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A DISCRIPTIVE STUDY OF OKLAHOMA 2008 TWO-YEAR OLD IMMUNIZATION SURVEY

BY

Charlotte Denise Kaboré
Degree to be awarded: MPH

Iris E. Smith, PhD, MPH Date
Committee Chairperson
Associate Professor and Director of Career Education

Allysceaeioun Spears, PhD, MPH Date
Field Advisor

Melissa Alperin, MPH, CHES Date
Director, Career MPH Program

A DISCRIPTIVE STUDY OF OKLAHOMA 2008 TWO-YEAR OLD IMMUNIZATION SURVEY

BY

Charlotte Denise Kaboré
M.P.H., Emory University, 2011
M.S., Tennessee State University, 1996
B.S., University of Arkansas at Pine Bluff, 1992
Wilson College, Teacher Certification Program (Biology), 2002

Special Studies Project Committee Chair: Iris Smith, Ph. D, M.P.H.

An abstract of
A Special Studies Project submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements of the degree of
Master of Public Health in the Career MPH program

A DISCRIPTIVE STUDY OF OKLAHOMA 2008 TWO-YEAR OLD IMMUNIZATION SURVEY

BY
Charlotte Denise Kaboré

Immunizations have transformed the landscape of medicine over the past 50 to 60 years. Immunizations help to protect our children, our families, our schools and the community-at-large from vaccine preventable diseases which lurk in the environment in which we all share. By having a small sub-set of individuals who are not adequately immunized is an open invitation to allowing the return of vaccine preventable diseases. In the state of Oklahoma, there is a growing concern for the continuous low immunization rates among two-year old children. This study examines the primary series [(4:3:1:3:3- four doses of diphtheria and tetanus toxioids an acellualare pertussis vaccine (DTaP); three doses of inactivated poliovirus vaccine (IPV); one dose of measles-containing vaccine (MMR); three doses of Haemophilus influenza type b vaccine (Hib); three doses of hepatitis B vaccine (Hep B)] vaccine coverage rates for the 2008 cohort using data from the Oklahoma Immunization Information System (OIIS). The purpose of the study is to determine the extent of vaccine coverage for the 2008 cohort of two year olds and to identify disparities in coverage based on geography, ethnicity, gender or other demographic factors. This descriptive study is secondary data analysis of the 2008 Oklahoma two-year old survey data to provide information for guiding program improvement. There are a total of 77 counties in Oklahoma and 43,942 children were included in this descriptive study. The findings of the primary series showed that only 4 counties, Harmon (96.2%), Jefferson (90.1%), Woods (90.1%) and Major (90.0%) were up-to-date at the recommended national average 90%. The state of Oklahoma had a 78.4% coverage percent which is 11.6% below the national average. There is no significant difference between the gender (OR= 1.00, 95% confidence interval [CI] 0.9, 1.05). Of the children UTD for the primary series, 73.4% were Black, 85.7% Hispanic, 80.6% Native American, 78.4% white, and 87.37. To date, there is no published data to explain why Oklahoma children are not receiving the recommended vaccines in a timely manner prior to two years of age. The survey provides coverage rates by county to provide a local perspective.

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DEDICATION

I would like to dedicate my thesis to my late father, Herman Smith and my late mother-in-law, Solage Kaboré.

ACKNOWLEDGEMENTS

"Trust in the Lord with all your heart and lean not on your own understanding. In all your ways acknowledge Him, and He shall direct your paths." Proverbs 3:5-6.

To my husband, Dr. H. Julien Kaboré, I am grateful to God for your support throughout this process. Thank you very much for serving as my epidemiology consultant for this thesis project.

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Introduction and Rationale

Immunizations have transformed the landscape of medicine over the past 50 to 60 years. Immunizations indirectly help to protect our children, our families, our schools and the community-at-large from vaccine preventable diseases which lurk in the environment in which we all share. By having a small sub-set of individuals who are not adequately immunized is an open invitation to allowing the return of vaccine preventable diseases. Hence, broad based immunization requirements are one of the greatest public health achievements of the 20th Century as described by the Centers for Disease Control and Prevention (CDC). (CDC, 2003a).

Over the last 30 years, *Healthy People* have been commitment by the federal government to improve the quality of our Nation's health with an ambitious framework for public health prevention practices. *Healthy People* 2010 outline objectives that identify immunizations as a health indicator to improve measures of public health and encourage participation in improving health by 2020 for the next decade. According to objective 18 for Immunization and Infectious Diseases (Healthy People 2020), the objective was modified from *Healthy People* 2010 objectives (DHHS, 2010). The central theme of each initiative is to actively achieve and maintain high immunization rates among our national population for universally recommended vaccines.

A more specific recommendation of *Healthy People* 2020 is to increase the proportion of children aged 10-35 months who received their recommended vaccines according to the CDC's National Immunization Survey (NIS) (Hammer et al., 2010). A second specific objective of the CDC survey was to achieve a 90% immunization

coverage rates for children by 2 years of age. *(CDC, 2000; "U.S. Department of Health and Human Services: Office of Disease Prevention and Health Promotion--Healthy People 2010," 2000).* Moreover, communities which have higher immunization rates for the primary series show a higher immunity level to vaccine-preventable diseases.

In the state of Oklahoma, there is a growing concern for the continuous low immunization rates among two-year old children. According to NIS data for 2002-2003, the state of Oklahoma had lower immunization rates than the national average. In an effort to address their low rates, the state of Oklahoma has created several public health interventions such as the provider-based OK by One (OBO), (Appendix A) and a patient-based *Operation Buzzer Beater* (OBB).

The NIS is a nation-wide annual survey to assess the coverage rates among 19 and 35 months aged children living in the United States at the time of the interview. The NIS sample size is about 30,000 children; however, the number does not represent the entire population, and thus sample estimates and population values are likely to be different. In 1994, the NIS was conducted by the National Center for Immunizations and Respiratory Diseases (NCIRD) and the National Center for Health Statistics (NCHS) of the CDC, whose job it is to provide the public with important statistics about childhood immunization coverage and related health matters. The National Opinion Research Center (NORC) at the University of Chicago conducts the NIS for the CDC. The NIS is random-digit-dialing telephone survey followed by a mailed survey to children's immunization providers. The NIS data is used to produce timely estimates of vaccination

coverage rates for all childhood vaccinations recommended by the Advisory Committee on Immunization Practices (ACIP). These estimates are produced for the nation and non-overlapping geographic areas which consist of the 50 states, the District of Columbia, and selected large urban areas. Vaccination coverage is based on estimates of children who have received particular vaccines. The survey is used to:

1. Identify groups at risk of contracting vaccine-preventable diseases;
2. Stimulate efforts to increase coverage;
3. Evaluate how well the efforts work.

The vaccines included in the survey for the individual vaccines as well as the 4:3:1:3:3 which are as follows: 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). Hence, state-level estimates of public health indicator such as immunization are routinely published. (Barker et al., 2005)

The Oklahoma State Department of Health (OSDH) Immunization Service developed a special population based two-year old survey to determine the immunization status of Oklahoma's two-year old children. The state of Oklahoma began using a state-wide survey to look at the county specific coverage rates among its target population. The Oklahoma survey can therefore be used to make targeted county or regional-specific interventions and/or policy changes. However, not all states in the U.S conduct their own two-year old survey. The state of Oklahoma is strongly committed to following the CDC

guidelines to increase the percentage of children under two protected from preventable disease to 90%.

