" Canadian Journal of Public Health, Vol. 60, (Oct, 1969), 395.

[54] Lee Bertram "The Percentage of School Enterers Having Received Immunization in the Borough of Etobicoke in 1972", Canadian Journal of Public Health, Vol. 65, (Jan/Feb, 1974), 41.

[55] John Witte, "Current Status of Vaccine-Preventable Diseases," Postgraduate Medicine, Vol. 56, No. 4, (Oct, 1974), 55.

Reports of localized epidemics also occurred in the literature. Measles outbreaks in Calgary in 1970[56] and in Winnipeg in 1973[57] are among those cited. Most recently 23 children in Terrace, B.C. were found to be carriers of diphtheria.[58]

> "In 1967, at the American Public Health Association meeting in San Francisco, a paper was presented that announced the possibility of complete eradication of measles by the end of that year. Six years later and some 10 years after the highly effective live measles-virus vaccines were licensed in the United States, we are still faced with a measles problem of epidemic proportions. There is almost uniform agreement that measles is still a problem because of a failure to vaccinate children against the disease."[59]

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[56]Agnes O'Neil, "The Measles Epidemic in Calgary 1969-1970; the Protective Effect of a Vaccination for the Individual and the Community", Canadian Medical Association Journal, Vol. 105 (Oct 23, 1971), 819.

[57]Percy Barsky, "Measles: Winnipeg, 1973", Canadian Medical Association Journal, Vol. 110, (April 20, 1974), 931.

[58]Der Hoi-Yin, "23 Terrace Children, Teacher Found Carriers of Diphtheria", Vancouver Sun, Vol. 92, No. 17, (1978), A1.

[59]Herbert Schreier, "On the Failure to Eradicate Measles", The New England Journal of Medicine, Vol. 290, No. 14, (Apr 4, 1974), 803.

IMMUNIZATION STANDARDS

To control against epidemics of disease in a community, the United States Government Center for Disease Control reports an 85 percent immunization level in the population is needed.[60] The Canadian government advises similarly.

SUMMARY

The literature review included an investigation of the major factors influencing compliance with immunization schedules and the current status of immunizations in Canada and the United States.

The discrepancies between those factors which influence general medical compliance and those which influence preventative oriented compliance were noted. Controversy also exists concerning which factors directly influence immunizations. However, education, socio-economic level, attitude, knowledge, family composition and mobility are cited most consistently.

The literature revealed a tendency towards decreasing levels of immunization for all childhood diseases in both Canada and the United States. Several instances of localized epidemics were noted.

Chapter III contains the design and methodology of the study.

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[60]Markland, op. cit., 284.

CHAPTER III

DESIGN AND METHODOLOGY

This chapter describes two major areas: the design of the study, including the setting and sample; and the methodology, including the measurement procedures, pretest, data collection, and an overview of the data analysis.

THE DESIGN OF THE STUDY

Exploratory Design

There were three objectives for the study. The first was to compare children's immunization status with the national standards. The second was to compare the children's recorded immunization status with their reported immunization status. The last was to discover the relationship between children's immunization status and selected internal and external factors.

The design employed for the research was an exploratory one. A survey questionnaire was designed to determine if a relationship existed amongst the variables influencing children's immunization status and to quantify parental knowledge of their children's immunizations. Information concerning the recorded status of children's immunizations was obtained using health unit records.

The Setting

The setting was one health unit area whose boundaries included two municipalities adjacent to a large city. These municipalities contained two school districts. The population of this area in 1971 was 108,950.[1] The socio-economic range was broad, including representation from a wide range of ethnic groups and religions.[2]

The Subjects

A sampling of the 5 to 6 year old preschool population was obtained using kindergarten classes in the area. Of the 49 classes (2,262 students), 24 classes were chosen to be studied using a table of random numbers.[3] However, in four cases, principals refused permission to distribute the questionnaire. Twenty classes (537 students) participated in the study. The questionnaire was given to each child in the sample to be taken home, completed by a parent, and returned. The total number of subjects returning completed questionnaires by the deadline, was 376 (60.6 percent).

Kindergarten students were chosen because of the ease of distribution of the questionnaires in the classroom setting. The study was conducted in the spring, with the students entering Grade I the following September. As well, by sampling kindergarten students, children who had been at risk for disease throughout the entire preschool age span were identified.

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[1] Vancouver Census Tract Bulletin - 1971, Statistics Canada Series A and B (August, 1975).

[2] Ibid.

[3] Boundary Health Unit, Kindergarten Enrolment Statistics, 1976.

METHODOLOGY OF THE STUDY

Measurement Procedures

The major source of data for the study was the questionnaire.[4] This format was chosen because of the nature of the data to be collected and the large sample size. Approximately nine minutes were needed to complete the questionnaire. Confidentiality was assured in a covering letter which also encouraged cooperation and noted health unit approval.[5]

Permission was granted by the district superintendent of schools to approach the principals of the chosen classes seeking approval for distribution of the questionnaire. Twenty of the twenty-four school principals agreed to have their kindergarten teachers distribute the questionnaires to each child.

During the construction of the questionnaire, public health nurses were asked to examine and edit items relevant to the hypotheses concerning knowledge and attitudes toward immunization. These items had been obtained from the literature. The nurses were then asked to submit original items to complete these sections. Of the four nurses solicited, three contributed items for inclusion. Other items were inferred from the literature, or evolved directly from a question or hypothesis. Each item was then assigned to match the question or hypothesis it was designed to test. Table III presents the questions and hypotheses with the appropriate source of data.

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[4] See Appendix A.

[5] See Appendix B.

TABLE III

QUESTIONS AND HYPOTHESES WITH APPROPRIATE SOURCE OF DATA

Question Number		Hypothesis Topic	Source of Data
I		Comparison to National Standards	Health Unit Records
II		Recorded versus Reported Status	Health Unit Records Questionnaire Item 21
III	Hypothesis I	Family Educational Level	Questionnaire Items 10 and 11
	II	Family Mobility	Questionnaire Items 4, 5 and 6
	III	Family Composition	Questionnaire Items 7 and 8
	IV	Family Socio-Economic Level	Questionnaire Item 12
	V	Attitude Toward Immunization	Questionnaire Items 22, 23, 24, 25, 26, 27 and 28
	VI	Knowledge of Immunization	Questionnaire Items 13, 14, 15, 16, 17, 18, 19, and 20
	VII	Multiple Factors	Questionnaire Items All of the above except Item 21

The questionnaire was constructed using a multiple choice format which is appropriate for computer analysis. Where possible, "I don't know" or "undecided" choices were given to limit guessing. Those items which tested attitudes were designed as three choices (agree, disagree, or undecided) rather than five (including the extras, strongly agree and strongly disagree) because of the difficulty in determining the exclusiveness of the extra choices.

Upon completion of the questionnaire, a panel of public health nurses was asked to evaluate whether each item was appropriate and inclusive in relation to its matched question or hypothesis. A pretest was also conducted on eight parents of preschool children. These were all mothers who attended the health unit clinic for immunization of their preschool children. The time taken to complete the questionnaire was noted.

