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Factors Associated with Parental Decision Making and Childhood Vaccination

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FACTORS ASSOCIATED WITH PARENTAL DECISION MAKING

AND CHILDHOOD VACCINATION

By

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ABSTRACT

Factors Associated with Parental Decision Making
and Childhood Vaccination

by

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In order to better understand factors affecting immunization status, logistic regression was used to assess the association of various socio-demographic factors and whether parents would have their child immunized if not a state mandate. Factors included in the study were race, household income, number of children in the household, number of adults in the household, if the child had a primary provider, if the child had a health check-up in the last twelve months, and medical insurance status of the child. The combined Nevada Kindergarten Health Survey Result of 2009-2010 (Year Two) and 2010-2011 (Year Three) conducted by the Nevada Institute for Children's Research and Policy (NICRP) was used as the data source. It was hypothesized that race, household income levels, the size of the family and access to healthcare would affect the decision making process of parents towards vaccination. When the later six variables were considered in a multiple logistic regression model, they significantly predicted whether the parent would have his/her child immunized when it is not a state mandate ($p<0.05$). The odds of having a child immunized were increasingly greater when the child's annual household income was below \$35,000 ($p<0.05$). The odds of having a child immunized decreased if 1) there were four or higher number of children in the household; 2) there was one or less adult in the household; 3) the child was not seen by a healthcare provider

for a routine check-up in the past 12 months, and 4) when the child did not have a primary healthcare provider (p<0.05). Whether the child had medical insurance did not significantly affect the odds of having a child immunized when it is not a state mandate. The result of univariate logistic regression model suggested that comparing to Caucasian race, the odds of having a child immunized when it was not a state mandate increased in African American, Hispanic or Native American families (p<0.05).

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CHAPTER 1

INTRODUCTION

1.1 Background

As a result of advances in medicine and public health interventions, in the United States and around the world, people are living longer and healthier. One of the ten public health achievements in the United States from 2001 to 2010 was the substantial decline in cases, hospitalizations, deaths, and health-care costs associated with vaccine-preventable diseases (Centers for Disease Control and Prevention [CDC], 2011a). A recent economic analysis indicated that vaccination of each U.S. birth cohort with the current standard childhood immunization schedule prevents approximately 42,000 deaths and 20 million cases of disease, with net savings of nearly $14 billion in direct costs and $69 billion in total societal costs (Zhou, 2011).

For more than 200 years, vaccines have been a part of the human fight against infectious diseases. At the beginning of the 20th century, infectious diseases were widely prevalent in the United States. Before the vaccine against polio was available, 13,000 to 20,000 cases of paralytic polio were reported each year in the United States. Today, only four countries, Afghanistan, India, Nigeria, and Pakistan remain endemic. Before the vaccine against measles was available, nearly everyone in the U.S. got measles, and an average of 450 measles-associated deaths was reported each year between 1953 and 1963. Today, the widespread use of measles vaccine has led to a greater than 99 percent reduction in measles compared with the pre-vaccine era in the U.S. (National Center for Immunization and Respiratory Diseases [NCIRD], 2012).

Influenza is a serious disease that can lead to hospitalization and sometimes even death. Over a period of 31 seasons between 1976 and 2007, estimates of flu-associated deaths in the United States range from about 3,000 to about 49,000 people (CDC, 2010a). For children, influenza is more dangerous than the common cold. Most of the time, children need medical care because of influenza, especially before they turn 5 years old. Severe influenza complications are most common in children younger than 2 years old. Children with chronic health problems like asthma, diabetes and disorders of the brain or nervous system are at especially high risk of developing serious flu complications. Each year, on average, around 20,000 children under the age of 5 are hospitalized because of influenza complications (CDC, 2013a).

The first and most important step in protecting against the flu is to get flu vaccination each season. In 2010, in addition to recommending vaccines that prevent 17 vaccine-preventable diseases , the Advisory Committee on Immunization Practices (ACIP) also recommended influenza vaccination for all persons 6 months of age and older who do not have any contraindication to vaccination (CDC, 2010b). Today, yearly influenza vaccination has become a commonly accepted practice worldwide to reduce the impact of the seasonal influenza infection.

1.2 Research Problem and Justification

As the number of immunization has increased, reports of post-immunization adverse events have also increased. This increase, combined with the decrease in the incidence of vaccine-preventable diseases, has resulted in an increased focus on vaccine safety. Perhaps the most highly publicized debate involves the hypothesized associations between MMR vaccines and autism spectrum disorders (ASDs).

ASDs are a group of related brain-based disorders that affect a child's behavior, social, and communication skills. Recent estimates from CDC's Autism Developmental Disabilities Monitoring network found that approximately 1 in 88 children have ASD. ASDs are lifelong conditions with no known cure. Because the MMR vaccine is first given at age 12-15 months, and the first signs of autism often appear at 15-18 months of age, concerns have been raised about a possible link between the MMR vaccine and the development of autism. Those who claim that MMR vaccine causes autism often cite two research papers. The first paper was published by Andrew Wakefield and colleagues in The Lancet titled "Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children"(Wakefield, Murch, Anthony, Linnell, & Casson, 1998). Wakefield hypothesized that the MMR vaccine caused a series of events that included intestinal inflammation, loss of intestinal barrier function, entrance of encephalopathic proteins into the bloodstream, and the development of autism as the end result. In support of his hypothesis, Dr. Wakefield described 12 children with neuro-developmental delay (8 with autism). All of these children had gastrointestinal complaints and developed autism within 1 month of receiving MMR vaccine. Since the study was published, 10 of the 13 authors have retracted the findings. In 2010, citing ethical misconduct on the part of Dr. Wakefield, The Lancet retracted the study. The second paper examined the relationship between measles virus and autism (Uhlmann, Martin, Sheils, Pilkington, Silva, 2002). The authors tested intestinal biopsy samples for the presence of measles virus genome from children with and without autism. Measles virus genome was detected by reverse-transcriptase polymerase chain reaction (RT-PCR) and in situ hybridization. 75 of 90 children with autism were found to have measles virus

genome in intestinal biopsy tissue as compared with only 5 of 70 control patients. However, a 2008 case-control study published in Public Library of Science (PLoS) could not confirm the result of the earlier study that claimed measles virus RNA were found in the intestinal tissue of a specific group of autistic children (Hornig et al., 2008). Over the years, the Institute of Medicine (IOM) and the American Academy of Pediatrics (AAP) have organized several panels of independent scientists – all concluded there was no association between MMR vaccine and autism. Studies conducted in Europe could not find any association either.