Rationale

When the Comprehensive Childhood Immunization Initiative (CII) Act was enacted in 1993, it prompted public health officials to look at immunization coverage rates in various populations more closely and develop a plan (CDC, 1994). The importance of measuring the immunization coverage rates was accentuated in an effort to know the susceptibility of a population. The NIS was developed and implemented based on the enactment of the CII which ultimately became the nation's tool for measuring coverage rates for being up-to-date (UTD) with seven vaccines which are: four doses of diphtheria and tetanus toxioids an acellualare pertussis vaccine (DTaP); three doses of inactivated poliovirus vaccine (IPV); one dose of measles-containing vaccine (MCV); three doses of Haemophilus influenza type b vaccine (Hib); three doses of hepatitis B vaccine (Hep B); one dose of varicella vaccine (VRC); and three doses of pneumococcal conjugate vaccine (PCV) (DHHS, 2005). Moreover, these seven vaccines are commonly referred to at the 4:3:1:3:3:1:3 series and represents more than 80% of the vaccines that children will need during their lifetime to achieve immunity from vaccine-preventable diseases. It is very important to the health of each individual child to complete this series and for the general public because all vaccine preventable diseases are transmitted through person-to-person contact, with the exception of tetanus. The NIS provides state-level estimates of preschool immunization coverage, and these estimates of are routinely published. (Barker, et al., 2005)

Problem Statement

Oklahoma has historically maintained low immunization rates. The reason for these low rates has not been determined. According to the NIS from 2002-2005, the state of Oklahoma ranked among the lowest states to have two-year old children vaccinated in the 4:3:1:3:3 series. The CDC's survey data showed that Oklahoma ranked 48th out of the fifty states for three years in a row from 2002-2005 and ranked 44th in 2005. These low state immunization coverage rates led the Oklahoma State Department of Health Immunization Service to become very concerned about the susceptibility of Oklahoma children to vaccine-preventable diseases. To date, there is no published data to explain why Oklahoma children are not receiving the recommended vaccines in a timely manner prior to two years of age. Hence, the Oklahoma two-year old survey provides immunization coverage rates by county to provide a local perspective. There is a possibility of disparities with certain communities in the state of Oklahoma. This viewpoint slightly differs from the NIS study population which captures a snapshot of the entire state.

Purpose Statement

This study will examine the vaccine coverage rates for the 2008 cohort of two year old children in Oklahoma, using data from the Oklahoma Immunization Information System (OIIS) for the 2008 cohort of two year old children . The purpose of the study is to:

- Determine the extent of vaccine coverage for the 2008 cohort of two year olds
- Identify disparities in coverage based on geography, ethnicity, gender or other demographic factors.

This information can be used to help drive policy for County Health Departments/ providers and create effective interventions which will contribute to an increase in the immunization rates by two years old children in the state of Oklahoma. Moreover, information from this study can be used to formulate recommendations and help to guide the statewide policies decisions to ensure adequate coverage with two year olds. Ultimately, this information can be used to advance the two year survey goal to obtain 90% coverage among children two years of age statewide. Oklahoma has 77 counties and about 45,000 two-year old birth cohorts are identified in the Oklahoma State Immunization Information System (OSIIS). OSIIS is a statewide immunization registry operated by the Oklahoma State Department of Health, designed to collect and maintain accurate, complete, and current immunization records for Oklahomans. Also, this study will measure a snapshot of a point in time toward the goal of ensuring that 90% of Oklahoma children are up-to-date with the primary series (4:3:1:3:3:1) of immunizations by 24 months of age (two years of age) and develop strategies for improvement of the immunization rate.

Research Questions

This study will assess the 2008 Oklahoma immunization coverage among children two years of age using secondary data analysis.

Question 1.

Which counties are up-to-date for the immunization primary series among the 2008 Oklahoma two year old survey?

Question 2.

Does immunization primary series coverage among the two year olds in the 2008

Oklahoma Survey differ by gender?

Question 3.

Does immunization primary series coverage among the two year olds in the 2008 Oklahoma Survey differ by race?

Significance Statement

Information in this study can be used to increase awareness to ensure Oklahoma policies and procedures for two year olds to be vaccinated in a timely manner. By knowing the two-year old coverage rates at the state and county level, interventions can be designed to effectively serve the areas identified with rates below the recommended 90% immunization coverage. Hence by conducting a data analysis of a snapshot in time, it may provide possibly statewide the following:

1. Show health disparities among immunization rates of two year old children based on geographic locations and minority status.
2. Guide culturally and linguistically appropriate tailored interventions for the target population/counties/communities with the lowest immunization rates.

Definition of Terms

The definitions provided are to ensure uniformity and understanding of the terms throughout the study. The research developed all definitions not accompanied by a citation.

CDC Schedule: The annually published CDC *Childhood and Adolescent Immunization Schedule.*

Common Review Date: The point in time that a child will be within a specific age range.

Complete and Up To Date: The point in time in which the patient has received all of the selected vaccinations by either the compliance date or the compliance age ("Recommended childhood and adolescent immunization schedule--United States, January-June 2004," 2004).

Simplified Immunization Schedule: The term used to represent the Oklahoma by One (OBO) Schedule.

Two –year old: Children 24 months of age.

Uninsured: People who have no health insurance.

Underinsured: People whose out-of-pocket health expenses would have exceeded 10 percent of family income ("Healthcare cost and financing: working poor unlikely to receive employment-related insurance.,") or people with an inability to pay out-of-pocket health expenses despite having insurance.

VFC Provider(s): Provider(s) refers to a single or group practice that administers vaccines to VFC eligible children through the Oklahoma Immunization Program.

Summary

Immunizations have been noted as the greatest accomplishment of the 20th century for impacting public health. This study measured immunization coverage rates among two-year old children in Oklahoma. The purpose is to access Oklahoma immunization coverage among children two years of age using secondary data. Therefore, analyzing the immunization coverage at the county levels could have long term benefits in increasing immunization coverage levels. Chapters 2, 3, 4, and 5 will provide the study methodological framework, analysis of data, and summary of findings, respectively. Chapter 2 will provide a review of the literature regarding importance in measuring immunization coverage rates for increasing immunization coverage, and rationale for the study's framework. Chapter 3 focuses on a review of the methodology for the study, and includes: (a) the overview of the design study, (b) background of the population and sample selection, (c) instruments used in the data collection, (d) data preparation for analysis, and (e) the statistical tests to be used in data analysis. In Chapter 4 the researcher discusses the results of the statistical tests performed. Chapter 5 will conclude with a summary of the study's summary and findings, social implications, recommendations for future direction and studies.

CHAPTER 2

LITERATURE REVIEW

Introduction

Over the past 10 years, immunization coverage rates have become one of the greatest indicators of public health. This chapter summarizes the literature and current information related to the history of vaccine practices and legislative mandate that formed the basis for monitoring immunization coverage rates. Moreover, a review of the history of vaccine schedules and their increasing complexity will be provided. Finally, the researcher will present an overview of the two-year old coverage rates history of Oklahoma.

To obtain peer-reviewed studies the following key words were used to search: immunizations, immunization coverage rates, Community Guide, Advisory Committee on Immunization Practice (ACIP), immunization policy, and interventions. A total of 100 articles were obtained via Pub Med via Centers for Disease Control and Prevention and Emory University Medline, MeSH with Full Text.

Childhood Immunization Initiative

In 1993, President Clinton proposed and Congress enacted the Comprehensive Childhood Immunization Initiative (CII) Act. The objective was to protect all children from nine vaccine preventable diseases by their second birthday. The CII focused on (a) improving the delivery of vaccines to children; (b) reducing the cost of vaccines for

parents; c) enhancing awareness, partnerships, and community participation; (d) improving vaccinations and their use; and (e) monitoring vaccination coverage and occurrences of disease (CDC, 1994).

Under the Omnibus Budget Reconciliation Act (OBRA), the Vaccine For Children (VFC) program was created in 1993 as Section 1928 of the Social Security Act. The program was formed as an entitlement program and funding was approved by the Office of Management and Budget (OMB) and distributed through the Centers for Medicare and Medicaid Services (CMS) (formally known as the Health Care Financing Authority) to the CDC. On October 1, 1994, this program became operational with an unprecedented approach to improve vaccine availability throughout the 50 states and US territories.

All vaccines recommended by the ACIP are made available through the VFC program. Via private and public providers, the VFC program supplies vaccines to children through 18 years of age who meet at least one of the following eligibility requirements: (a) Medicaid eligible as defined by a state Medicaid program, (b) Alaskan Native or Native American, (c) uninsured, and (d) underinsured.