At the completion of the pretest each mother was interviewed by the researcher to determine the clarity of each item and to discuss any comments the mothers wished to make. The results of these interviews were used to reconstruct several of the test items.

Health unit records were also used as a source of data. During the year, the health unit clerks, using the kindergarten class lists, prepared a record of each child's immunization status from the health unit charts. These records would be used by the public health nurses to complete the children's immunizations during the summer and ensuing Grade I year.

Overview of the Data Analysis

The data analysis centered on the questions investigated and the hypotheses. The questionnaire was designed for analysis by computer using the Statistical Package for the Social Sciences (SPSS)[6] and Stepwise Discriminant Analysis (UBC BMD07M).[7] Frequency distributions and cross-tabulations with immunization status, were performed for each of the

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[6]Norman Nie et al., Statistical Package for the Social Sciences, (McGraw Hill Book Company, New York, (1975).

[7]Jason Halm, Stepwise Discriminant Analysis, University of British Columbia Computing Centre (UBC BMD07M), (1976).

selected factors: socio-economic level; parental educational level; knowledge of and attitude toward immunization; family composition; and family mobility. A factor analysis was then performed to determine if an underlying pattern of relationship existed amongst the variables. Finally a discriminant analysis was performed to determine the statistical distinctiveness of a group of subjects with complete, versus incomplete, immunization.

SUMMARY

The parents of kindergarten students from 20 randomly selected classes completed a questionnaire on preschool immunizations. The questionnaire had been constructed using items submitted from a panel of public health nurses and obtained from the literature. A pretest was conducted. Analysis of the test items included frequency distributions, crosstabulations, factor analysis, and discriminant analysis. Details of the data analysis are contained in Chapter IV.

CHAPTER IV

ANALYSIS OF THE DATA

The analysis of the data was facilitated by the use of a computer. Two programs were used; the Statistical Package for the Social Sciences (SPSS)[1] and Stepwise Discriminant Analysis (UBC BMD07M).[2]

Initially, the basic distributional characteristics of each variable were analyzed using the subprogram FREQUENCIES.[3] This provided the researcher with a basic computer reference file and a validity check to ensure that subsequent analysis was based on accurate input information.

Relationships amongst the variables were then examined using a contingency table analysis with subprogram CROSSTABS.[4] Each variable was tabulated as a function of the children's reported immunization status.

A level of confidence of 0.01 was used to establish statistical significance.

Following this, a factor analysis was done to determine if there was an underlying pattern of relationships amongst the variables. Subprogram FACTOR[5] was used to reduce the number of significant variables.

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[1] Nie et al., op. cit.

[2] Halm, op. cit.

[3] Nie et al., op. cit., 181.

[4] Ibid, 218.

[5] Ibid, 468.

Lastly a stepwise discriminant analysis[6] was used to statistically distinguish between the two groups; those in which children's immunization were complete and those in which they were not.

Results of the data analysis are presented below, focusing on the specific questions investigated, with a discussion of additional data following.

ANALYSIS RELATED TO THE SPECIFIC QUESTIONS INVESTIGATED

Analysis Related to Question I

Question I examined the level of preschool children's immunizations using data obtained from the health unit records.

Table IV shows the recorded immunization status of all of the preschool children registered in kindergarten, compared to the national standard. The mean for the three immunizations was 48.9 percent complete. When compared to the national standard the mean difference for the three immunizations was 36 percent.

TABLE IV

CHILDREN'S RECORDED IMMUNIZATION STATUS
COMPARED TO NATIONAL STANDARD
N = 2262

Immunization	Percent Immunized	National Standard (Percent)	Percent Difference
D.P.T.	50.0	85	35
Polio, oral	49.8	85	35
Rubeola	46.9	85	38
Mean	48.9	85	36

[6]Halm, op. cit., 1.

Data Analysis Related to Question II

Question II examined the difference between the recorded and reported children's immunization status. Data for the reported immunization status were collected in two modes. Firstly, respondents were asked to report whether their child's immunizations were complete, incomplete, or unknown. This is referred to in the remainder of the study as the children's reported immunization status. Secondly, respondents were asked to identify those diseases for which their child needed immunization. This is referred to as the disease-specific reported immunization status. Data for the recorded immunization status were obtained from health unit records of all kindergarten students. When the disease-specific reported immunization status was compared to the recorded status from health unit records, there was a mean percent difference of 39.7 as shown in Table V.

Rubeola, the least complete immunization according to the records (46.9 percent), was reported by the respondents as the most complete (89.9 percent). Rubeola, therefore had the largest percent difference (43.0 percent).

Only 18 respondents reported immunizations lacking for all four diseases.

TABLE V

DISEASE-SPECIFIC RECORDED VERSUS REPORTED IMMUNIZATION STATUS

Immunization	Recorded Completeness of Immunization N = 2262*		Reported Completeness of Immunization N = 376		Percent Difference
	Number	Percent	Number	Percent	
D.P.T.	1132	50.0	332	88.5	38.5
Polio	1126	49.8	329	87.5	37.7
Rubeola	1061	46.9	338	89.9	43.0
Mean	1106	48.9	333	88.6	39.7

*Note: The recorded immunization status sample includes all the kindergarten children on health unit record. The reported immunization status is a sample drawn from all kindergarten students including those immunized by their family physicians.

Table VI, a frequency distribution for children's reported immunization status, shows that 70.5 percent of the respondents sampled, believed their children's immunizations to be up-to-date. As well, 21.0 percent of the mothers responded that their children's immunizations were incomplete.

TABLE VI

FREQUENCY DISTRIBUTION FOR
CHILDREN'S REPORTED IMMUNIZATION STATUS

Category Label	Absolute Frequency	Relative Frequency (Percent)
Complete	265	70.5
Incomplete	79	21.0
Unknown	24	6.4
Missing Data	8	2.1
Total	376	100.0

Data Analysis Related to Question III

Question III sought to determine if a relationship existed between one or more of the selected internal and external factors and preschool children's immunization status. The results are presented focusing on acceptance or rejection of the seven hypotheses related to this question.

Data Analysis Related to Hypothesis I

Hypothesis I stated that there is no relationship between the reported immunization status of children and parental education.

Tables VII and VIII show frequency distributions for mothers' and fathers' educational levels.

TABLE VII

FREQUENCY DISTRIBUTION FOR
MOTHERS' EDUCATIONAL LEVEL

Category Label	Absolute Frequency	Relative Frequency (Percent)
Grade 10 or Less	89	23.7
Grade Twelve	155	41.2
Tech or Voc	71	18.9
Some University	29	7.7
College Grad	21	5.6
Missing Data	11	2.9
Total	376	100.0

TABLE VIII

FREQUENCY DISTRIBUTION FOR
FATHERS' EDUCATIONAL LEVEL

Category Label	Absolute Frequency	Relative Frequency (Percent)
Grade 10 or Less	98	26.1
Grade Twelve	101	26.9
Tech or Voc	94	25.0
Some University	37	9.8
College Grad	29	7.7
Missing Data	17	4.5
Total	376	100.0

The mothers' and fathers' educational levels were compared to reported immunization status. The results are presented as a contingency table analysis in Tables IX and X respectively. A chi-square test of statistical significance, to determine whether a systematic relationship existed between mothers' education and children's reported immunization status, yielded a raw chi-square of 13.89151 with 8 degrees of freedom and a significance of 0.0846. The same statistical procedures applied to the fathers' educational level, resulted in a raw chi-square of 19.34769 with 8 degrees of freedom and a significance of 0.0131.