In order to monitor the immunizations status of children across the country, the National Center for Immunizations and Respiratory Diseases (NCIRD) sponsored The National Immunization Survey (NIS). NCIRD conducted the survey jointly with the National Center for Health Statistics (NCHS) and Centers for Disease Control and Prevention (CDC). The NIS has two parts. In part one, NIS conducts a telephone survey to children's parents which is then followed by a mail survey to children's immunization providers (part two). NIS conducted its first survey in April 1994. The target population for the NIS is children between the ages of 19 and 35 months living in the United States at the time of the interview. Data from the NIS are used to produce timely estimates of vaccination coverage rates for all childhood vaccinations recommended by ACIP. Estimates are produced for the nation and non-overlapping geographic areas consisting of the 50 states, the District of Columbia, and selected large urban areas. The official estimates of vaccination coverage rates from the NIS are rates of being up-to-date with respect to the ACIP recommended numbers of doses of vaccines. Vaccinations included in the survey are: diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP);

poliovirus vaccine (polio); measles-containing vaccine (MCV); haemophilus influenzae type b vaccine (Hib); hepatitis B vaccine (Hep B); varicella zoster vaccine, pneumococcal conjugate vaccine (PCV), hepatitis A vaccine (Hep A), and influenza vaccine (FLU). The 2011 National Immunization Survey (NIS) result shows that the nationwide coverage with the seven-vaccine series (4:3:1:3:3:1:4), excluding Hib, was 73.6%. At 83.5%, North Dakota had the highest coverage in the nation. At 66%, Nevada ranked the 47th in the nation for vaccine coverage in children between the ages of 19 months to 35 months. 4:3:1:3:3:1:4 series include ≥4 doses DTaP/DT/DTP, ≥3 doses of poliovirus vaccine, ≥1 dose of any measles-containing vaccine, ≥3 doses of HepB, ≥1 dose of varicella vaccine, and ≥4 doses of PCV; haemophilus influenza type B vaccine is excluded due to vaccine shortage for that year (CDC, 2012).

CDC conducted its first National Flu Survey (NFS) November 1 through 14, 2010 and March 3 through 30, 2011 to provide interim national and selected local area-level influenza vaccination coverage estimates. By approximately mid-March 2011, an estimated 46.2% ($\pm$ 6.9) of children had received influenza vaccination. NIS from October 4-November 17, 2012 found only 39.9% of children were vaccinated for flu vaccines during the early season.

Despite the tremendous benefits of vaccination, the immunization rate nationally and locally is not at the level it should be. More than half of the United States population $\geq$ 6 months was not vaccinated against flu. In 2011, more than 25% of children younger than 3 years of age did not receive the recommended 4:3:1:3:3:1:4 series.

Many studies have been conducted to explore the socioeconomic and demographic factors related to immunization practice. Many factors have been identified,

but these factors vary from one society to another. Given the low immunization rate in

Nevada, it is evident that several different factors might be responsible for the low

immunization coverage in Nevada. It certainly needs further investigation.

The present study was undertaken to explore selected socioeconomic and

demographic factors that affect the decision making process of parents regarding

immunization when it was not a mandate by the school district in Nevada. The study

examined the relationship among household composition, household income, medical

insurance coverage, the availability of a primary care provider, history of health check-up

in the previous 12 months, and vaccine-related attitude of parents.

1.3 Research Question

What are the socioeconomic and demographic factors that affect the decision

making process of parents regarding immunization when it is not a mandate by the school

district in Nevada?

1.4 Research Objectives

To study factors affecting the likelihood of childhood immunization and to

determine the association between selected socioeconomic and demographic factors and

the decision-making process of parents regarding immunization when it is not a mandate

by the school district in Nevada.

1.5 Hypotheses

In order to better understand factors affecting immunization status, based on the

theoretical concepts and the findings from previous research, the proposed study will

examine the relationship among race, household composition, household income, the

availability of a primary care provider, and vaccine-related attitude of parents. In the

context of childhood immunization, it was hypothesized that parents or guardians with minority status, lower household income, larger number of children in the household, less number of adults in the family, no primary care provider for the child, not taking the child to visit a healthcare provider in the last 12 months, and no medical insurance, would be less likely to have their children immunized if vaccination was not a mandate by the state.

CHAPTER 2

LITERATURE REVIEW

2.1 Role of Immunization

There are many factors that affect morbidity and mortality. Many diseases can be prevented through health intervention programs, such as immunization, adequate nutrition, safe water and good sanitation, family planning, and the availability of health care services. In 2008, World Health Organization (WHO) estimated 1.5 million deaths among children younger than 5 years of age were due to vaccine preventable diseases. This represents 17% of global total mortality in children younger than 5 years of age (World Health Organization [WHO], 2013).

2.2 Immunization Requirements

In the United States, the Food and Drug Administration (FDA) regulates and licenses all vaccines to ensure safety and effectiveness. There are no federal vaccination laws, but all 50 states require certain vaccinations for children entering public schools. Depending on the state, children must be vaccinated against some or all of the following diseases: mumps, measles, rubella, diphtheria, pertussis, tetanus, and polio. In Nevada, children entering Kindergarten are required to have received 4 doses of DTaP-Diphtheria, Tetanus, acellular Pertussis vaccines, 2 doses of MMR-Measles, Mumps, Rubella vaccines, and 3 doses of Polio vaccines. Hepatitis A, hepatitis B and varicella vaccines are required as new entrants. Flu-Influenza (seasonal) vaccines are not required (CDC, 2011b).

Per Nevada state law, unless being excused because of religious belief or medical condition, a child may not be enrolled in a public school within this State unless the

child's parents or guardian submit to the board of trustees of the school district in which

the child resides or the governing body of the charter school in which the child has been

accepted for enrollment a certificate stating that the child has been immunized and has

received proper boosters for that immunization or is complying with schedules

established by regulation pursuant to NRS 439.550 for the following diseases:

Diphtheria, Tetanus, Pertussis, Poliomyelitis, Rubella, Measles, Mumps, Hepatitis A,

Hepatitis B, Varicella (Department of Health and Human Services Nevada Division of

Public and Behavioral Health [DPBH], 2013).

2.3 Socioeconomic and Demographic Factors Related to Immunization

2.3.1 Theoretical Concept of Socioeconomic-Demographic Status and Health

Many researchers have been trying to explain the relationship between

socioeconomic-demographic status and health by comparing the mortality and morbidity

of different socioeconomic-demographic groups within individual countries, contrasting

health experiences across countries, documenting the extent of inequalities and exploring

possible explanations of differences in health outcomes. Feinstein (1993) summarized

various explanations from previous studies into two dimensions. One dimension refers to

the underlying characteristics of a person that may cause differences in health status, and

divides these characteristics into two distinct groups: resource-dependent characteristics

like wealth, home ownership, and automobile ownership; and non-resource-dependent

behavioral characteristics, including psychological, genetic, and cultural factors. The

second dimension refers to the stage of life experience in which inequalities are

generated, and can be divided into two groups: inequalities arising from different

experiences over the life span, such as differences in occupation, education; and

inequalities that arise from differences in access to and utilization of health care services.

In accordance with differences in socioeconomic and demographic status, researchers also try to explain some behaviors that may be related to health since personal behaviors have a substantial influence on overall health outcomes. To address high rates of diseases and other poor health outcomes, public health interventions have often focused primarily on associated personal health behaviors. However, an individual's health-related behavior exists in the context of social and physical environments which often strongly influence behaviors and choices (Committee on Health and Behavior, 2001).

The health related behavior has been defined broadly to include any behavior that has a significant effect on health or is generally believed to have such an effect. Health related behavior could be subdivided into risky behavior, preventive behavior, and treatment seeking or self-treatment (Waldron, 1988).

Childhood immunization is a preventive health behavior that is directed toward the child by the parent. The parent gets the child immunized for the purpose of preventing infectious diseases in the child (Burns, 1992). According to the theoretical concept, in the context of childhood immunization, health related behavior of the parent and their socioeconomic and demographic background may influence the immunization status of the child.