The National Immunization Survey (NIS) was implemented by the National Center for Immunization and Respiratory Diseases) (formally known as the National Immunization Program), the National Center for Health Statistics, and the CDC (United States Department of Health (DHHS, 2005). The survey was developed to monitor progress toward the *Healthy People 2000* goals of 90% coverage rate for children 19-35 months (2 year olds). The NIS provides state level coverage rates for series and antigen completion rates for 50 states and 28 selected urban areas.

Specifically, the data provides information on the immunization coverage rates for seven vaccines: four doses of diphtheria and tetanus toxoids and pertussis vaccine (DTP or DTaP), where aP refers to acellular pertussis vaccine; three doses of poliovirus vaccine (OPV/IPV); one dose of measles-containing vaccine (MCV); three doses of *Haemophilus influenzae* type b vaccine (Hib); three doses of hepatitis B vaccine (Hep B); one dose of varicella vaccine (VRC). This primary series is commonly referred to as the 4:3:1:3:3:1 series represent the current *Gold Standard* for state ranking by the CDC.

The NIS is an ongoing random-digit dialing survey lead by the CDC which is used to provide annual estimates of immunization coverage among 19-35 month old children. Moreover in households with an age-eligible child, the respondent is asked for permission to contact the child's immunization provider(s). Later, the surveyed child's immunization providers are asked to submit the child's vaccination record. Provider information is used to determine the number of doses of each vaccine that a child received. The sample is weighted to represent the population of children 19-35 months old during a particular calendar year. Sampling weights account for multiple voice telephone lines in the household, telephone non-response, provider non-response, vital statistics national data, and non-telephone households. (Barker, et al., 2005)

Measuring vaccination coverage permits evaluation of vaccination services, appropriate targeting of additional services and, when linked to surveillance data, assessment of the success of vaccination strategies in preventing disease (Luman, Worku, Berhane, Martin, & Cairns, 2007). Immunization is one of the most successful and cost-effective health interventions ever. It has eradicated small-pox, lowered the global

incidence of polio so far by 99% and achieved dramatic reductions in illness, disability and death from diphtheria, tetanus, whooping cough and measles. Immunization has a promising future. We are entering a new era in which it is expected that the number of available vaccines will double. Immunization services are increasingly used to deliver other important health interventions, making them a strong pillar of health systems. Vaccination coverage levels of 90 percent are, in sufficient to prevent circulation of viruses and bacteria-causing vaccine preventable diseases (Reed, 1999). Therefore, the maintenance of high vaccination coverage levels in early childhood is the best way to prevent the spread of vaccine preventable diseases (VPDs) in childhood and to provide the foundation for controlling VPDs among adults. According to *Healthy People*, the United States (U.S.) must ensure that each new cohort of children is fully vaccinated with all recommended vaccine doses (CDC, 2000). The pockets of undervaccinated individuals make the population vulnerable to major outbreaks of VPDs. Therefore, monitoring the coverage at smaller geographic levels within the U.S. helps to ensure that these potential pockets of children are identified to target interventions and reduce the risk of future disease outbreaks. In addition, each State and major urban area should aim to obtain 90 percentage coverage to ensure uniformly high vaccination coverage.

The National Immunization Survey (NIS) and the National Health Interview Survey (NHIS) produce national coverage estimates for children aged 19 months to 35 months. The NIS is a cost-effective, random-digit-dialing telephone survey that produces national and state-level vaccination coverage estimates. As the NIS is a telephone survey, potential coverage bias exists as the survey excludes children living in nontelephone households

(Bartlett, Ezzati-Rice, Stokley, & Zhao, 2001).

The Oklahoma State Department of Health (OSDH) Immunization Service (IS) began conducting an annual birth certificate based Two-Year-Old survey in 1993. The purpose of the survey is to measure progress toward the goal of ensuring that 90% of Oklahoma children are up-to-date with the primary series of immunizations by their second birthday and to develop strategies for improvement of the immunization rate. Each year a sample of children born in Oklahoma during a calendar year was selected from birth certificates records. For example, the children surveyed in 2008 were born from January 1, through December 31, 2005. Initially, IS staff conducted the surveys by locating a verified copy of each child's immunization record. Sources of information used to locate the child and verify the immunization record include: parents, private physicians, county health departments, Indian Health Service (IHS) and tribal clinics, the hospital where the child was born, postal service, county election boards, welfare recipient rolls, state income tax rolls, housing project records, telephone directories, military base locators and clinics, day care facilities, and other public clinics. However, now the data is obtained from the Immunization Registry by birth cohort. Below is a chart listing the results of the completed surveys by year.

Table 1. Summary of Two Year-Old Survey Results for Oklahoma

Year of survey	Percent UTD with 4:3:1	Birth Cohort	% Immunized at Health Departments	% Immunized at Private Clinic	% Immunized by Other Clinics
1993	65%	1990	46%	35%	19%
1994	69%	1991	50%	25%	25%
1995	72%	1992	56%	24%	20%
1996	74%	1993	48%	33%	19%
1997	74%	1994	46%	34%	20%
1998	73%	1995	46%	34%	20%
1999	78%	1996	33%	42%	25%
2000	72%	1997			

-Percent UTD with 4:3:1 - the percent of children up-to-date with 4 DTP/DTaP, 3 Polio, and 1 MMR by 24 months of age
-% Immunized by Other clinics includes children immunized by Indian Health Service and tribal clinics, military, other public clinics, and a combination of public and private providers.

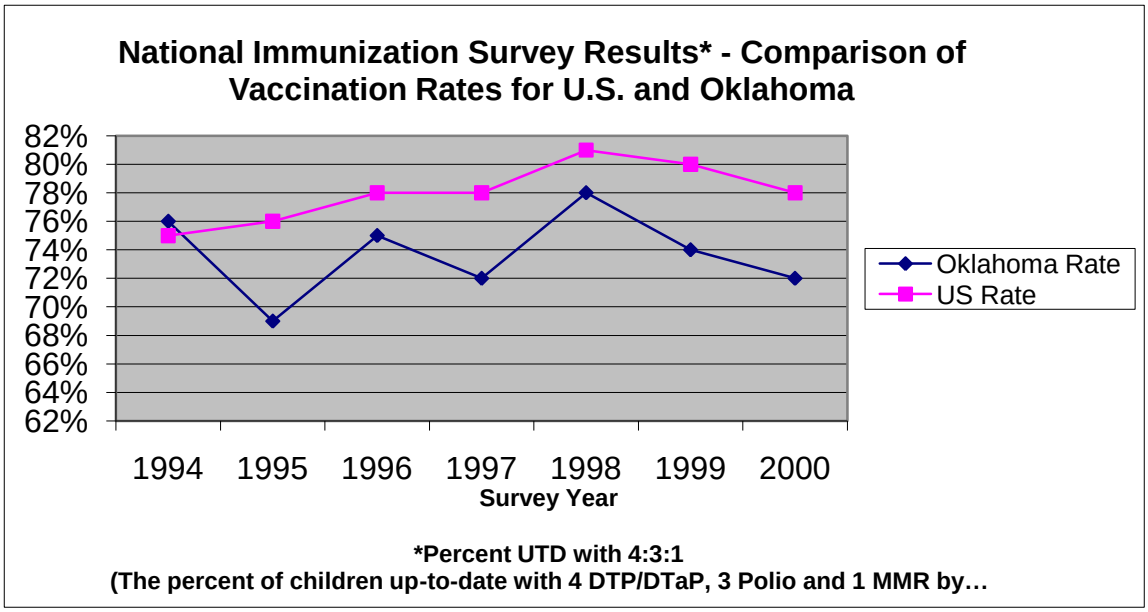


Figure 1. Graph of the comparison the National Immunization Survey to Oklahoma Survey from 1994 to 2000.