TABLE IX

ANALYSIS OF MOTHERS' EDUCATIONAL LEVEL
BY CHILDREN'S REPORTED IMMUNIZATION STATUS
N = 360

Mothers' Educational Level	Immunization Status			Raw Total (Percent)
	Complete	Incomplete	Unknown	
Grade 10 or less	57	20	11	88 (24.4%)
Grade 12	112	31	10	153 (42.5%)
Tech or Vocational School	49	19	1	69 (19.2%)
Some University	23	6	0	29 (8.1%)
University Graduate	18	2	1	21 (5.8%)
Column Total (Percent)	259 (71.9%)	78 (21.7%)	23 (6.4%)	360 (100%)

Raw Chi-Square = 13.89151 with 8 degrees of freedom.
Significance = 0.0846

TABLE X

ANALYSIS OF FATHERS' EDUCATIONAL LEVEL
BY CHILDREN'S REPORTED IMMUNIZATION STATUS

N = 354

Fathers' Educational Level	Immunization Status			Row Total (Percent)
	Complete	Incomplete	Unknown	
Grade 10 or Less	69	17	12	98 (27.7%)
Grade 12	68	28	5	101 (28.5%)
Tech or Vocational School	63	23	4	90 (25.4%)
Some University	29	7	0	36 (10.2%)
University Graduate	27	1	1	29 (8.2%)
Column Total (Percent)	256 (72.3%)	76 (21.5%)	22 (6.2%)	354 (100.0%)

Raw Chi-Square = 19.34769 with 8 degrees of freedom.
Significance - 0.0131

On the basis of these findings, the null hypothesis was accepted.

Data Analysis Related to Hypothesis II

Hypothesis II stated that there is no relationship between children's reported immunization status and family mobility.

The questionnaire items concerning family mobility solicited information about the number of years the family had resided at their present address (Table XI), the number of times the family had moved in the past five years (Table XII), and the farthest move (Table XIII). A mobility index

composite was formed by amalgamation of these three items. The choices for each item were ranked from 1 to 5, according to increasing mobility. These rankings are included on the questionnaire in Appendix A. A total score was computed ranging from 3 (did not move) to 15. Scores from 3 to 7 were classified as low mobility; 8 to 11, medium mobility; and 12 to 15, high mobility. The frequency distribution of this composite is presented in TABLE XIV.

TABLE XI

FREQUENCY DISTRIBUTION OF YEARS
OF RESIDENCE AT PRESENT ADDRESS

Category Label	Absolute Frequency	Relative Frequency (Percent)
Less than 1 Year	77	20.5
Between 1 - 2 Years	61	16.2
Between 2 - 3 Years	55	14.6
Between 3 - 4 Years	45	12.0
More Than 4 Years	134	35.6
Missing Data	4	1.1
Total	376	100.0

TABLE XII

FREQUENCY DISTRIBUTION FOR NUMBER OF TIMES MOVED IN LAST 5 YEARS

Category Label	Absolute Frequency	Relative Frequency (Percent)
Once	98	26.1
Twice	69	18.4
Three Times	47	12.5
4 or More Times	42	11.2
Never	114	30.3
Missing Data	6	1.6
Total	376	100.0

TABLE XIII

FREQUENCY DISTRIBUTION FOR FARTHEST MOVE IN LAST TWO YEARS

Category Label	Absolute Frequency	Relative Frequency (Percent)
From Lower Mainland	150	39.9
From Elsewhere in B.C.	14	3.7
From Another Province	29	7.7
From Outside Canada	9	2.4
Have Not Moved	160	42.6
Missing Data	14	3.7
Total	376	100.0

TABLE XIV

FREQUENCY DISTRIBUTION FOR
MOBILITY INDEX

Category Label	Absolute Frequency	Relative Frequency (Percent)
Low	139	37.0
Medium	152	40.4
High	77	20.5
Missing Data	8	2.1
Total	376	100.0

Slightly more than one-half (51.3 percent) of the families had lived in their present homes less than three years, while 20.7 percent had resided there less than one year. When questioned about the number of times the family had moved in the past five years, 42.1 percent reported moving two or more times. In the previous two years, 55.8 percent of the families had moved, 41.4 percent from the lower mainland and 13.8 percent from elsewhere.

When a contingency table analysis between the mobility index and children's reported immunization status was performed, the raw chi-square was 3.25306 with 4 degrees of freedom and a significance of 0.5164 (Table XV). Analysis of the three component items of the mobility index by reported immunization status yielded similar levels of significance.[7] On the basis of these findings, the null hypothesis was accepted.

TABLE XV

CROSSTABULATION OF MOBILITY INDEX
BY REPORTED IMMUNIZATION STATUS OF CHILD

Mobility Index	Immunization Status			
	Complete	Incomplete	Unknown	Row Total (Percent)
Low	104	26	8	138 (38.1)
Medium	111	31	9	151 (41.7)
High	47	19	7	73 (20.2)
Column Total (Percent)	262 (72.4%)	76 (21.0%)	24 (6.6%)	362 (100.0%)

Raw Chi-Square = 3.25306 with 4 degrees of freedom.
Significance = 0.5164

[7](a) Years at Present Address by Reported Immunization Status. Chi-Square - 5.24998, 8 degrees of freedom and significance of 0.7306
(b) Farthest Move By Reported Immunization Status. Chi-Square- 4.49941, 8 degrees of freedom, and significance of 0.8095
(c) Number of Times Moved by Reported Immunization Status. Chi-Square - 11.39023 with 8 degrees of freedom and significance of 0.1806.

Data Analysis Related to Hypothesis III

Hypothesis III states that there is no relationship between the reported immunization status of children and family composition.

The family composition was studied under two items on the questionnaire; the number of children in the family, and the position in the family of the child studied. The mean number of children in these families was 2.469 with a standard deviation of 0.878. The questionnaire was brought home by the eldest child in 46.0 percent of the families.

Table XVI presents the results of a crosstabulation of the number of children in the family by reported immunization status.

TABLE XVI

ANALYSIS OF THE NUMBER OF CHILDREN IN THE FAMILY BY CHILDREN'S REPORTED IMMUNIZATION STATUS
N = 367

Number of Children	Immunization Status			
	Complete	Incomplete	Unknown	Row Total (Percent)
1	17	8	2	27 (7.4%)
2	145	41	11	197 (53.7%)
3	82	17	4	103 (28.1%)
4	14	8	5	27 (7.4%)
5 or more	7	4	2	13 (3.5%)
Column Total (Percent)	265 (72.2%)	78 (21.3%)	24 (6.5%)	367 (100.0%)

Raw Chi-Square = 15.65569 with 8 degrees of freedom.
Significance = 0.0476

When a contingency table analysis was performed on the position in the family of the child in the study by reported immunization status the significance of the chi-square was 0.4511.