2.3.2 Findings from Previous Research

Several studies have concluded that parental attitudes and beliefs affect immunization behaviors. Research also discovered socioeconomic, family, and health care factors are key contributors for the majority of children who are not up-to-date for

vaccines. Associations between poverty and vaccination status were identified in several studies, however, the result has not been conclusive. Although the NIS 2011 survey showed children living below poverty lagged behind children living at or above poverty in receiving newer vaccines and vaccines that require 4 doses to complete the series (CDC, 2012), another research found parents in relatively high socioeconomic brackets forgo vaccines for their children more often than poorer individuals (National Committee for Quality Assurance [NCQA], 2012). In addition, studies have found that having a larger number of children in the household (Trauth, Zimmerman, Musa, Mainzer, & Nutini, 2002) and having ≥2 healthcare providers were significantly and independently associated with inadequate immunization status (Schaffer, Humiston, Shone, Averhoff, & Szilagyi, 2001). There were also racial disparities in US childhood immunization rates, with black and Hispanic children having lower rates than children of other races (Daniels, Jiles, Klevens, & Herrera, 2001). The NIS 2011 results showed American Indian/Alaska Native (AI/AN) children had lower coverage compared with white children for many vaccines, which could not be explained by other, readily apparent factors such as poverty or the introduction of the cellular telephone sampling frame (CDC, 2012). However, significant success has been achieved in reducing racial disparities in vaccination coverage for young children among non-Hispanic whites vs. non-Hispanic black from 2001 to 2010 to a non-significant statistical level (Zhao & Smith, 2013).

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Source of Data

This study analyzed Nevada Kindergarten Health Survey Data from 2009-2010
(Year Two) and 2010-2011 (Year Three) conducted by the Nevada Institute for
Children's Research and Policy (NICRP).

In 2008, in order to gain baseline information on the health status of children
entering the school system to better track student's health status, NICRP, in partnership
with the state's 17 school districts, the Southern Nevada Health District (SNHD), and the
Nevada State Health Division (NSHD), conducted its first health survey examining the
health status as well as health insurance status of Nevada's children entering
kindergarten. The goal of the survey was to quantify the health status of children as they
were entering school and to identify specific areas for improvement.

In the fall of 2009, NICRP distributed revised survey questionnaires to
kindergarten teachers in all public elementary schools in the state except schools in
Esmeralda and Clark County. Esmeralda County, a rural county with 5 kindergarteners
enrolled in the 2009-2010 school year, chose not to participate in the survey. Clark
County School District requested that only a sample of their schools be included in the
survey to reduce burden on school staff. In Clark County, surveys were sent to a
randomly selected sample of schools ($n = 140$) in the district to obtain a 5 percent margin
of error in survey results. Schools were selected based on their Title I status, as provided
by the Clark County School District, to ensure that a representative sample of both Title I
and non-Title I schools was achieved. A school qualifies as a designated Title I school if

it receives supplemental federal funding from the Department of Education and serves a large student population from low income families. Typically, a minimum 40% of the children in a Title I school come from low income families. It was determined that of 213 elementary schools in the Clark County School District, 71 (33.3%) were Title I schools. Forty-five schools (32.1 percent of the target 140 schools in the sample) were randomly selected using Statistical Product and Service Solutions (SPSS) (a statistical analysis software) from a list of all Title I schools. The remaining 95 schools (67.1 percent of the needed sample of 140) were randomly selected from a list of non-Title I schools using SPSS.

In the fall of 2010, same survey questionnaires were distributed to kindergarten teachers in all public elementary schools in the state, with the exception of schools in the Clark County School District. Surveys were sent to a randomly selected sample of schools in Clark County ($n = 139$) based on their Title I status. The school sample selection process in Clark County in 2010 was the same as in 2009.

In all school districts, teachers distributed surveys to parents during the first part of the school year. Parents who chose to participate turned in the survey questionnaire to either the receptionist at the school office or their child's teacher. Those surveys were then returned to NICRP via mail.

Each survey was assigned a unique identification number by NICRP staff to aid in tracking of survey responses. Survey responses for Year Two received as of January 1, 2010 and survey responses for Year Three received as of February 1, 2011 were entered into SPSS 17.0. Surveys completed in Spanish were entered into the English database by

a bilingual staff member at NICRP. No identifying information was included in any of the surveys.

Survey results were presented in the form of basic frequencies (counts and percentages) for all questions asked in the survey. Cross tabulations were calculated for selected variables to provide additional information on specific topics. A chi-square statistic was also calculated to test for the statistical significance of the differences provided in the cross tabulation tables. Percentage calculations as well as statistical significance are presented with figures, as appropriate. In addition, the 2010-2011data was compared across counties for the current data collection period (Clark, Washoe, Rural), and with the 2008-2009 and the 2009-2010 data (NICRP, 2010).

3.2 Survey Instrument

The original short questionnaire in 2008 was developed in both English and Spanish and contained 22 questions. The revised survey questionnaire which was used in the 2009-2010 (Year Two) and 2010-2011 (Year Three) was also in English and Spanish but contained 27 questions (10 demographic questions and 17 health related questions).

3.3 Sample Size

In the 2009-2010 school year, 24,261 surveys were sent to participating schools. At the end of the data collection period (December 2010), 9,504 surveys were received and entered, resulting in a 39.2 percent response rate. 9,231 out of 9,504 surveys received responded to survey question #9 which was "If immunization were not required for school, would you still have your child immunized?". Of 9231 responses, only 508 parents (5.5 %) indicated that they would not have their child immunized if it were not required by a state mandate.

In the 2010-2011 school year, 24,032 surveys were sent to participating schools. At the end of the data collection period (February 2011), 10,487 surveys were received resulting in a response rate of 43.6 percent. 10,269 out of 10,487 surveys received responded to survey question #9 "If immunization were not required for school, would you still have your child immunized?". Of 10,269 reponses, only 667 parents (6.5 %) indicated that they would not have their child immunized if it were not required by a state mandate.

Year Two and Year Three survey data were combined in order to achieve the minimum number of cases required based on the guideline for the minimum number of cases to be included in a logistic regression model (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996). N = 10 k/p (p is the smallest of the proportion of negative or positive cases in the population and k is the number of covariate), in our regression model, p = 0.055 (5.5% survey respondents in Year Two indicated that they would not have their child immunized if it were not required by law), k = 6 (there are 6 independent variables in our model), therefore N = 1091. After combining Year Two and Year Three data, we had 1176 respondents indicated that they would not have their child immunized if it were not required by the state law.

Due to the fact that in both years (Year Two and Year Three), the same survey questionnaire was used, the same sample selection process was applied, and the demographic characteristics of both years were similar (Table 1, Appendix B), making it appropriate to combine Year Two and Year Three data in our study.