In 1998, the Immunization Division began a partnership with the state Medicaid agency, the Oklahoma Health Care Authority (OHCA), to include analysis of the status of Medicaid eligible children as a part of the survey. When the survey was completed the Medicaid eligible children were identified and a separate analysis was completed for those records. This partnership is enabled by a data sharing agreement signed by both agencies.

Theoretical Framework

The theoretical framework for this descriptive study is Diffusion of Innovations Theory which addresses how new ideas, products, and social practices spread within an organization, community, or society, or from one society to another. (Glanz, 1995) According to the late E.M. Rogers, diffusion of innovations is "the process by which an *innovation* is communicated through certain *channels* over *time* among the members of a *social system*." (Rogers, 1995) The Diffusion of Innovations Theory was used to study the adoption of a wide range of health behaviors and programs. (Table 2)

Diffusion of innovations that prevent disease and promote health requires a multilevel change process that usually takes place in diverse settings, through different strategies. At the individual level, adopting a health behavior innovation usually involves lifestyle change. Moreover, at the organizational level, it may entail starting programs, changing regulations, or altering personnel roles. However, at a community level, diffusion can include using the media, advancing policies, or starting initiatives.

Table 2. Concepts in Diffusion of Innovations

Concept	Definition
Innovation	An idea, object, or practice that is thought to be new by an individual, organization, or community
Communication channels	The means of transmitting the new idea from one person to another
Social System	A group of individuals who together adopt the innovation
Time	How long it takes to adopt the innovation

(Glanz, 1995) http://www.cancer.gov/PDF/481f5d53-63df-41bc-bfaf-5aa48ee1da4d/TAAG3.pdf

According to Rogers, a number of factors determine how quickly, and to what extent, an innovation will be adopted and diffused. He described the process of adoption as a classic "bell curve," with five categories of adopters: *innovators*, *early adopters*, *early majority adopters*, *late majority adopters*, and *laggards*. When an innovation is introduced, the majority of people will either be early majority adopters or late majority adopters; fewer will be early adopters or laggards; and very few will be innovators (the first people to use the innovation). (Glanz, 1995) (Table 2) The Diffusion of Innovations Theory applies to this descriptive study by demonstrating how the five categories of adopters show positive outcomes.

Table 3. Key Attributes Affecting the Speed and Extent of an Innovation's Diffusion

Attribute	Key Question
Relative advantage	Is the innovation better than what it will replace?
Compatibility	Does the innovation fit with the intended audience?
Complexity	Is the innovation easy to use?
Trialability	Can the innovation be tried before making a decision to adopt?
Observability	Are the results of the innovation observable and easily measurable?

(Glanz, 1995) http://www.cancer.gov/PDF/481f5d53-63df-41bc-bfaf-5aa48ee1da4d/TAAG3.pdf

The Immunization Schedule

In 1983, the first printed immunization schedule (Figure 1) was released by the CDC (1983). It was very It could be characterized as plain compared to current immunization schedules because there were only four vaccines (DTP, OPV, Measles, Mumps, Rubella (MMR), and Tetanus toxoid (Td)) which were recommended at the time.

TABLE 1. Recommended schedule for active immunization of normal infants and children (See individual ACIP recommendations for details.)

Recommended age*	Vaccine(s)†	Comments
2 mo.	DTP-1,§ OPV-1¶	Can be given earlier in areas of high endemicity
4 mo.	DTP-2, OPV-2	6-wks-2-mo. interval desired between OPV doses to avoid interference
6 mo.	DTP-3	An additional dose of OPV at this time is optional for use in areas with a high risk of polio exposure
15 mo.**	MMR††	
18 mo.**	DTP-4, OPV-3	Completion of primary series
4-6 yr.§§	DTP-5, OPV-4	Preferably at or before school entry
14-16. yr	Td¶¶	Repeat every 10 years throughout life

*These recommended ages should not be construed as absolute, i.e. 2 mos. can be 6-10 weeks, etc.

†For all products used, consult manufacturer's package enclosure for instructions for storage, handling, and administration. Immunobiologics prepared by different manufacturers may vary, and those of the same manufacturer may change from time to time. The package insert should be followed for a specific product.

§DTP—Diphtheria and tetanus toxoids and pertussis vaccine.

¶OPV—Oral, attenuated poliovirus vaccine contains poliovirus types 1, 2, and 3.

**Simultaneous administration of MMR, DTP, and OPV is appropriate for patients whose compliance with medical care recommendations cannot be assured.

††MMR—Live measles, mumps, and rubella viruses in a combined vaccine (see text for discussion of single vaccines versus combination).

§§Up to the seventh birthday.

¶¶Td—Adult tetanus toxoid and diphtheria toxoid in combination, which contains the same dose of tetanus toxoid as DTP or DT and a reduced dose of diphtheria toxoid.

1983 childhood immunization schedule

Figure 2. Centers for Disease Control (CDC) - Recommended Childhood Immunization Schedule – January 1983. Reprinted with Permission.

Hence, the twenty-first century brought about major changes to vaccine schedules (CDC, 2003b). The CDC published in 2003 Schedule with a new schedule for children and adolescents *CDC Catch-up Schedule for Children and Adolescents* who begin their immunizations more than a month later than the recommended time (CDC, 2003b). The latter served as a supplemental schedule to provide the minimum age and minimum interval recommended between the routine doses. The 2008 recommended immunization schedule for persons aged 0-6 years in the United States and the catch-up immunization schedule for 2008 were approved by the Advisory Committee on Immunization Practices

(ACIP), the American Academy of Pediatrics, and the American Academy of Family Physicians. (CDC, 2008)

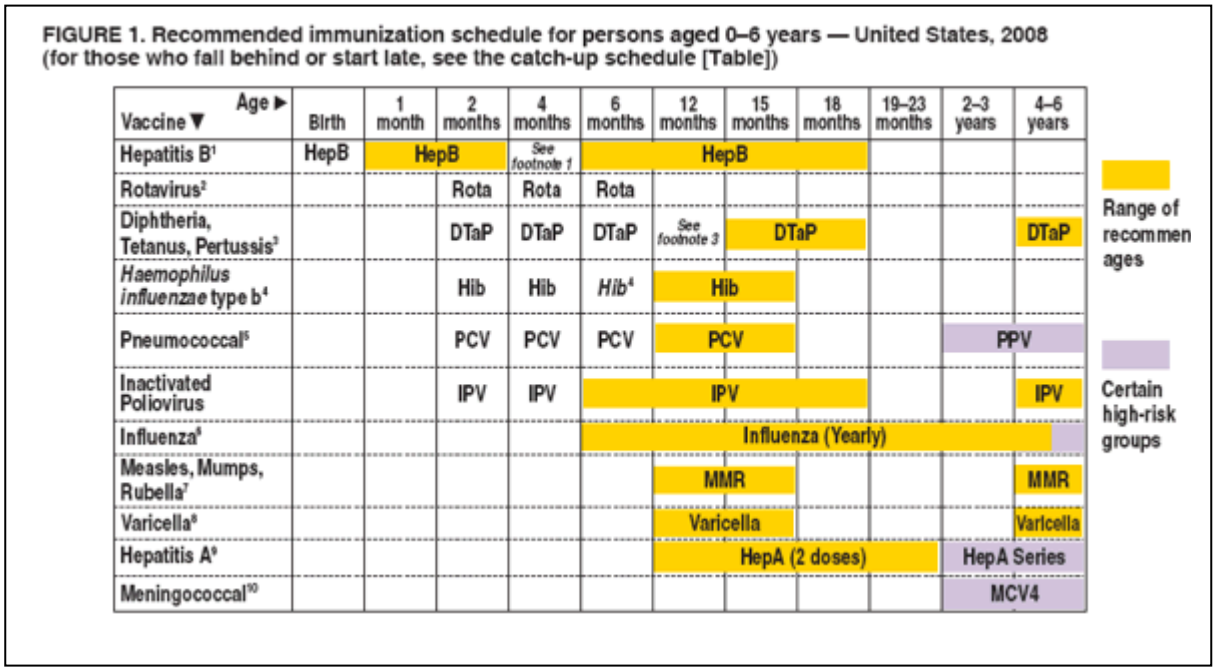


FIGURE 1. Recommended immunization schedule for persons aged 0–6 years — United States, 2008
(for those who fall behind or start late, see the catch-up schedule [Table])