On the basis of the significance established, the null hypothesis was accepted.

Data Analysis Related to Hypothesis IV

Hypothesis IV states that there is no relationship between the immunization status of children and family socio-economic status.

Table XVII shows the income level of the families sampled.

TABLE XVII

FAMILY INCOME

Category Label	Absolute Frequency	Relative Frequency (Percent)
Less Than $5,000	8	2.1
$5,000 To $10,000	33	8.8
$10,000 To $15,000	88	23.4
$15,000 To $20,000	122	32.4
More Than $20,000	69	18.4
Missing Data	56	14.9
Total	376	100.0

The average income of the families sampled was in the $10,000 to $15,000 category. According to the Canada Census bulletin, in 1971 the average income for all families in the area was $9,323.[8] Just over 10 percent (10.9) of the families sampled reported incomes of less than $10,000. Of the 376 families who returned the questionnaire, 56 or 14.9 percent did not respond to the item concerning income.

Table XVIII shows the results of a crosstabulation of family income by children's reported immunization status. The raw chi-square is 14.15424 with 8 degrees of freedom and a significance of 0.0778.

TABLE XVIII

ANALYSIS OF FAMILY INCOME BY
CHILDREN'S REPORTED IMMUNIZATION STATUS
N = 315

Family Income	Immunization Status			
	Complete	Incomplete	Unknown	Row Total (Percent)
Less than $5,000	3	3	2	8 (2.5%)
$5,001 to $10,000	22	7	3	32 (10.2%)
$10,001 to $15,000	64	21	3	88 (27.9%)
$15,001 to $20,000	90	26	4	120 (38.1%)
More Than $20,001	47	12	8	67 (21.3%)
Column Total (Percent)	226 (71.7%)	69 (21.9%)	20 (6.3%)	315 (100.0%)

Raw Chi-Square = 14.15424 with 8 degrees of freedom.
Significance = 0.0778

[8] Vancouver Census Tract Bulletin, Statistics Canada Series B (1971), 49.

Based on the findings, the null hypothesis was accepted.

Data Analysis Related to Hypothesis V

Hypothesis V stated that there is no relationship between the reported immunization status of children and parental attitude toward immunization.

An attitude score was compiled using data from six items on the questionnaire. These items included; parental immunization status, recognized importance of immunization, preference of disease to immunization, parental dread of immunization, child's dread of immunization, and acceptance of responsibility for immunization. Two of these items had positive attitude response frequencies close to 90 percent (importance of immunizations - 88.6 percent and prefer disease to immunization - 89.6 percent). Tables XIX, XX, XXI and XXII present the frequencies for the other four items.

TABLE XIX

FREQUENCY DISTRIBUTION FOR PARENTAL IMMUNIZATION STATUS

Immunization Status	Absolute Frequency	Relative Frequency (Percent)
Complete	139	37.0
Incomplete	141	37.5
Unknown	86	22.9
Missing Data	10	2.7
	376	100.0

A total of 60.4 percent of the respondents reported an incomplete or unknown immunization status.

TABLE XX

FREQUENCY DISTRIBUTION FOR PARENT'S DREAD OF IMMUNIZATION AS A CHILD

Dreaded Immunization	Absolute Frequency	Relative Frequency (Percent)
Agree	135	35.9
Disagree	196	52.1
Undecided	33	8.8
Missing Data	12	3.2
Total	376	100.0

Of the parents responding, 35.9 percent expressed a dread of receiving immunizations as a child.

TABLE XXI

FREQUENCY DISTRIBUTION FOR CHILD'S DREAD OF IMMUNIZATION

Dreads Immunization	Absolute Frequency	Relative Frequency (Percent)
Agree	85	22.6
Disagree	230	61.2
Undecided	45	12.0
Missing Data	16	4.3
Total	376	100.0

When questioned about their children, 22.6 percent of the parents thought their children dreaded getting immunizations.

TABLE XXII

FREQUENCY DISTRIBUTION FOR RESPONSIBILITY FOR IMMUNIZATION

Nurse and School Responsible	Absolute Frequency	Relative Frequency (Percent)
Agree	114	30.3
Disagree	201	53.5
Undecided	53	14.1
Missing Data	8	2.1
Total	376	100.0

Slightly less than half (44.4 percent) of the parents were undecided or felt that the school and public health nurse should be responsible for their children's immunizations.

A composite attitude score was tabulated as a function of the number of items in which the parent chose the response indicative of a positive attitude toward immunization. Two points were assigned for each positive response, one point for each undecided response, and zero points for each negative response. For the six items, scores ranged from zero to twelve. Because two of the items were answered positively by an overwhelming majority (approximately 90 percent) of respondents, the attitude score was adjusted slightly to accommodate this slant. As a result, attitude scores from 0 to 4 were classifed low; 5 to 8, medium; and 9 to 12, high.

A contingency table analysis of attitude score by reported immunization status is presented in Table XXIII. A raw chi-square of 26.15884 with 4 degrees of freedom, and a significance of 0.0000 were established. Therefore, a more positive parental attitude score is associated with parental reports of a more complete immunization status.

TABLE XXIII

ANALYSIS OF PARENTAL ATTITUDE SCORE BY CHILDREN'S REPORTED IMMUNIZATION STATUS
N = 368

Attitude Score	Immunization Status			Row Total (Percent)
	Complete	Incomplete	Unknown	
Low	35	5	10	50 (13.6%)
Medium	126	51	11	188 (51.1%)
High	104	23	3	130 (35.3%)
Column Total (Percent)	265 (72.0%)	79 (21.5%)	24 (6.5%)	368 (100.0%)

Raw Chi-Square = 26.15884 with 4 degrees of freedom.
Significance = 0.0000.

Two of the six variables which made up the composite attitude score, were highly associated with children's reported immunization status. Raw chi-squares were significant for parental immunization status, at a level of 0.0000, and for responsibility for immunization status, at a level of 0.0046. The chi-square of the child's fear of immunization by reported immunization status, was significant at a level of 0.0341. Details are presented in Tables XXIV, XXV, and XXVI.

TABLE XXIV

CROSSTABULATION OF OWN IMMUNIZATION STATUS
BY REPORTED IMMUNIZATION STATUS OF CHILD

	Children's Immunization Status			
Own Immunization	Complete	Incomplete	Unknown	Row Total (Percent)
Complete	114	20	3	137 (37.6%)
Incomplete	100	35	6	141 (38.7%)
Unknown	48	24	14	86 (23.6%)
Column Total (Percent)	262 (72.0%)	79 (21.7%)	23 (6.3%)	364 (100.0%)

Raw Chi-Square = 29.03819 with 4 degrees of freedom.
Significance = 0.0000

TABLE XXV

CROSSTABULATION OF RESPONSIBILITY FOR IMMUNIZATION
BY REPORTED IMMUNIZATION STATUS OF CHILD

	Immunization Status			
Responsibility	Complete	Incomplete	Unknown	Row Total (Percent)
Agree	77	20	14	111 (30.6%)
Disagree	149	47	4	200 (55.1%)
Undecided	36	11	5	52 (14.3%)
Column Total (Percent)	262 (72.2%)	78 (21.5%)	23 (6.3%)	363 (100.0%)

Raw Chi-Square = 15.05357 with 4 degrees of freedom.
Significance = 0.0046

TABLE XXVI

CROSSTABULATION OF CHILD'S DREAD OF IMMUNIZATION BY REPORTED IMMUNIZATION STATUS OF CHILD

Child's Dread Of Immunization	Immunization Status			
	Complete	Incomplete	Unknown	Row Total (Percent)
Agree	61	18	6	85 (23.9%)
Disagree	169	49	10	228 (64.0%)
Undecided	24	12	7	43 (12.1%)
Column Total (Percent)	254 (71.3%)	79 (22.2%)	23 (6.5%)	356 (100.0%)

Raw Chi-Square = 10.40747 with 4 degrees of freedom.
Significance = 0.0341

Therefore, a completed parental immunization status and parental acceptance of the responsibility for their children's immunizations are associated with reports of a more complete immunization status in the child.