3.4 Operational Definitions

Dependent Variable: The survey respondent's answer to the question "If immunizations were not required for school, would you still have your child immunized?"
          Categories: Yes (Reference Group)
                                    No

Independent Variables:
    1. Annual household income (income)
            Categories: $0 - $14,999
                              $15,000 - $24,999
                              $25,000 -$34,999
                              $35,000 - $44,999
                              $45,000 - $54,999
                              $55,000 – $64,999
                              $65,000 + (reference group)
    2. Total number of children in the household (# of children)
            Categories: 0 – 1
                              2 (reference group)
                              3
                              4
                              5 – 11
    3. Total number of adults in the household (# of adults)
            Categories: 0 – 1
                              2 (reference group)
                              3
                              4
                              5
                              6 – 14
    4. Does your child have a primary healthcare provider? (primary provider)
                Categories: Yes (reference group)
                                No
    5. Has your child been seen by a medical provider for a routine check-up in the past 12 months? (check-up)
                Categories: Yes (reference group)
                                No
    6. Is your child currently covered by medical insurance? (insurance)
                Categories: Yes (reference group)
                                No
    7. Race
            Categories: 1 (African American)
                                2 (Asian/Pacific Islander)
                              3 (Other + Multiple Categories Circles)
                              4 (Hispanic)
                              5 (Native American)
                              6 (Caucasian – reference group)

3.5 Data Analysis and Management

    The data was analyzed with SPSS 20.0 software package. Logistic Regression

technique was used for describing the relationship of the dependent variable and

independent variables. Logistic regression is a statistical method in which there are one or more independent variables that determine a binary outcome (dependent variable). The outcome is a dichotomous variable (in which there are only two discrete possible outcomes Yes or No). The goal of logistic regression is to find the best fitting model to describe the relationship between the dichotomous characteristic of the dependent variable and a set of independent variables. Logistic regression generates the coefficients (and its standard errors and significance levels) of a formula to predict a *logit transformation* of the probability the characteristic of the dependent variable is present.

Two statistical models were designed in the study. A multiple logistic regression model was conducted to assess if six independent variables; income, number of children, number of adults, primary provider, check-up, and insurance, significantly predicted the parent would have his/her child immunized when not a state mandate. Logistic regression has very few assumptions. There are no distributional assumptions; however, observations must be independent, and independent variables must be linearly related to the logit of the dependent variable (Leech, Barrett, and Morgan, 2011). Logistic regression also requires large samples to be accurate since logistic regression uses maximum-likelihood estimation to compute the coefficients for the logistic regression equation. The risk of making Type II errors increases dramatically in smaller samples. There should be a minimum of 20 cases per independent variable. Since there were 6 independent variables, the minimum number of cases required was 120. In the study, there were 1176 respondents indicated that they would not have their child immunized if it were not required by law. This sample size is large enough to conduct the logistic regression.

A univariate logistic regression model was used to assess the relationship between race (independent variable) and the decision making of parents regarding children's immunization when it is not a state mandate (dependent variable).

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Results

Initially, seven independent variables (race, income, # of children, # of adults, primary provider, check-up, and insurance) were included in one model. However, when all seven predictor variables were considered together, the Hosmer and Lemeshow Test was significant indicating that the model failed the goodness-of-fit test. When race was excluded as an independent variable, the Hosmer and Lemeshow Test became insignificant indicating that the model has met the goodness-of-fit test. Therefore, the multiple logistic regression model excluded race as one of the independent variables due to potential problem of multi-collinerity. Race may not have been properly coded in the study, for example, 9.4% of the respondents chose "other" as the race or circled multiple race categories on the questionnaire. A separate univariate logistic regression model with race as the only independent variable was conducted to investigate the relationship between race and the dependent variable, namely, the survey respondent's answer to the question "If immunizations were not required for school, would you still have your child immunized?".

Outliers were not excluded from test models for two reasons. 1) Excluding outliers would disproportionately affect the population who would not consent for immunization if it's not mandatory. 2) Outliers constituted 23.9% of all cases at $ZRE\_1 < 3.0$ & $COO\_1 < 1.0$ level.

Assumptions of observations being independent were verified by checking the correlations among 6 independent variables (income, # of children, # of adults, primary

provider, check-up, and insurance) prior to running the multiple logistic regression

model. The correlation matrix indicated that there were no large correlations between all

six independent variables. A matrix scatterplot was created to check the assumptions that

independent variables were linearly related to the logit. Two straight lines of data points

in six scatterplots of the dependent variable with each independent variables indicated

that the multiple logistic regression model did meet the assumption of linearity.

When all six independent variables (income, # of children, # of adults, primary

provider, check-up, and insurance) were considered together, they significantly predicted

whether or not the parent would have his/her child immunized if it's not a state mandate,

$x^2 = 109.667$, $N = 16641$, $p < .001$. The odds ratio with confidence interval for annual

income (0-$14,999) was 1.50 (95% C.I. = 1.20-1.88), for annual income ($15,000-

$24,999) was 1.36 (95% C.I. = 1.09-1.70), and for annual income ($25,000-$34,999) was

1.29 (95% C.I. = 1.03-1.62). These indicate that comparing to family with annual income

$65,000 or higher, the odds of having a child immunized when it was not a state mandate

increased by 50% in a family with annual income 0-$14,999, 36% in a family with

annual income $15,000 - $24,999, and 29% in a family with annual income $25,000 -

$34,999). The odds ratio with confidence interval for household with 4 children was 0.75

(95% C.I. = 0.61 − 0.92), and the odds ratio with confidence interval for household with 5

− 11 children was 0.76 (95% C.I. = 0.58 − 0.99). These indicate that compared to families

with 2 children; the odds of having a child immunized when it was not a state mandate

decreased by 25% when there were four children in the household and by 24% when

there were 5 − 11 children in the household. The odds ratio with confidence interval for

household with 0 - 1adult was 0.66 (95% C.I. = 0.55 − 0.80) which indicated that the

odds of having a child immunized when it was not a state mandate decreased by 34% in a

family when there was no adult or there was only one adult. The odds ratio with

confidence interval for a child not being seen by a healthcare provider for a routine

check-up in the past 12 months was 0.57 (95% C.I. = 0.48 – 0.68) which indicated the

odds of having a child immunized when it was not a state mandate decreased by 43%

when a child was not seen by a healthcare provider for a routine check-up in the past 12

months. The odds ratio with confidence interval for a child without a primary healthcare

provider was 0.79 (95% C.I. = 0.65 – 0.96) which indicated the odds of having a child

immunized when it was not a state mandate decreased by 21% when the child did not

have a primary healthcare provider. Whether or not the child had medical insurance did

not significantly affect the odds of having a child immunized when it was not a state

mandate (Table 2, Appendix C).

In the univariate logistic regression model, race significantly predicted whether or

not the parent would have his/her child immunized if it's not a state mandate, $x^2 = 86.774$,

$N = 18539$, $p < .001$. The odds ratio with confidence interval for race (African American)

was 1.55 (95% C.I. = 1.16-1.2.07), for Hispanics was 1.98 (95% C.I. = 1.70-2.30), for

Native American was 2.30 (95% C.I. = 1.25 – 4.21). The result indicates that compared

to Caucasians, the odds of having a child immunized when it was not a state mandate

increased 55% in an African American family, 98% in a Hispanic family, and 130% in a

Native American family (Table 3, Appendix D).

4.2 Discussion

One of the objectives of Healthy People 2020 is to achieve and maintain effective

vaccination coverage levels for universally recommended vaccines among young

children, specifically, to increase the percentage of children aged 19 to 35 months who receive the recommended doses of DTaP, polio, MMR, Hib, hepatitis B, varicella and pneumococcal conjugated vaccine (PCV) from 44% in 2009 (base line) to 80% (target) (Healthy People 2020, 2013). Even though vaccination is among the most cost-effective clinical preventive services and is a core component of any preventive services package, numerous studies have also shown childhood immunization programs provide a very high return on investment, so why do we continue to fall short of our goals to immunize children and adults in the United States? To answer this question, a variety of barriers to immunization have been identified, namely, systemic barriers, health care provider barriers, and parent/patient barriers (Gore et al., 1999). Systemic barriers include underfunded immunization programs and underutilized and unevenly supported Immunization registry systems among the states. Health care provider barriers include inadequate clinician knowledge about vaccines and contraindications, complicated immunization schedules, incomplete immunization records, inconvenient clinic hours, and long clinic waiting time. Parent/patient barriers include lack of knowledge, fear of vaccine-related side effects, the belief that their child was not at risk for developing the disease due to herd immunity, the belief in the superiority of natural immunity (from disease exposure) to vaccine induced immunity (Prislin, Dyer, Blakely, & Johnson, 1998), and religious objections to vaccination.