Vaccine ▼ / Age ▶	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B[1]	HepB	HepB		See footnote 1	HepB						
Rotavirus[2]			Rota	Rota	Rota						
Diphtheria, Tetanus, Pertussis[3]			DTaP	DTaP	DTaP	See footnote 3	DTaP				DTaP
Haemophilus influenzae type b[4]			Hib	Hib	*Hib*[4]	Hib					
Pneumococcal[5]			PCV	PCV	PCV	PCV				PPV	
Inactivated Poliovirus			IPV	IPV	IPV						IPV
Influenza[6]					Influenza (Yearly)						
Measles, Mumps, Rubella[7]						MMR					MMR
Varicella[8]						Varicella					Varicella
Hepatitis A[9]						HepA (2 doses)				HepA Series	
Meningococcal[10]										MCV4	

Range of recommen ages

Certain high-risk groups

Figure 3. Centers for Disease Control (CDC)-Recommended Childhood Immunization Schedule-January 2008. Reprinted with Permission.

CATCH-UP SCHEDULE FOR PERSONS AGED 4 MONTHS–6 YEARS					
Vaccine	Minimum age for Dose 1	Minimum interval between doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Hepatitis B[1]	Birth	4 weeks	8 weeks (and 16 weeks after first dose)		
Rotavirus[2]	6 weeks	4 weeks	4 weeks		
Diphtheria, Tetanus, Pertussis[3]	6 weeks	4 weeks	4 weeks	6 months	6 months[3]
Haemophilus influenzae type b[4]	6 weeks	4 weeks if first dose administered at age <12 months; 8 weeks (as final dose) if first dose administered at age 12–14 months; No further doses needed if first dose administered at age ≥15 months	4 weeks[4] if current age <12 months; 8 weeks (as final dose)[4] if current age ≥12 months and second dose administered at age <15 months; No further doses needed if previous dose administered at age ≥15 months	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months	
Pneumococcal[5]	6 weeks	4 weeks if first dose administered at age <12 months; 8 weeks (as final dose) if first dose administered at age ≥12 months or current age 24–59 months; No further doses needed for healthy children if first dose administered at age ≥24 months	4 weeks if current age <12 months; 8 weeks (as final dose) if current age ≥12 months; No further doses needed for healthy children if previous dose administered at age ≥24 months	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months	
Inactivated Poliovirus[6]	6 weeks	4 weeks	4 weeks	4 weeks[6]	
Measles, Mumps, Rubella[7]	12 months	4 weeks			
Varicella[8]	12 months	3 months			
Hepatitis A[9]	12 months	6 months			
CATCH-UP SCHEDULE FOR PERSONS AGED 7–18 YEARS					
Tetanus, Diphtheria/ Tetanus, Diphtheria, Pertussis[10]	7 years[10]	4 weeks	4 weeks if first dose administered at age <12 months; 6 months if first dose administered at age ≥12 months	6 months if first dose administered at age <12 months	
Human Papillomavirus[11]	9 years	4 weeks	12 weeks		
Hepatitis A[9]	12 months	6 months			
Hepatitis B[1]	Birth	4 weeks	8 weeks (and 16 weeks after first dose)		
Inactivated Poliovirus[6]	6 weeks	4 weeks	4 weeks	4 weeks[6]	
Measles, Mumps, Rubella[7]	12 months	4 weeks			
Varicella[8]	12 months	4 weeks if first dose administered at age ≥13 years; 3 months if first dose administered at age <13 years			

Table 4. Catch-up immunization schedule for persons aged 4 months--18 years who start late or who are ≥1 month behind --- United States, 2008. Reprinted with Permission.

Disparities in Childhood Immunization Rates

The gap between immunization rates in minority and white populations has been narrowed, but there are still disparities among many racial, ethnic, and underserved populations. Overall childhood immunization rates are extremely high.(NCHS, 2000.) Efforts must be continued to maintain 90 percent vaccine coverage in all populations. Although great progress has been made in improving childhood immunization rates, some disparities in overall immunization coverage rates among racial and ethnic groups still exist. This disparity is of great concern in large urban areas with underserved populations because of the potential for outbreaks of vaccine-preventable diseases. (NIP, 2003) The reduction of health disparities among all people in the

United States is a national health priority. (DHHS, 2010) Although immunization rates have improved in the past 20 years, disparities continue to exist among ethnic and racial groups, across different socioeconomic classes, and in different geographic locations. (DHHS, 2010)

The majority of *Healthy People 2010* (HP2010) objectives for early childhood vaccination coverage were met by the end of 2010 (*2*), and progress has been made toward eliminating disparities in vaccination coverage among children (CDC, 2009; Zhao Z, 2010) Eliminating racial and ethnic disparities in childhood immunization rates will require enhanced efforts at preventing disease, promoting health and delivering appropriate care. This will necessitate improved collection and use of standardized data to correctly identify all high risk populations and monitor the effectiveness of health interventions targeting these groups. In addition, eliminating health disparities will also require new knowledge about the determinants of disease, causes of health disparities, and effective interventions for prevention and treatment. It will also require improving access to the benefits of society, including quality preventive and treatment services, as well as innovative ways of working in partnership with health care systems, State and local governments, tribal governments, academia, national and community-based organizations, and communities.(Zhao Z, 2010)

Chapter III

Methodology

INTRODUCTION

This descriptive study is secondary data analysis of the 2008 Oklahoma two-year old survey data to provide information for guiding program improvement. The data for this project was obtained from Oklahoma State Immunization Information System (OSIIS) with the vaccination dates and the birth months in an Excel format. The Oklahoma State Department of Health utilizes an electronic system called Public Health Oklahoma Information System (PHOCIS) in their local health departments and Women, Infant, and Children (WIC) clinics. PHOCIS allows local health departments and independent WIC sites to create a comprehensive record of demographic information and patient contact information (i.e. address, phone number, close relative, financial information necessary for WIC eligibility, and insurance information (e.g. Medicaid). Data was stored and locked on the computer which is password protected. The data has birth months and OSIIS number assigned. Data records were cleaned and quality checks performed. For this project, the variables that will be analyzed are race, county vaccination coverage rates and gender.

This chapter reviews the research design that answers the research questions of the study and tests the hypotheses. A review of the population and study sample selection will be discussed in detail. The chapter also will include the process the researcher used for data collection and the data preparation process for analysis. The chapter will also provide the method of data analysis and the statistical tools utilized. Also, the study will

address what other factors may have an influence on immunization coverage rates. This evaluation was designed as a formative evaluation; its purpose is to help shape the Oklahoma Two-Year Old immunization coverage rates. This chapter describes the evaluation process, the research design, the instruments, the plans for data analysis and the limitations of the study.

Research Design

The study design is retrospective observational which looks backwards in time at the 2005 birth cohort of 45,000 births in the state of Oklahoma. Although the study lacked randomization, there were several advantages to the study design. First, the design required few staff resources because the exposure and outcome had occurred. Second, the design allowed an examination of immunization coverage rates at the county level. Third, the design also permitted a snap shot of 2008 two year old immunization coverage rates among counties. One weakness of the study design was the reliance on immunization registry which served as a depository for immunizations given within a year.

Despite the potential weaknesses of this study design, it is the most appropriate design to use in order to address the current questions. The birth cohort of the snap shot of 2008 birth cohort was analyzed.

Population

The 2008 two year old cohort were born from January 1 to December 31, 2005. During this time period, there were approximately 45,000 children, and this cohort was

selected to perform the descriptive secondary data analysis on the Oklahoma two year old children.