Based on these findings the null hypothesis was rejected.

Data Analysis Related To Hypothesis VI

Hypothesis VI stated that there is no relationship between the reported immunization status of children and parental knowledge of immunization.

The composite knowledge score was tabulated using eight items from the questionnaire (13 through 20). One mark was assigned for each incorrect response. A composite score category of low, medium or high was formed as the inverse of the total of incorrect responses. Therefore, those respondents with the fewest errors scored a high knowledge score. There were 126 respondents coded high; 166 respondents coded medium; and 84 respondents coded low for knowledge score. Table XXVII presents a contingency table analysis of knowledge score by children's reported immunization status. The chi-square is calculated to be 4.16580 with 4 degrees of freedom and significance is 0.3840.

TABLE XXVII

ANALYSIS OF KNOWLEDGE SCORE BY
CHILDREN'S REPORTED IMMUNIZATION STATUS
N = 368

Knowledge Score	Immunization Status			
	Complete	Incomplete	Unknown	Row Total (Percent)
High	92	28	5	125 (34.0%)
Medium	117	35	10	162 (44.0%)
Low	56	16	9	81 (22.0%)
Column Total (Percent)	265 (72.0%)	79 (21.5%)	24 (6.5%)	368 (100.0%)

Raw Chi-Square = 4.16580 with 4 degrees of freedom.
Significance = 0.3840

Based on these findings, the null hypothesis was accepted.

Data Analysis Related to Hypothesis VII

Hypothesis VII stated that there is no relationship between the reported immunization status of children and two or more of the factors of parental education, family mobility, family composition, family socio-economic status, parental attitude and parental knowledge of immunization.

A factor analysis was performed to determine if an underlying pattern of relationships existed amongst the variables. For this purpose all the variables, including the composite variables, transiency index, attitude score, and knowledge score, were entered to form the correlation matrix. Initially a factor matrix using principal factor with iterations (replacement of main diagonal elements with communalty estimates) to determine eigenvalues was done. Eigenvalues represent the amount of total variance accounted for by the variable. The number of factors, four, chosen for rotation was determined by the relative sizes of the eigenvalues. The final analysis was accomplished using a varimax (simplification of the columns of the matrix), orthogonal (right angle) rotation to terminal factors. In the unrotated solution, every variable is accounted for by two significant common factors. However, the rotated solutions are conceptually simpler because they are accounted for by a single significant common factor. This terminal rotated solution is presented in Table XXVIII.

TABLE XXVIII

TERMINAL FACTOR ANALYSIS -
VARIMAX, ORTHOGNAL ROTATION

FACTOR I - MOBILITY

Variables	Loadings
Mobility Index Composite	0.94959
Years at Present Address	0.87960
Farthest Move	0.73410

FACTOR II - EDUCATION - INCOME

Variables	Loadings
Father's Education	0.71728
Mother's Education	0.65390
Income	0.35204

FACTOR III - FAMILY COMPOSITION

Variables	Loadings
Number of Children	0.68209
Position in Family	0.62820

FACTOR IV - ATTITUDE

Variables	Loadings
Feel Have Adequate Knowledge	0.62927
Own Immunization Status	0.24329
Attitude Score (Composite)	0.14319

The factor analysis indicated that a relationship existed amongst the variables. The extracted factors of mobility, education - income, family composition, and attitude best accounted for the relationship amongst all the variables.

As well, a discriminant analysis was used to determine the variables which contributed most to the differentiation between incomplete and complete children's reported immunization status. The mathematical objective of the

discriminant analysis was to weigh and linearly combine the variables studied so that the groups with complete and incomplete immunization status were as statistically distinct as possible. The stepwise procedure was used to detect those variables which, in combination, best accounted for the distinctiveness of each group. Table XXIX presents the results of the discriminant analysis.

TABLE XXIX

CLASSIFICATION FUNCTION FOR
STEPWISE DISCRIMINANT ANALYSIS
N = 228

Variable	Immunization Status	
	Complete	Incomplete or Unknown
Times Moved	2.7547	2.4603
Father's Education	2.0084	1.7748
Own Immunization Status	2.8040	3.3914
Feel Have Adequate Knowledge	2.2323	2.5894
Constant	-12.527	-12.700

Discriminant analysis is a predictive tool. The information gained in Table XXIX indicates that a child's immunization status is more likely to be incomplete as reported by the parents when there is:

1) high family mobility
2) a low educational level for the father
3) an incomplete parental immunization status
4) a feeling of lack of knowledge, in the parent, about immunizations.

As well, children's immunization status is more likely to be reported as complete when there is:

1) low family mobility
2) a high level of education for the father
3) a completed parental immunization status
4) confidence of knowledge of immunizations by parent.

On the basis of these findings, the null hypothesis was rejected.

ADDITIONAL DATA

Two of the items on the questionnaire elicited information which was not directly related to a hypothesis. The first of these determined who made the decision for the child to be taken for immunizations (item 9). The respondents reported the mother made the decision in 84.3 percent of the cases. Table XXX shows a contingency table analysis for the deciding person by children's reported immunization status. The raw chi-square was 10.04901 with 4 degrees of freedom and a significance of 0.0396.

TABLE XXX

ANALYSIS OF DECIDING PERSON BY
CHILDREN'S REPORTED IMMUNIZATION STATUS
N = 366

Deciding Person(s)	Immunization Status			
	Complete	Incomplete	Unknown	Row Total (Percent)
Mother	226	66	19	311 (85.0%)
Father	9	3	4	16 (4.4%)
Mother and Father	29	9	1	39 (10.7%)
Column Total (Percent)	264 (72.1%)	78 (21.3%)	24 (6.6%)	366 (100.0%)

Raw Chi-Square = 10.04901 with 4 degrees of freedom.
Significance = 0.0396

The second item concerned the respondents' feeling about the adequacy of personal knowledge of immunizations (item 28). In responding, 53.7 percent felt their knowledge was adequate, 21.8 percent felt it was inadequate, and 21.8 percent were undecided.

Contingency table analysis of feelings of adequate knowledge by reported immunization status presented in Table XXXI, revealed a chi-square of 31.91490 with 4 degrees of freedom and a significance of 0.0000. Therefore, a feeling of inadequate knowledge of immunizations is associated with a more incomplete children's immunization status as reported by parents.