In Nevada, systemic barriers are well documented. The state's public health system is responsible for improving the health of Nevadans. However, the public health system in Nevada has been chronically underfunded for decades. In FY 2010-11, the Nevada state funding for public health was the lowest in the nation. At $3.45, Nevada

earned itself the bottom number one spot (Trust for America's Health [TFAH], 2013). As a result of inadequate funding, 34% of Nevada's children aged 19 to 35 months were not adequately immunized in 2011.

Nevada WebIZ is a web-based immunization registry program and contains 85% of children' immunization records in the state. Immunization registries improve the quality and efficiency of health care for children by providing critical tools to ensure all children receive the required immunizations at the right time. However, statewide, only around 1,000 public and private organizations, including physicians, health districts, community health nurses and school districts are currently using WebIZ to view, create and update immunization records for Nevada's children.

Fragmentation of patient care can affect the immunization status as well. Having multiple healthcare providers → incomplete immunization records → over-immunization or incomplete immunization. In a study regarding adolescent immunization practices, 95% of providers reported they checked immunization status during well-child visits. However, when asked about sick-child visits, only 43% said they checked immunization status, and only 23% reported they provided necessary immunizations (Schaffer et al., 2001). The result in our study agreed the odds of having a child immunized decreased when the child was not seen by a healthcare provider for a routine check-up in the past 12 months and when a child did not have a primary healthcare provider.

According to the annual State of Health Care Quality report, between 2008 and 2009, vaccination rates for measles, mumps and rubella (MMR) in children insured by commercial plans, a surrogate for higher income, dropped nearly four percentage points while vaccination rates for children covered under Medicaid actually increased (NCQA,

2012). Since the federal poverty guideline in 2008 was $21,200 for a family of four and the federal minimum income eligibility level for Medicaid was 133% of the poverty guideline, the annual household income of Medicaid recipients in 2008 was $28,196 (National Conference of State Legislature [NCSL], 2010). Three income categories (0 - $14,999, $15,000 - $24,999, and $25,000 - $34,999) in our study fell into this income range. Therefore, it is not a coincidence that our study had similar findings: the odds of having a child immunized are increasingly greater as the child's annual household income is below $35,000.

Whether or not the child had medical insurance did not significantly affect the odds of having a child immunized when it's not a state mandate. This result is surprising; however, it might be due to the effectiveness of Vaccines for Children Program (VFC) in the state. VFC is a federally funded program that provides vaccines at no cost to children who might not otherwise be vaccinated because of inability to pay.

The result of the univariate logistic regression model regarding race suggests the trend of declining disparity of vaccine coverage among non-Hispanic whites vs. Non-Hispanic black is happening nationwide as well as in the state of Nevada. The reason is probably due to the national and statewide campaign for immunization in the minority communities.

4.3 Scope and Limitations

The study is subject to several limitations. First, all information contained in the survey was self-reported by each parent or guardian. The information provided relied on the memory and honesty of the participants in the survey. Additionally, some respondents did not answer all the questions in the survey. Although NICRP kept all surveys in the

database used for analysis, it is important to note not all respondents answered all questions. Bias may exist due to the exclusion of households who did not respond to the survey or a particular survey question. Previous studies showed there are many factors affecting childhood immunization, such as parent's education and occupation, age of the mother, prenatal care, and residency status. Since our study is based on the data from Kindergarten Health Survey 2009-2010 (Year Two) and 2010-2011 (Year Three) conducted by the NICRP, some of those data were not available and therefore could not be included in this study. The study focused only on several selected socioeconomic and demographic factors related to childhood immunization.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Immunization is the process of stimulating the body's immune system against

certain infectious diseases by administering vaccines. Immunization is one of the main

health interventions to prevent childhood morbidity and mortality. Immunization is only

effective if the child receives the recommended vaccines. Therefore, it is very important

to study factors affecting parent's decision making process regarding vaccination when it

is not required by the school district or the local health authority, particularly in Nevada

where the immunization coverage is lower than other states in the nation.

This study examined selected socioeconomic and demographic factors affecting

parent's decision making process regarding vaccination when it is not a state mandate,

namely, race, household income, number of children in the household, number of adults

in the household, if the child had a primary provider, if the child had a health check-up in

the last twelve months, and medical insurance status of the child. Based on secondary

data from the 2009-2011 Nevada Kindergarten Health Survey, a total of 16641 survey

responses were selected as the unit of analysis in this study. Findings of this study can be

summarized as follows:

In the multiple logistic regression model, among six independent variables which

may influence the decision- making process of the parent regarding immunization, five

independent variables were statistically significant in their relationship to the dependent

variable, namely, if immunizations were not required for school, would you still have

your child immunized? They were household income; number of children in the

household, number of adults in the household; if the child had a primary provider; and if the child had a health check-up in the last twelve months. There was no statistically significant relationship between medical insurance status and the dependent variable. The study found the odds of having a child immunized were increasingly greater if family annual household income was below $35,000. The study confirmed compared to a family with 2 children; the odds of having a child immunized when it was not a state mandate decreased for families with four or more children. The study also confirmed the odds of having a child immunized when it was not a state mandate decreased when a child was not seen by a healthcare provider for a routine check-up in the past 12 months or when there was no primary healthcare provider or only one or less adult in the household.

The result of the univariate logistic regression model showed race was statically significant in its relationship with the dependent variable. Compared to Caucasians, the odds of having a child immunized when it was not a state mandate increased 55% in a African American family, 98% in a Hispanic family, and 130% in a Native American family. The increase of the odds might be due to the focused immunization campaign in the minority communities.

5.2 Conclusion

Most proposed hypotheses except hypotheses regarding race, income and medical insurance status were supported by the statistically significant result of the study. The odds of having a child immunized decreased as 1) there were four or more children in the household; 2) there was one or less adult in the household; 3) the child was not seen by a healthcare provider for a routine check-up in the past 12 months, and 4) when the child did not have a primary healthcare provider ($p<0.05$). Compared to Caucasians,

African American, Hispanics and Native American are more likely to have their children immunized when it is not a state mandate. The odds of having a child immunized were increasingly greater when the family annual household income was below $35,000 (p<0.05). Whether or not the child had medical insurance did not significantly affect the odds of having a child immunized when it's not a state mandate.

5.3 Recommendations

5.3.1. Recommendations for Policy Implementation

In order to increase immunization coverage and to ensure the completeness of immunization, based on the findings in this study it is recommended:

For children whose parents have an income above $35,000 per year, it is recommended that healthcare providers should pay more attention to encourage and educate the parents about vaccine preventable diseases and the benefits of the vaccination.

In households with higher number of siblings, it is recommended that an immunization reminder card be sent to the parents regularly and assistance to take the child to get vaccines be offered, e.g. providing transportation.

For children with one or less adult in the household, it is recommended to get childcare centers and schools staff involved in providing access to immunization.

For children without a primary care provider or a check-up in the last 12 months, it is recommended that childcare centers and schools cooperate with Southern Nevada Health District to provide routine physical exams and immunization to children.