Data Preparation for Analysis

The researcher performed quality control on the data to ensure all immunization records were complete with all primary series vaccines. If data was missed for the vaccines, the records were excluded as incomplete.

Data Analysis

Descriptive Statistics

The researcher used data received from OSIIS for the 2008 two-year old children to run a secondary data analysis of the immunization coverage rates. Statistical Analysis Systems (SAS) was used for the analysis. The following variables were analyzed from the data to provide a snap shot of coverage by race, county vaccination coverage rates and gender.

Ethical Issues

The study did not required direct contact with children, their families, or providers. All immunization history was extracted from the immunization registry for the secondary data analysis.

Institutional Permission

The researcher did seek permission from the OSDH-IS Service Chief to perform a secondary data analysis. After receiving a letter of permission from OSDH (APPENDIX D) and upon acceptance of the proposal by the research's thesis committee, the research submitted all required information to the Emory University IRB. The study protocol was approved by Emory IRB August 18, 2010. After IRB approval, the data analysis process planning was started.

Chapter IV

Results

A. Introduction

The purpose of the retrospective descriptive secondary data analysis was to determine the immunization coverage levels in Oklahoma two year olds born 2005 and therefore, make up the 2008 cohort. Also, the study addressed other factors that may have influenced the immunization coverage among the two year olds. Chapter 4 offers the findings of the study in a standard report-style narrative with tables and detailed presentation of data.

B. Findings

There are a total of 77 counties in Oklahoma and 43,942 children were included in this descriptive study of the 2008 two year old survey. The birth cohort survey is identified as an acceptable method for identifying immunization coverage levels at state or state sub-population levels. The data for this descriptive study were obtained for a snap shot in time from the Oklahoma Immunization Information System (OSIIS) registry. For this study, the children were born between January 1 2005 to December 31, 2005. Based on the three questions for this study the findings are provided below.

The finding for the two year old children survey for 2008 primary series consist of 4:3:1:3:3- four doses of diphtheria and tetanus toxioids an acellualare pertussis vaccine (DTaP); three doses of inactivated poliovirus vaccine (IPV); one

dose of measles-containing vaccine (MMR); three doses of Haemophilus influenza type b vaccine (Hib); three doses of hepatitis B vaccine (Hep B).

Question 1.

Which counties are up-to-date for the immunization primary series among the 2008 Oklahoma two year old survey?

Only 4 counties, Harmon (96.2%), Jefferson (90.1%), Woods (90.1%) and Major (90.0%) were up-to-date at the recommended national average 90% for the primary series. (Figure 4). The remainder of the counties in the state were below the national average. The state of Oklahoma had 78.4% coverage which is 11.6% below the national average. Twenty five of the 77 counties were between 87.5% to 80.4%. Moreover, 46 of 77 counties were between 79.8% and 70% (Figure 4). The two counties with the lowest immunization coverage were Noble (69.2%) and Wagnoner (68.6%). This descriptive study established that for the state of Oklahoma the 2008 survey up-to-date coverage for the primary series (4:3:1:3:3) of two year old children is low. However, based on the data if just one more immunization shot is given the coverage for up-to-date of the primary series will increase greatly statewide (Figure 5). If the two year old children receive one additional shot in the primary series, the coverage levels with improve greatly statewide and nearly the entire state of Oklahoma will increase the percentage of children protected from preventable diseases to 90%.

Figure 4. Oklahoma 4:3:1:3:3 Coverage at 2 Years of Age for 2008 Survey

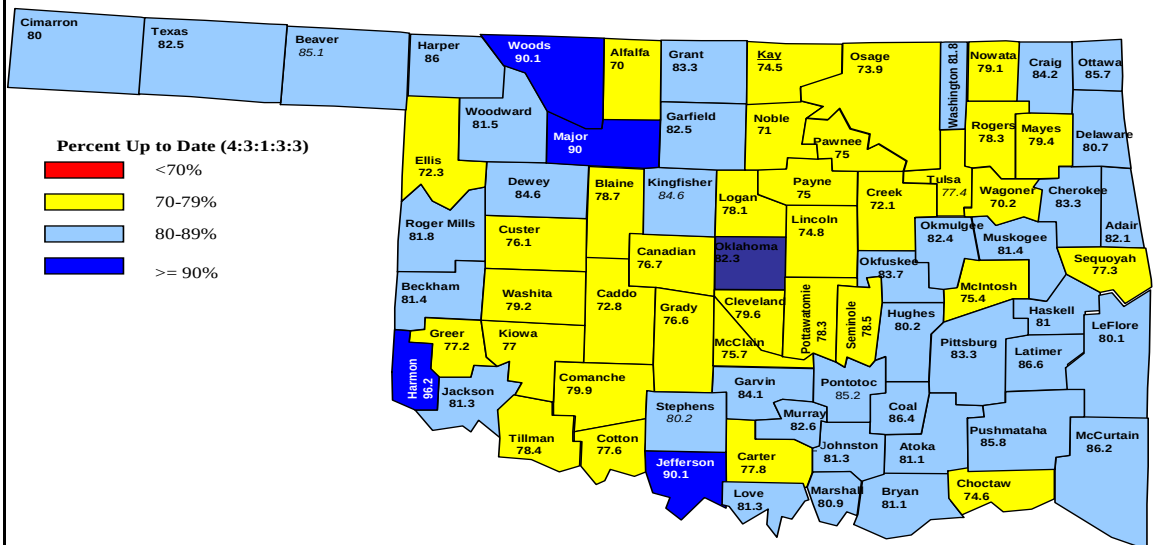
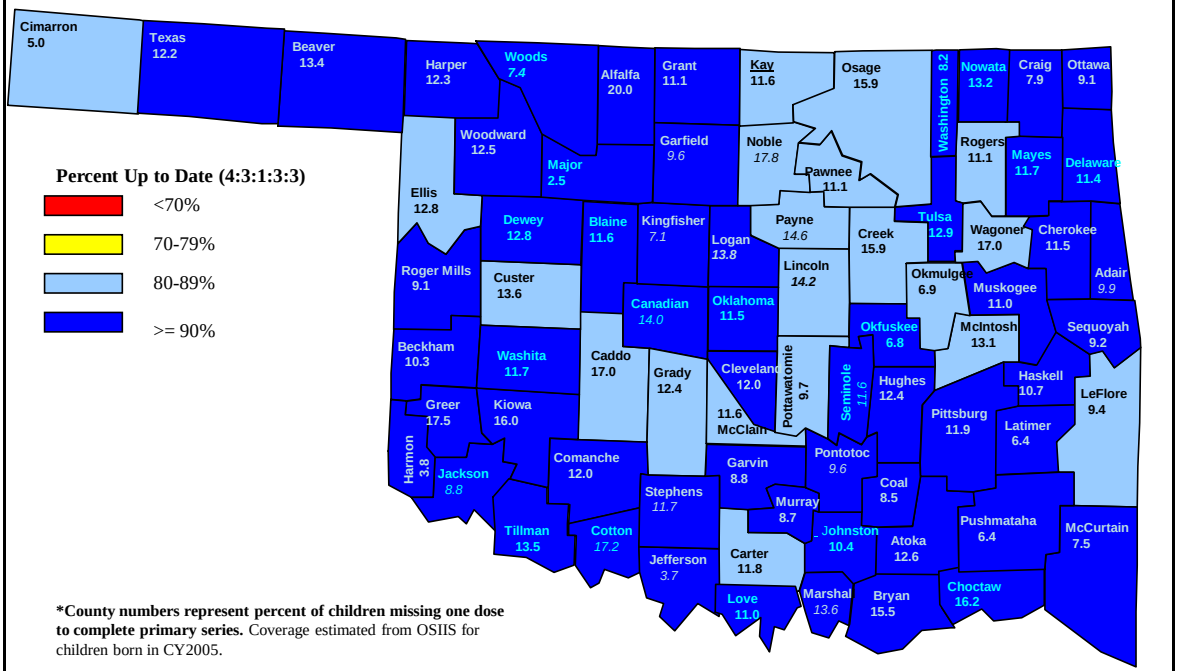