TABLE XXXI

ANALYSIS OF FEELINGS OF ADEQUACY OF KNOWLEDGE BY CHILDREN'S REPORTED IMMUNIZATION STATUS
N = 361

Feel Adequate Knowledge?	Immunization Status			
	Complete	Incomplete	Unknown	Row Total (Percent)
Agree	163	34	3	200 (55.4%)
Disagree	43	27	12	82 (22.7%)
Undecided	53	18	8	79 (21.9%)
Column Total (Percent)	259 (71.7%)	79 (21.9%)	23 (6.4%)	361 (100.0%)

Raw chi-square = 31.91490 with 4 degrees of freedom.
Significance = 0.0000.

SUMMARY

Analysis of the data related to Question I revealed that there was a difference between the children's recorded immunization status and the national standards.

When the data relating to Question II was analyzed, a discrepancy was noted between the children's reported and the recorded immunization status.

For Question III, analysis of the data relating to Hypothesis I, II, III, IV, and VI, demonstrated that there was not a significant relationship between, parental educational level, family mobility, family socio-economic level, family composition, and parental knowledge of immunizations, and children's reported immunization status. Accordingly, these null hypotheses were accepted.

The data relating to Hypothesis V demonstrated a significant relationship between parental attitude toward immunizations and children's reported immunization status. In accordance, the null hypothesis was rejected.

Analysis of the data relating to Hypothesis VII indicated that a relationship existed amongst two or more of the variables and reported immunization status. As a result of these findings, the null hypothesis was rejected.

Analysis of the additional data indicated that no relationship existed between the deciding person and reported immunization status. However, a correlation between parental feelings of adequacy of knowledge of immunizations and reported immunization status was established.

A discussion and implications of these findings will be presented in Chapter V.

CHAPTER V

SUMMARY, DISCUSSION OF THE FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

SUMMARY

This exploratory study was designed to determine the status of children's immunizations and to discover the influence of the selected internal and external factors on that status.

The specific questions asked for the study were:

I. Are the recorded levels of preschool children's immunizations comparible to the national standard?

II. Is there a difference between children's immunization status as reported by parents and as recorded in health unit statistics?

III. Is there a relationship between one or more of the selected internal or external factors and preschool children's immunization status?

The following hypotheses were tested in relation to Question III:

I. There is no relationship between the reported immunization status of preschool children and parental education.

II. There is no relationship between the reported immunization status of preschool children and family mobility.

III. There is no relationship between the reported immunization status of preschool children and family composition.

IV. There is no relationship between the reported immunization status of preschool children and family socio-economic status.

V. There is no relationship between the reported immunization status of preschool children and parental attitude towards immunization.

VI. There is no relationship between the reported immunization status of preschool children and parental knowledge towards immunization.

VII. There is no relationship between the reported immunization status of preschool children and two or more of the selected internal and external factors.

The literature review included an investigation of the major variables influencing compliance with immunization status and the current status of immunizations in Canada and the United States.

The study was conducted in one suburban health unit. The parents of kindergarten students from twenty classes completed a questionnaire on children's immunizations. The questionnaire had been constructed using items submitted from public health nurses or inferred from the literature. A total of 376 questionnaires was returned.

The data were analyzed as follows:

1. The basic distributional characteristics of each of the chosen variables were analyzed.

2. Each variable was tabulated as a function of the children's immunization status using a contingency table analysis.

3. A factor analysis was done to determine if there was an underlying pattern of relationships amongst the variables.

4. A discriminant analysis was used to statistically distinguish between those groups of children whose immunizations were reported to be complete and those whose were not.

The major findings of the study were:

1. There was a difference between preschool children's recorded immunization status, according to health unit statistics, and the national standard.

2. There was a discrepancy between preschool children's immunization status as reported by parents and as recorded in health unit statistics.

3. There was not a significant relationship between parental education level,family mobility, family socio-economic level, family composition, or parental knowledge of immunizations and preschool children's reported immunization status.

4. There was a significant relationship between a positive parental attitude toward immunization and completed preschool children's reported immunization status.

5. There was a significant relationship amongst the variables. High family mobility, a low educational level for the father, an incomplete parental immunization status, and a feeling of lack of knowledge about immunizations were discriminatory for a reported incomplete immunization status. As well mobility, education-income, family composition and attitude best accounted for the relationship amongst the variables on factor analysis.

DISCUSSION OF THE FINDINGS

The findings are discussed under the following headings:

A. Recorded and Reported Immunization Status.

B. Selected Internal and External Factors.

C. Sources of Error.

A. Reported and Recorded Immunization Status

The data analysis revealed a mean difference of 36 percent between recorded levels of immunization and the national standards. This suggests not only that large numbers of children are at risk for preventable diseases, but also that health unit child health clinics are not being utilized

as fully as possible. Results of the data analysis on the disease-specific reported immunization status indicated that most of the children were incomplete for one or two of the immunizations. This partially complete status indicates the children and their parents have been in contact with the health unit (or doctor's office) on at least one occasion.

When parents were asked to respond to the item on the immunization status of their children, a discrepancy occurred. A total of 70.5 percent of parents responded that their children's immunizations were complete (21 percent reported them as incomplete). However, when asked to identify those specific diseases for which their children's immunizations were incomplete, only 11.4 percent reported the missing immunizations. This discrepancy may have arisen, in part, from a failure to understand the item. It should be noted that items with a contingency phrase (i.e. if the answer to "a" is no, then please answer "b") are often misinterpreted. However, the discrepancy may also indicate that parents cannot recall those specific diseases for which their children's immunizations are incomplete.

In support of this argument, the results of items 13 and 14 indicate that only 21.3 percent of the respondents could correctly identify the diseases for which immunization is offered in B.C. and those for which a single immunization offers lifelong protection. These items highlight a general lack of knowledge about the specific diseases for which immunization is offered. This confusion may influence a parent's ability to recall the disease-specific immunization status of his or her children.

There are a number of other reasons which might explain why parents cannot recall the status of their children's immunizations. Some of these include:

1. a lack of understanding of the immunization schedule
2. a failure of nurses to communicate the appropriate immunization information to the parent
3. a time lapse problem i.e. the child's immunization status is forgotten over the preschool years.

Further research might provide more insight into this dimension of the study.

B. The Selected Internal and External Factors

Although both mother's and father's educational level were not significantly related to reported immuniation status, it is interesting that the discriminant analysis determined that the father's education contributed to the statistical distinctiveness of the two groups (immunization complete or incomplete). Perhaps this is a reflection of the male dominance of our North American families. Further research is indicated.

Family mobility is another variable which, on contingency table analysis, failed to reveal a significant relationship with reported immunization status. However, in the factor analysis, Factor I, which accounts for the highest correlation amongst the variables, was mobility.

As well, the discriminant analysis determined mobility was significant. Therefore, when the variables are examined in relation to each other, mobility emerges as an important contributing variable although in isolation it is not significantly related to the children's reported immunization status.