To enroll in the kindergarten, Nevada state law requires children to be up-to-date on vaccinations with medical and religious exemptions. The guardian must have records

indicating the child has had, or has started four doses of DPT

(diphtheria/pertussis/tetanus), three doses of Polio and two doses of MMR

(mumps/measles/rubella) (Clark County School District [CCSD], 2012). Most children

are up to date on their immunizations when they are enrolled in the kindergarten.

However, there was a problem of delayed immunization as evidenced with 34% of

Nevada's children aged 19 to 35 months were not adequately immunized in 2011 (TFAH,

2013).

To deal with the problem of delayed immunization, it is recommended that

parents should be better educated about the benefits of vaccinations and a strict guideline

regarding mandatory immunization requirement should be in place at all daycare centers

and temporary child care service centers. With the passing of the Affordable Care Act, it

is expected more children will have access to primary care providers which ultimately

will increase the immunization rate.

5.3.2 Recommendations for Further Study

Many concepts beyond the conceptual framework in this study could not be

examined due to the limitation of the data. Although previous studies showed black,

Hispanic and American Indian/Alaska Native children have lower rates than children of

other races; our study did not confirm this finding. It is recommended that a further study

be conducted to include additional variables such as parents' education and occupation;

child's race and ethnicity; distance between the family home and the healthcare

provider's office or the local health department; and healthcare provider's belief, attitude

and behavior regarding immunization.

APPENDIX A: KINDERGARTEN HEALTH SURVEY (2009 – 2010)

DEAR PARENT OR GUARDIAN: *This survey has been designed by the Nevada Institute for Children's Research and Policy at the*
*University of Nevada Las Vegas, in partnership with the State of Nevada, Department of Health and Human Services and the local County School District. The information from this survey will be used to help understand the health of children entering kindergarten this year. You have been asked to participate because you will have a child in kindergarten. All information from this survey will be used to discuss children's health on a group level. Your child's name will **never** be connected to your responses in any way or known by the researchers. **All information in this survey is confidential.***

Child's Age ___ _____
Elementary School Name: _____
Child's Gender: Male Female
Weight of Child: _____lbs.
Child's Height: ____ ___ft. _____in. (12in = 1ft)
Total number of **children** in your household: (ages 0-17) _____
Total number of **adults** in your household: (ages 18+)_____
Annual Household Income (check one)
☐ $0 -$14,999
☐ $15,000 -$24,999
☐ $25,000 -$34,999
☐ $35,000 -$44,999
☐ $45,000 -$54,999
☐ $55,000 -$64,999
☐ $65,000 -$74,999
☐ $75,000 -$84,999
☐ $85,000 -$94,999
☐ $95,000 +
Your HOME zip code: _____
Child's Race / Ethnicity (check one)
☐ African American
☐ Asian / Pacific Islander
☐ Caucasian
☐ Hispanic
☐ Native American
☐ Other (please specify)
_____

PLEASE RETURN THIS SURVEY TO YOUR CHILD'S TEACHER BY TUESDAY SEPTEMBER 8, 2009
Thank you for your participation. If you are interested in participating in future research please contact the Nevada Institute for Children's Research and Policy at (702) 895-1040 or via email at nicrp@unlv.nevada.edu.
TEACHERS: Please return the survey to your school's front office or mail to **NICRP, Kindergarten Health Survey, 4505 Maryland Parkway, Box 453030, Las Vegas, NV 89154**

1. Is your child currently covered by medical insurance?
☐Yes ☐No
If "Yes", what type of insurance? ☐Private, ☐Medicaid,
☐Nevada Check Up, ☐Other_____

2. Has your child been seen by a medical provider for a routine check-up (not an illness) in the *past 12 months*?
☐Yes ☐No

3. Does your child have a primary care provider (regular doctor, nurse practitioner or physician's assistant)?
☐Yes ☐No

4. Has your child seen a dentist in the past 12 months?
☐Yes ☐No

5. Has your child ever had a cavity?
☐Yes ☐No

6. Within the last 12 months how many times have you taken your child to the Emergency Room (not Urgent Care) for an illness or injury that was not life-threatening?
☐ None (0) ☐ 1-2 ☐ 3-5 ☐ 6-9 ☐ 10 or more

7. Please check all medical conditions listed below that your child has
☐Asthma/Airway Disorder ☐ Glasses/Contacts ☐Diabetes ☐ Hearing Aid/Impairment ☐Seizures ☐ Physical Disability ☐Mental Health Condition ☐ ADD/ADHD ☐Cancer ☐ None
☐ Other (specify)_____

8. Do you think your child may have a medical problem that he/she has not seen a doctor for?
☐Yes ☐No
If yes, what is it? _____

9. If immunizations were not required for school, would you still have your child immunized?
☐Yes ☐No

10. Where do you take your child for immunization (shots)? If you have used more than one of these, please check the last one:
☐ Primary Care Provider (Child's regular doctor) ☐ Health District ☐ School-Based Clinic ☐ Community Health Clinic ☐ Other (specify):
_____

11. Has your child ever been tested for lead poisoning?
☐ Yes ☐ No

12. Have you experienced any barriers to accessing health care for your child? **(check all that apply)** ☐ None ☐ Lack of transportation ☐ Lack of insurance ☐ Lack of good medical providers
☐ Lack of money ☐ Other (please specify): _____

13. Have you ever tried to get mental or behavioral services for your child?
☐Yes ☐No
If "Yes", have you had trouble getting services?
☐Yes (explain)_____ ☐No

14. In general, are you able to follow your doctor's recommendations for medications and/or follow up visits?

□All of the time □Some of the time
□Most of the time □None of the time
If you did not say "All of the time", please explain why not:
_____
15. In general, how many times a week does your child do at least 30 minutes of physical activity? (circle one) 0 1 2 3 4 5 6 7
16. What type of pre-school did your child attend most often in the past 12 months? **(check one)**
□Head start □ Private □ Home Based □ Home Based □School/University Campus □ None/Stayed Home
□ Other_____
Please answer the following questions for the child that is enrolled in kindergarten this year.

ESTIMADOS PADRES DE FAMILIA O GUARDIAN: La siguiente encuesta ha sido diseñada por Nevada Institute for Children's
Research and Policy en la Universidad de Nevada Las Vegas, en colaboración con el Centro de Salud de Sur de Nevada y el Distrito
Escolar del Condado. La información adquirida en este estudio se utilizará para ayudar a comprender la salud de los niños
que comienzan la escuela preescolar este año. Le hemos pedido que participe porque usted tiene un niño en la escuela
preescolar. Toda la información obtenida será utilizada para discutir y estudiar el nivel de salud colectiva del grupo. Nunca
*habrá conexión entre el nombre de su niño(a) y sus respuestas. **Todo información en este studio será confidencial.***
Edad del niño(a): _____
Nombre de la escuela primaria: _____
Sexo del niño(a): Masculino Femenino
Peso del niño(a) : _____lbs.
Estatura del niño(a): _____ft. _____in. (12in = 1ft)
Total de **niños(as)** viviendo en casa (Edades 0-17):
_____
Total de **adultos** viviendo en casa (Edades 18+):
_____
Ingreso anual del hogar (cheque uno)
□$0 -$14,999
□$15,000 -$24,999
□$25,000 -$34,999
□$35,000 -$44,999
□$45,000 -$54,999
□$55,000 -$64,999
□$65,000 -$74,999
□$75,000 -$84,999
□$85,000 -$94,999
□$95,000 +