Figure 5. Potential Impact of Just One More Dose by Two Years of Age on improving County 4:3:1:3:3 Coverage: 2008 Survey

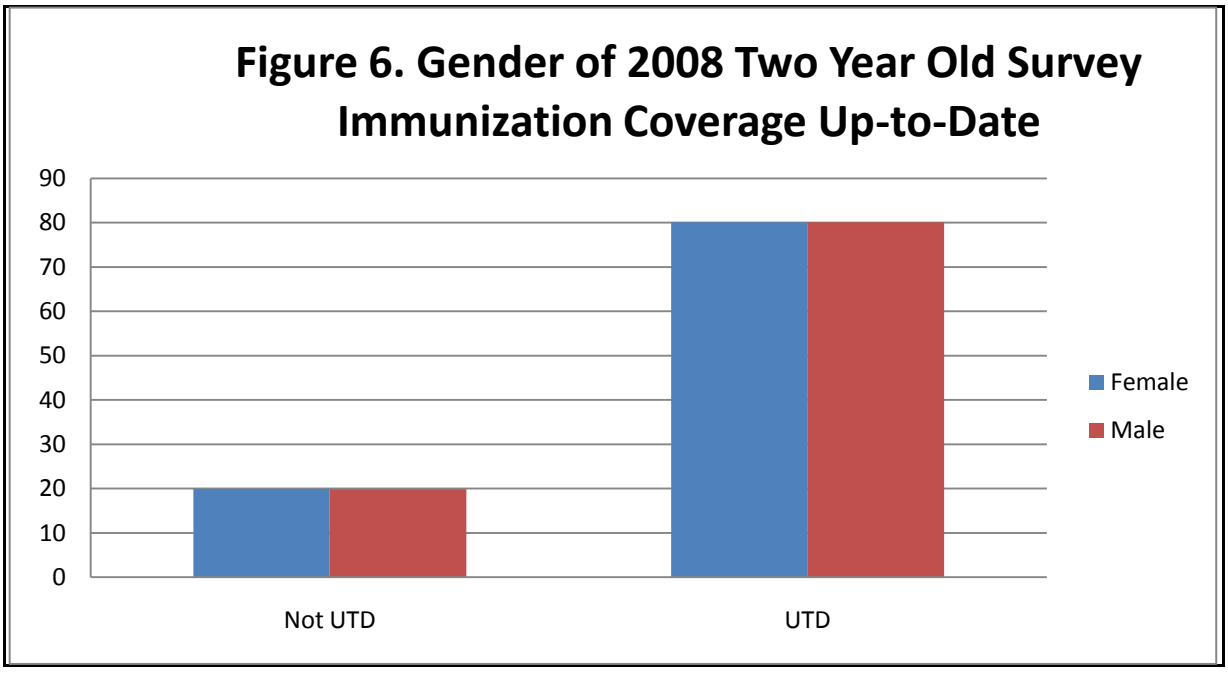


***County numbers represent percent of children missing one dose to complete primary series.** Coverage estimated from OSIIS for children born in CY2005.

Question 2.

Does immunization primary series coverage among the two year olds in the 2008 Oklahoma Survey differ by gender?

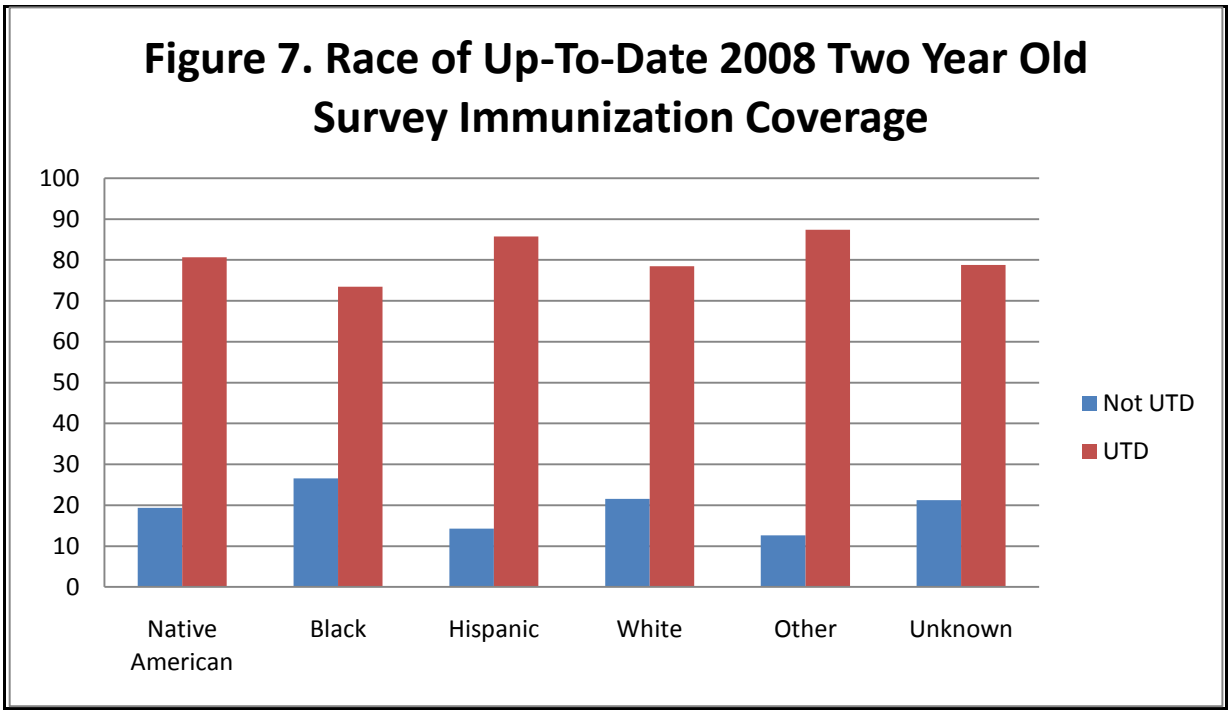
As shown in figure 6, the immunization primary series (4:3:1:3:3) up-to-date (UTD) coverage does not differ among the two year olds in the 2008 Oklahoma Survey. The female and male UTD coverage are both at 80% and the not UTD is 20%, respectively. Therefore, the data demonstrates that gender does not have an impact for the immunization coverage for the up-to-date of the primary series. There is no significant difference between the gender (OR= 1.00, 95% confidence interval [CI] 0.9, 1.05).



Question 3. Does immunization primary series coverage among up-to-date two year olds in the 2008 Oklahoma Survey differ by race?

Of the children that were UTD for the primary series 73.4% were Black, 85.7% Hispanic, 80.6% Native American, 78.4% white, and 87.37 other (did not identify themselves with the other races). These percentages represent the proportion of the sub-population covered. Hispanic has the highest up-to-date (UTD) primary series coverage and is followed by the category 'Other' race. Next, Native American has a UTD immunization coverage for the primary series of 78.4% and is followed by White at 79%. The lowest UTD coverage among the races is black. (Figure 7). There is difference among the primary series coverage among the UTD by race. White are significantly more likely to be UTD than blacks (OR= 1.32, 95% CI, 1.23, 1.41). Moreover, there is a significant difference between White and Native American. Native Americans are more UTD (OR 1.15, 95% CI, 1.07, 1.23). Comparing White to Hispanic, there is a significant difference that Hispanics are more like to be UTD than White (OR 1.65, 95% CI, 1.54, 1.77). For Black and Native American there is a significant difference (OR 1.51, 95% CI, 1.38, 1.65) that Native American are more UTD. In addition, there is a significant difference among Black to Hispanic (OR 2.18, 95% CI, 1.99, 2.38) Hispanic are more UTD than Black. In comparison of Native American to Hispanic, Hispanic is significantly more likely to be UTD (OR 1.44, 95% CI 1.32, 1.58). It is possible that geography could play a role in the ethnic group

disparities. There could be some salient characteristics of those counties that could have influenced the rate such as cultural factors and access issues.