The reason that mobility is a dominating influence was not examined in this study. However, it may be that the process of adjustment and integration into a new community causes a reorientation period during which families' priorities become reorganized. Accordingly, many of the variables such as educational level, family size, or attitude toward immunization would be influenced. Further research is indicated in this area.

The high family mobility determined by the study may indicate the necessity for a re-examination of traditional methods of health education in our immunization program. Perhaps more emphasis on parental responsibility for their children's immunizations is necessary. Perhaps central computer records and notifications systems would encourage more parents to keep their children's immunization up-to-date. Efforts should be made to create a delivery system for children's immunizations which is more responsive to the mobile factor in our society.

Family composition occurred as a significant variable only in the factor analysis. This indicates that, although not individually related to reported immunization status, it is to some extent responsible for influencing the

other variables. This is in direct contrast to the findings of the California Health Survey[1], in 1958, which reported a direct relationship between family size and completed immunization status. Part of this discrepancy may be accounted for by the smaller mean family size (2.469 reported in this study) of today.

Although there was no direct relationship between income and reported immunization status, the sample may have been biased. Two of the four principals who refused consent to distribute the questionnaire, were from areas that reported the lowest incomes in the Canada Census of 1971. The average income of the families studied was, accordingly, higher than that reported in the census.

There was a significant relationship between parental attitude and reported immunization status. As well, attitude loaded highly on Factor IV in the factor analysis, and one of the items from the composite attitude score, was significant in the discriminant analysis. These results indicate that attitude is an important component of the study of immunizations. The design of future health education campaigns should be directed toward attitude change.

The component of the composite attitude score, which was significant in the discriminant analysis was the parental immunization status. Perhaps parents who keep their own immunizations up-to-date are more likely to have a positive attitude toward immunization and, therefore, keep their children's immunizations up-to-date.

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[1]Hollister, op. cit.

Parental knowledge was not significant in any of the statistical analyses performed. However, when parents were asked to rate the adequacy of their knowledge of immunizations, only slightly more than one-half felt their knowledge level was adequate. Furthermore, when this feeling of adequacy was compared to the reported immunization status in the contingency table analysis, in the factor analysis, and in the discriminant analysis, the results were significant. These findings indicate that the actual knowledge score obtained by the parent does not influence children's reported immunization status. However, the feelings the parents have about the state of their knowledge is related. Perhaps the focus of our health education programs should be aimed not only directly at the delivery of factual knowledge but also at increasing parental feelings about the adequacy of their knowledge.

C. Sources of Error

Kindergarten classes were used in this study to select a random sample of preschool students. The kindergarten registration in the spring of the study was 2,262 students. The following September, 2,270 students registered for Grade I. It would appear that almost all preschool children attend kindergarten. Accordingly, sample representativeness was considered adequate for the study.

The accuracy of the health unit records was not examined in this study. Since many of the immunizations were given 4 or 5 years ago, accuracy is difficult to establish. However, accuracy could be established by blood antibody titre levels, or by extrapolation, involving a study of accuracy in present record keeping systems. Similarly, the accuracy of the parental immunization status was not determined. Both of these inaccuracies represent possible sources of error.

Another factor may influence the accuracy of the recorded immunization status statistic. This concerns the ability of the health unit record to accurately reflect the immunization status of those children who are immunized by their family physician or another health unit. Although the health unit attempts to determine the status of the children immunized elsewhere, communications may not be consistently accurate or complete.

Reliability and validity are important considerations in the design of a study, in particular with reference to a questionnaire. Because of the exploratory nature of the material and the fact that this questionnaire was designed for the project, it is difficult to assess its reliability. However, comparison with the Canada Census on income, education, and family size indicates the questionnaire was answered accurately by the respondents on these items. The internal consistency of the two part item on the status of the children's immunizations (item 21) is a possible source of error. Further testing is needed to determine if the discrepancy between reported immunization status and reported disease-specific immunization status results from the design of the item or is an accurate reflection of parental recall. The evidence from item 13 and 14 regarding knowledge of immunizations would support the latter.

The questionnaire was designed with items from two sources. Public health nurses were asked to submit items to measure knowledge and attitude. Other items were inferred directly from the literature. Following the pretest, another panel of two public health nurses was asked to assess each item. Further refinement of the questionnaire, using the results of

the item analysis from this study, might ensure validity. As well, the ability of the variables which emerged on discriminant analysis to predict immunization behaviour was not tested. Further study is needed to assess their predictive validity.

Another possible source of error concerns the lack of the researcher's control over the testing situation. Questionnaires were sent home to be completed. Directions did not indicate who should complete the questionnaire. Inaccuracies may have evolved if the parent usually responsible for the child's immunization, did not complete the form.

CONCLUSIONS

The conclusions drawn as a result of the study are:

1. The immunization status of preschool children as recorded in health unit records is not sufficiently complete to control the vaccine preventable childhood diseases.

2. Preschool children's reported immunization status when not complete, is usually only partially incomplete.

3. Parental report of their preschool children's immunization status differs from health unit records.

4. Parental educational level, family mobility, family composition, family socio-economic level, and parental knowledge of immunizations are not significantly related to preschool children's reported immunization status.

5. Parental attitude toward immunization is significantly related to preschool children's reported immunization status.

6. Parental immunization status is significantly related to preschool children's reported immunization status.

7. Parental feelings of the adequacy of their knowledge of immunizations is significantly related to preschool children's reported immunization status.

IMPLICATIONS FOR NURSING PRACTICE

The immunization status of the preschool children as recorded in health unit records studied was not sufficiently complete to control epidemics of the vaccine preventable childhood diseases. The health unit, through the community health nurses is largely responsible for the administration of the immunization program. Therefore, the findings of this study have the following implications for nursing practice:

1. Sufficient priority should be accorded to the infant immunization program to ensure that the immunization levels in the population approach the national standards. The present vaccine delivery system is failing to ensure that our children are protected from the morbidity and mortality of childhood diseases.

2. For the majority of children, their immunization status is only partially incomplete. This means that the parents have been in contact with a health care worker about their children's immunizations on at least one occasion. At this time nurses should ensure that parents know their children's immunization status and when succeeding immunizations are due.

3. Health education programs should be designed to emphasize the formation of a positive attitude toward infant immunizations.

4. Families who are "at risk" for incomplete immunizations in their preschool children should be identified. Health education tactics could then be directed towards these families.

5. Efforts should be made to ensure the accuracy and completeness of the health unit immunization records.

RECOMMENDATIONS FOR FURTHER STUDY

The recommendations for future study can be grouped into three sequences. The first involves expanding the results of the present study. This exploratory study examined the reported status of children's immunizations

and examined some of the variables influencing that status. A detailed analysis of the components of each of the variables, which was significantly related to immunization, should follow. As well, the predictive ability of the factors which emerged on discriminant analysis, the cost of the morbidity and mortality of the vaccine preventable diseases, or the extension of this study to include older children, could be examined.

The second sequence involves the creation and evaluation of relevant health education materials for immunizations. Using the results of this study, media campaigns and other health education techniques could be evolved to influence the immunization practices of preschool children's parents. The effects of these health education campaigns could then be evaluated.