Su código postal CASERO:

_____

Etnicidad del Niño(a)
☐ Afro Americano
☐ Asiático / Isleño Pacifico
☐ Caucásico
☐ Hispano / Latino
☐ Nativo Americano
☐ Otro (especifique):

_____

1. ¿Su niño(a) en este momento cuenta con seguro medico?
☐ Si ☐ No

¿Encaso de si? ¿que tipo de seguro? ☐ Privado ☐ Medicaid

☐ Nevada Check-Up ☐ Otro_____

2. ¿Su niño(a) ha sido visto por un proveedor de servicio
médico este año para un examen de rutina (no por enfermedad) en los últimos 12 meses?
☐ Si ☐ No

3. ¿Tiene su niño(a) un medico familiar (médico, enfermera de práctica o asistente de médico)?
☐ Si ☐ No

4. ¿Ha visto su niño(a) a un dentista en los últimos 12 meses?
☐ Si ☐ No

5. ¿Ha tenido su niño(a) caries? ☐ Si ☐ No

6. En los últimos 12 meses, ¿cuántas veces ha tenido que llevar a su niño(a) a la sala de emergencias por una enfermedad o lesión sin peligro la vida?
☐ Ninguna (0) ☐ 1-2 ☐ 3-5 ☐ 6-9 ☐ 10 o mas

7. Por favor seleccione todas las condiciones medicas que tenga su niño(a):
☐ Asma ☐ Lentes/ de Contacto
☐ Diabetes ☐ Oído/Discapacidad Auditiva
☐ Convulsiones ☐ Discapacidad física
☐ Condición de Salud Mental ☐ ADD/ADHD
☐ Cáncer ☐ Ninguno
☐ Otra (especifique) _____

8. ¿Cree que su niño(a) tenga un problema médico pero usted no ha ido a ver a un médico?
☐ Si ☐ No

Si la respuesta es si, por favor especifique: _____

9. Si las vacunas no fueran necesarias para la escuela, ¿Vacunaría (inmunizaciones) a su niño?
☐ Si ☐ No

10. ¿Dónde lleva a su hijo para inmunizaciones (vacunas)? Si ha utilizado más de un tipo de local, por favor, indique la más reciente:
☐ Proveedor cuidado primario (médico regular)
☐ Centro de Salud ☐ Clínica de salud basada en la escuela
☐ Clínica de Salud Comunitaria

□ Otro (especifique): _____

11. ¿A sido su niño(a) examinado por contaminación de plomo? □ Si □ No

12. ¿Se ha enfrentado con obstáculos en el acceso de salud para su hijo? **(cheque todo que apliqué)**

□ Ninguno □ Falta de aseguransa

□ Falta de proveedores médicos de calidad

□ Falta de transportacion □ Otro (especifique):

_____

13. ¿Alguna vez ha tratado de obtener servicio de salud mental o de comportamiento para su niño(a)? □ Si □ No

En caso que sí, ¿ha tenido problemas para obtener servicios?

□ No □ Si (espicifique) _____

_____

14. En general, ¿Puede seguir recomendaciones del médico en cuanto a medicamentos o seguimiento de las visitas?

□Todo el tiempo □Algunas veces

□La mayor parte del tiempo □Nunca

Si no contesto "Todo el tiempo ", por favor especifique porque:

_____

15. En general, cuantes veces a la semana hace su niño(a) por lo menos 30 minutos de actividad fisica? (circule uno)

0 1 2 3 4 5 6 7

16. Que tipo de escuela preescolar atendio su niño(a) mas en los ultimos 12 meses? **(cheque uno)**

□Head start □ Privada □ Ninguna

□Campamento en Escuela/Universidad □ Otra _____

Por favor conteste las siguentes preguntas sobre el niño(a) que se va a marticular en kinder este año.

VUELVA POR FAVOR ESTA INSPECCION A MAESTRO DE SU NIÑO POR EL MARTES, SEPTIEMBRE 8, 2009

Gracias por su participación. Si esta interesado en participar en investigaciones futuras por favor contacte al Nevada Institute for Children's Research and Policy al (702) 895-1040 o por email al nicrp@unlv.nevada.edu .

TEACHERS: Please return the survey to your school's front office or mail to **NICRP, Kindergarten Health Survey, 4505 Maryland Parkway, Box 453030, Las Vegas, NV 89154**

Table 1. Comparison of 2009-2010 through 2010-2011 Data

Survey Indicator	2009-2010 (Year Two) (Percent)	2010-2011 (Year Three) (Percent)
Demographic Information		
Gender of Kindergartener		
Male	49.8	49.8
Female	50.2	50.2
Race/Ethnicity of Kindergartener		
African American/Black	5.7	5.6
Asian/Pacific Islander	6.3	6.2
Caucasian	43.5	40.5
Hispanic	35.1	34
Native American/Alaska Native	2.1	1.4
Other Race	0.5	0.9
Multiple Races	6.7	11.4
Annual Household Income		
$0-$14,999	15.7	19
$15,000-$24,999	14.5	16
$25,000-$34,999	13.1	12.8
$35,000-$44,999	9.2	9.3
$45,000-$54,999	8.2	7.5
$55,000-$64,999	6.9	6.6
$65,000-$74,999	7.2	5.9
$75,000-$84,999	6.4	5.5
$85,000-$94,999	4.6	3.9
$95,000 +	14.3	13.4
Health Insurance Status & Access to Health Care		
Uninsured	18.6	16.6
No Primary Care Provider	19.5	18.9
No Routine Check-UP in Past Year	16.3	15.8
Would not Immunize if It's not Required	5.5	6.5

Table 2.
Logistic Regression Predicting Parent's Decision Making Regarding Children's Immunization
When It's Not A State Mandate

Variable	B	SE	Odds ratio	95% C.I for EXP(B)		p
				Lower	Upper	
annual income_0 to $14,999	.408	.113	1.503	1.204	1.877	.000
Annual Income_$15,000 to $24,999)	.310	.113	1.364	1.093	1.701	.006
Annual Income_$25,000 to $34,999	.254	.116	1.289	1.027	1.620	.029
Annual Income_$35,000 to $44,999	.151	.126	1.163	.908	1.488	.230
Annual Income_$45,000 to $54,999	-.229	.120	.795	.629	1.007	.057
Annual Income_$55,000 to $64,999	-.141	.131	.868	.672	1.121	.279
No CheckUp	-.564	.091	.569	.476	.680	.000
No Primary_Care	-.238	.101	.788	.647	.959	.018
0 to 1 Child in the household	-.115	.101	.891	.731	1.086	.253
5 to 11 Children in the household	-.275	.134	.759	.584	.988	.041
3 Children in the household	-.124	.084	.883	.750	1.041	.139
4 Children in the household	-.285	.104	.753	.613	.924	.007
0 to 1 Adult in the household	-.415	.098	.660	.545	.799	.000
6 to 14 Adults in the household	.453	.514	1.573	.573	4.296	.378
3 Adults in the household	-.102	.107	.903	.732	1.113	.339
4 Adults in the household	.060	.171	1.061	.759	1.484	.729
5 Adults in the household	.440	.365	1.552	.759	3.174	.228
No Medical Insurance	-.023	.100	.977	.804	1.188	.817
Constant	2.964	.074	19.379			.000

Table 3 Univariate Logistic Regression Predicting Parent's Decision Making Regarding
Children's Immunization When It's Not A State Mandate

Variable	*B*	*SE*	*Odds ratio*	95% C.I for EXP(B)		*p*
				Lower	Upper	
Race – African American	.437	.147	1.548	1.160	2.066	.003
Race – Asian/Pacific Islander	.119	.124	1.126	.883	1.437	.338
Race – Other + Multiple Categories	.166	.104	1.181	.963	1.448	.110
Race - Hispanic	.683	.077	1.980	1.702	2.304	.000
Race – Native American	.831	.310	2.295	1.251	4.213	.007
Constant	2.505	.043	12.238			.000

REFERENCES

Burns, A.C. (1992). The expanded health belief model as a basis for enlightened

preventive health care practice and research. *Journal of Health Care Marketing,*

12 (3), 32-45.

CDC.(2010a). Estimates of deaths associated with seasonal influenza--United States,

1976-2007. *MMWR Morbidity Mortality Weekly Reports 2010*, 59, 1057-1062.

CDC. (2010b). Prevention and control of influenza with vaccines: Recommendations of

the Advisory Committee on Immunization Practices (ACIP), *MMWR*

Recommendations and Reports 2010, 59(RR-8), 1-62.

http://www.cdc.gov/flu/protect/keyfacts.htm

CDC. (2011a). Ten Great Public Health Achievements --- United States, 2001—2010.

MMWR May 20, 2011 60(19), 619-623

CDC. (2011b). School vaccination requirements, exemptions and web links. Retrieved f

rom http://www2a.cdc.gov/nip/schoolsurv/schImmRqmtReport.asp

CDC. (2012). National, State, and Local Area Vaccination Coverage Among

Children Aged 19–35 Months — United States, 2011. *MMWR 2012,*

61(35), 689-696

CDC. (2013a). Children, the Flu, and the Flu Vaccine. Retrieved from

http://www.cdc.gov/flu/protect/children.htm

CDC. (2013b). Key Facts About Seasonal Flu Vaccine. Retrieved from

http://www.cdc.gov/flu/protect/keyfacts.htm

Clark County School District (CCSD). (2012). Student enrollment information. Retrieved

from http://ccsd.net/parents/enrollment/#proofImm

Committee on Health and Behavior (2001): Research, practice and policy, board on

neuroscience and behavioral health. health and behavior. The interplay of

biological, behavioral and societal influences. National Academies Press.

Retrieved from

http://books.nap.edu/openbook.php?record_id=9838&page=20

Daniels, D., Jiles, R.B., Klevens, R.M., Herrera, G.A. (2001). Undervaccinated African-

American preschoolers. A case of missed opportunities. *American Journal of*

Preventive Medicine, *20*, 61-68.

Department of Health and Human Services Nevada Division of Public and Behavioral

Health (DPBH). (2013). Laws regarding Nevada's school immunization

requirements. Retrieved from

http://health.nv.gov/PDFs/Immunizations/NVSchoolImmunizationRequirements.
pdf

Feinstein, J.S. (1993). The relationship between socioeconomic status and health: A

review of the literature**.** *The Milbank Quarterly***,** *71 (2),* 279-322.

Gore, P., Madhavan, S., Curry, D.,McClund, Gl, Castiglia, M., Rosenbluty, S. A. &

Smego, R. (1999). Predictors of childhood immunization completion in a rural

population. *Social*

Science & Medicine, 48, 1011-1027.

Healthy People 2020. (2013). 2020 Topics & Objectives – Objectives A-Z. Immunization

and Infectious Diseases. Retrieved from

**http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?t
opicId=23**

Hornig, M., Briese, T., Buie, T., Bauman, M.L., Lauwers, G., Siemetzki, U., Hummel,

K., et al. (2008). Lack of association between measles virus vaccine and autism

> with enteropathy: a case-control study. *PLoS ONE*, 3(9): e3140.

> doi:10.1371/journal.pone.0003140

Leech, N., Barrett, K., & Morgan, G. (2011). Logistic regression and discriminant

> analysis. *IBM SPSS for intermediate statistics* (pp.129) (4th ed.). New York, NY:

> Routledge.

National Center for Immunization and Respiratory Diseases (NCIRD). (2012). What

> would happen if we stopped vaccinations. Retrieved from

> http://www.cdc.gov/vaccines/vac-gen/whatifstop.htm

National Committee for Quality Assurance (NCQA). (2012). The state of health care

> quality report. Retrieved from http://www.ncqa.org/tabid/836/default.aspx

National Conference of State Legislature (NCSL). (2010). Medicaid and chip eligibility

> table by state. Retrieved from http://www.ncsl.org/research/health/medicaid-

> eligibility-table-by-state-state-activit.aspx

National Institute for Children's Research and Policy (NICRP). (2010). Health status of

> children entering kindergarten. Results of the 2009-2010 (year two) Nevada

> kindergarten health survey. Retrieved from

> http://nic.unlv.edu/files/KHS%20Year%202%20Final%20Report.pdf

Peduzzi, P., Concato, J., Kemper, E., Holford, T.R., Feinstein, A.R. (1996). A simulation

> study of the number of events per variable in logistic regression analysis. *Journal

> of Clinical Epidemiology, 49*, 1373-1379. [Abstract]

Prislin, R., Dyer J.A., Blakely, C.H., Johnson, C.D. (1998). Immunization status and

sociodemographic characteristics: The mediating role of beliefs, attitudes, and

perceived control. *American Journal of Public Health, 88*, 1821-1826.

Schaffer, S.J., Humiston, S.G,, Shone, L.P., Averhoff, F.M., Szilagyi, P.G. (2001).

Adolescent immunization practices: A national survey of U.S. physicians.

Archives of Pediatrics & Adolescent Medicine, 155, 566-571.

Trauth, J.M,, Zimmerman, R.K,, Musa, D., Mainzer, H.M., Nutini, J.F. (2002). Do beliefs

of inner-city parents about disease and vaccine risks affect immunization? *Journal

of the* National Medical Association, *94*, 820-832.

Trust for America's Health (TFAH). (2013), Key health data about Nevada, Retrieved

from

http://healthyamericans.org/states/?stateid=NV#section=3,year=2013,code=undefined

Uhlmann, V., Martin, C.M., Sheils, O., Pilkington, L., Silva, I., Killalea, A., Murch, S.

B., et al. (2002). Potential viral pathogenic mechanism for new variant

inflammatory bowel disease. *Molecular Pathology,* 55, 84–90. doi:

10.1136/mp.55.2.84

Wakefield, A.J., Murch, S.H,, Anthony, A., Linnell, J., Casson, D.M., et al. (1998). Ileal-

lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental

disorder in children. *Lancet*, 351, 637–641. doi: 10.1016/S0140-6736(97)11096-0

Waldron, I. (1988). Gender and health related behavior, In D. S. Gochman (ed.), *Health

behavior: Emerging research perspectives*. New York, NY: Plenuum Press.

WHO (2013). Vaccine-preventable diseases. The burden. Retrieved from

http://www.who.int/immunization_monitoring/diseases/en/

Zhao, Z., Smith, P.J. (2013). Trends in vaccination coverage disparities among children,

United States, 2001-2010. *Vaccine*, *31(19),* 2324-7.

Zhou, F. (2011). Updated economic evaluation of the routine childhood immunization

schedule in the United States. Presented at the 45th National Immunization

Conference. Washington, DC; March 28--31.

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