The third sequence of studies might involve the use of centralized computer services in the immunization program to improve the recorded statistics and to develop a notification system. For example, the effectiveness of enclosing a computerized reminder for immunizations due with the family allowance cheque could be investigated.

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APPENDICES

APPENDIX A

THE QUESTIONNAIRE

WITH PERCENT FREQUENCY FOR EACH RESPONSE

AND RANKINGS FOR ITEMS 4, 5 AND 6 INCLUDED

QUESTIONNAIRE

FOR OFFICE USE ONLY

1. Child's Name _____ _____ (Last Name) (First Name) — 1 2 3

2. Father's Name (Or Guardian) _____ _____ (Last Name) (First Name)

3. Address _____ — 4 5

Please place a ✓ in the box beside the response which most closely answers the question.

4. How long have you lived at your present address?

		Rank
20.5 ( )	1 year or less	5
16.2 ( )	between 1 - 2 years	4
14.6 ( )	between 2 - 3 years	3
12.0 ( )	between 3 - 4 years	2
35.6 ( )	more than 4 years	1

6

5. How many times have you moved in the past five years?

		Rank
26.1 ( )	once	2
18.4 ( )	twice	3
12.5 ( )	three times	4
11.2 ( )	four or more times	5
30.3 ( )	never	1

7

6. In the last two years, which statement(s) best describes your move(s)? (One for each move).

		Rank
39.9 ( )	moved here from somewhere else in the lower mainland	2
3.7 ( )	moved here from elsewhere in B.C.	3
7.7 ( )	moved here from another province	4
2.4 ( )	moved here from outside Canada	5
42.6 ( )	did not move	1

8

7. How many children are there in the family?

7.2 ( )	one
53.2 ( )	two
27.7 ( )	three
7.4 ( )	four
3.7 ( )	five or more

9

8. Was this questionnaire brought home by the eldest child?

45.5 ( ) Yes
53.5 ( ) No

10

9. Who usually makes the decision to take this child for his or her immunization (shot)?

84.3 ( ) mother
4.3 ( ) father
0.0 ( ) babysitter
0.5 ( ) relative
10.4 ( ) other (please specify)
0.5 Doctor

mother and father

11

10. What is the education of the mother of this family?

23.7 ( ) Grade 10 or less
41.2 ( ) Completed High School
18.9 ( ) Further education
if yes:
7.7 ( ) Technical School or Vocational School
5.6 ( ) University or College Graduated ( )

12

11. What is the education of the father of this child?

26.1 ( ) Grade 10 or less
26.9 ( ) Completed High School
25.0 ( ) Further education
if yes:
9.8 ( ) Technical School or Vocational School
7.7 ( ) University of College Graduated ( )

13

12. Which category contains the 1976 net family income from all sources (wages, social assistance, unemployment insurance, etc.)

2.1 ( ) less than $5,000
8.8 ( ) $5,001 - $10,000
23.4 ( ) $10,001 - $15,000
32.4 ( ) $15,001 - $20,000
18.4 ( ) more than $20,000

14

13. Place a ✓ in the box beside those diseases for which immunization is offered in British Columbia.

Item 13 & 14
Total Number of Errors

0 - 21.3 percent
1 - 11.7 percent
2 - 21.0 percent
3 - 18.1 percent

( ) Whooping Cough
( ) German Measles
( ) Diphtheria
( ) Tetanus
( ) Polio
( ) Scarlet Fever
( ) Smallpox
( ) Chickenpox
( ) Red Measles

15 16 17

14. Place a ✓ in the box beside those diseases for which one injection (shot) offers a lifelong protection.

4 - 10.6 percent
5 or more - 15.7 percent
missing 1.6 percent
total 100 percent

( ) Whooping Cough
( ) German Measles
( ) Diphtheria
( ) Tetanus
( ) Polio
( ) Scarlet Fever
( ) Smallpox
( ) Chickenpox
( ) Red Measles

18 19 20

15. Polio immunization is given by mouth.

89.9 ( ) True
6.1 ( ) False

21

16. A child usually receives his or her first immunizations at the age of six months.

31.9 ( ) True
63.3 ( ) False

22

17. A Child should be immunized while he is not feeling well?

9.0 ( ) True
87.5 ( ) False

23

18. Immunizations given at the health unit are free.

92.8 ( ) True
4.0 ( ) False

24

19. For every 1,000 reported cases of measles there is one measles death.

38.8( ) True
37.0( ) False

25

20. How many cases of measles were there in Canada last year?

2.1( ) 2,000 or less
2.7( ) more than 2,000 but less than 5,000
5.9( ) more than 5,000 but less than 12,000
7.7( ) more than 12,000
74.5( ) I don't know

26

21. My child's immunizations are up to date.

70.5( ) Yes
21.0( ) No
6.4( ) I don't know

27

If the answer is no, place a ✓ beside any of the following diseases for which your child <u>needs</u> immunization.

9.8( ) Red Measles

28

11.7( ) Diphtheria

29

13.6( ) German Measles

30

12.5( ) Polio

31

22. My own immunizations are up to date.

37.0( ) Yes
37.5( ) No
22.9( ) I don't know

32

23. Immunization is one of the most important aspects of your child's health care.

88.6( ) Agree
1.9( ) Disagree
6.9( ) Undecided

33

24. I would rather my child take a chance on getting measles than be immunized.

3.2 ( ) Agree
89.6 ( ) Disagree
4.0 ( ) Undecided

34

25. I dreaded getting "shots" as a child.

35.9 ( ) Agree
52.1 ( ) Disagree
8.8 ( ) Undecided

35

26. My child dreads getting "shots".

22.6 ( ) Agree
61.2 ( ) Disagree
12.0 ( ) Undecided

36

27. The Public Health Nurse and the school should be responsible for keeping school children's immunizations up to date.

30.3 ( ) Agree
53.5 ( ) Disagree
14.1 ( ) Undecided

37

28. I feel I have adequate knowledge about immunizations.

53.7 ( ) Agree
21.8 ( ) Disagree
21.8 ( ) Undecided

38

39

40

41

42

APPENDIX B

THE COVERING LETTER

APPENDIX C

GOVERNMENT OF BRITISH COLUMBIA, DEPARTMENT OF HEALTH

INFANT IMMUNIZATION SCHEDULE

The immunization schedule for children as provided by the Province of British Columbia Health Department is as follows:

3 months	Pertussis, Diphtheria and Tetanus, combined. Oral Polio (Sabin)
4 months	Pertussis, Diphtheria and Tetanus, combined.
5 months	Pertussis, Diphtheria and Tetanus, combined. Oral Polio (Sabin)
12 months	Measles Vaccination
14 months	Pertussis (whooping cough), Diphtheria and Tetanus, combined. Oral Polio (Sabin)
15 months	Rubella Vaccination
5 to 6 years	Pertussis, Diphtheria and Tetanus or Diphtheria and Tetanus combined. Oral Polio
Gr. 5 - about 10 years	Diphtheria, Tetanus, combined. Oral Polio (Sabin)
Gr. 10 - about 15 years	Diphtheria, Tetanus, combined. Oral Polio (Sabin)
Adults - every 5 years	Diphtheria, Tetanus, combined. Oral Polio (Sabin)