C. Summary

The purpose of this secondary data analysis was to determine the extent of vaccine coverage for the 2008 cohort of two year olds and identify disparities in coverage based on geography, ethnicity, gender or other demographic factors. This study examined the vaccine coverage rates for the 2008 cohort of two year old children in Oklahoma using data from the Oklahoma Immunization Information System (OSIIS). There are a total of 77 counties in Oklahoma and 43,942 children were included in this descriptive study of the 2008 two year old survey. The birth cohort survey is identified as an acceptable method for

identifying immunization coverage levels at state or state sub-population levels. The specific point in time for 2008 was chosen to assess the two year old immunization coverage rate by counties. The children were born between January 1 2005 and December 31, 2005 in this descriptive study. There were three questions for this descriptive study the findings provided are summarized and presented. They showed that among the two year old children survey for 2008 primary series (4:3:1:3:3- four doses of diphtheria and tetanus toxioids an acellualare pertussis vaccine (DTaP); three doses of inactivated poliovirus vaccine (IPV); one dose of measles-containing vaccine (MCV); three doses of Haemophilus influenza type b vaccine (Hib); three doses of hepatitis B vaccine (Hep B), only 4 counties, Harmon (96.2%), Jefferson (90.1%), Woods (90.1%) and Major (90.0%) were up-to-date at the recommended national average 90%. The state of Oklahoma had a 78.4% coverage percent which is 11.6% below the national average. There is no difference between the female and male up-to-date (UTD) coverage which are both at 80% and the not UTD is 20% respectively. Therefore, the data demonstrates that gender does not have an impact for the immunization coverage for UTD. Of the children that were UTD for the primary series 73.4% were Black, 85.7% Hispanic, 80.6% Native American, 78.4% white, and 87.37 other (did not identify themselves with the other races). These results show that at the county levels specific interventions should be targeted toward the lowest group with is black; however, all races are below the national average and this information could be used to formulate recommendation to help guide statewide policies decisions.

Chapter V

Conclusions

A. Introduction

In this chapter, conclusions, implications, and recommendations based on the descriptive analysis of examine the vaccine coverage rates for the 2008 cohort of two year old children in Oklahoma. All proposed questions were successfully answered. The methodology used in the study to support the secondary data analysis to respond to the questions was right on point. Historically, Oklahoma has maintained low immunization rates. However, the reason for these low rates has not been determined. According to the NIS from 2002-2005, the state of Oklahoma ranked among the lowest states to have two-year old children vaccinated in the 4:3:1:3:3 series. The CDC's survey data showed that Oklahoma ranked 48th out of the fifty states for three years in a row from 2002-2005 and ranked 44th in 2005. These low state immunization coverage rates led the Oklahoma State Department of Health Immunization Service to become very concerned about the susceptibility of Oklahoma children to vaccine-preventable diseases. To date, there is no published data to explain why Oklahoma children are not receiving the recommended vaccines in a timely manner prior to two years of age. Hence, the Oklahoma two-year old survey provides immunization coverage rates by county to provide a local perspective. Based on the descriptive data, there is a possibility of disparities with certain communities in the state of Oklahoma. Moreover, the entire state is at 78.4% and is below the national average of

90% for UTP immunization coverage among the two year olds. This study differs from the NIS study population which captures a snapshot of the entire state.

B. Summary of Findings

Based on the information obtained from this study, it can be used to increase awareness to ensure Oklahoma policies and procedures for two year olds to be vaccinated in a timely manner. By knowing the two-year old coverage rates at the state and county level, interventions can be designed to effectively serve the areas identified with rates below the recommended 90% immunization coverage. In this case, it is the entire state; however, there are pockets that have very low UTD immunization coverage that the state rate. By conducting this secondary data analysis of a snapshot in time, the results of this study indicated the following:

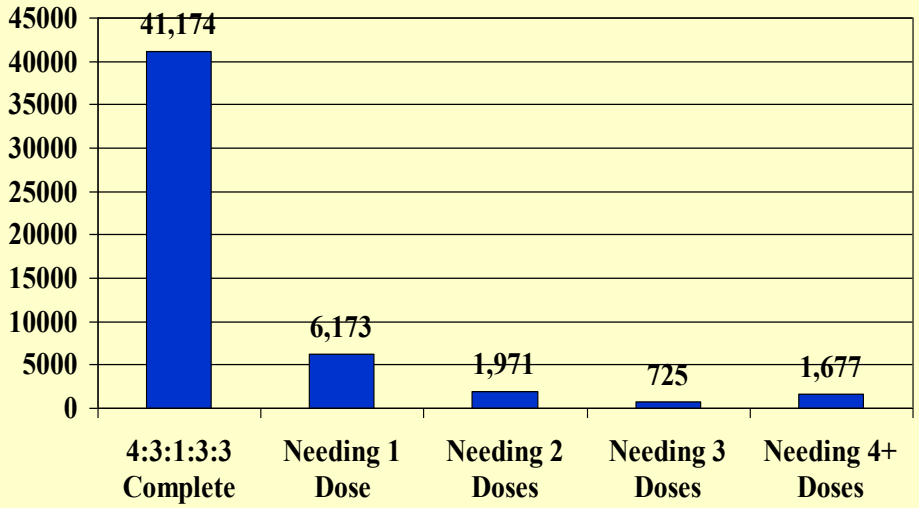
- There are health disparities among immunization rates of two year old children based on geographic locations and minority status.
- Culturally and linguistically appropriate tailored interventions for the target population/counties/communities with the lowest immunization rates could help to increase coverage rates.

C. Recommendations

Another aspect that was identified with the descriptive analysis of the 2008 Survey is the number of doses that will be needed to complete the primary series by 2 years of age. To complete the primary series (4:3:1:3:3), 6,173 children need 1 shot; 1,971 need 2 doses ; 725 need 3 doses; and 1,677 need 4 doses (Figure 6).

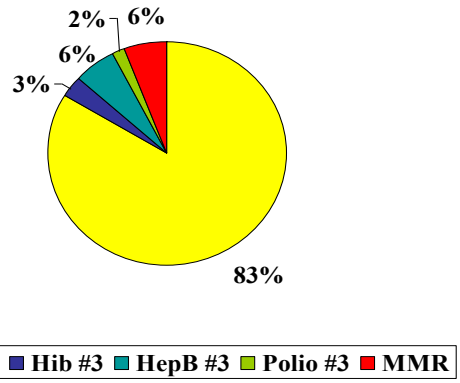
Figure 7 shows the specific antigens needed in the primary series. The antigen needed to complete series are the diphtheria and tetanus toxioids an acellualare pertussis vaccine (DTaP) at 83%, measles-containing vaccine (MMR), hepatitis B vaccine (Hep B) are needing 6% each, Haemophilus influenza type b vaccine (Hib) at 3% and inactivated poliovirus vaccine (IPV) at 2%. There is no indication of why certain shots in the primary series are not received. However, perhaps some of the negative publicity regarding possible side effects. Moreover, it would be more informative to do more qualitative research such as focus groups to determine why parents are not compliant.

Figure 8. Doses Needed to Complete the Primary Series Schedule by 2 Years of Age (2008 Survey)



Note: Only doses included in the 4:3:1:3:3 series were examined.

Figure 9. Dose most frequently reported missing by 24 months of age for 4:3:1:3:3 series completion



D. Summary

Identified were the number of doses of specific antigens that are need to bring the rates UTD statewide. Two year olds that need only 1 dose are 6,173; needing 2 doses 1,971; needing 3 doses 725; and needing 4 doses is 1,677. Therefore, figure 7 shows the specific antigens needed in the primary series. The antigen needed the most is the diphtheria and tetanus toxioids an acellualare pertussis vaccine (DTaP) at 83%. There is a tie at 6% that need the antigens measles-containing vaccine (MMR) and hepatitis B vaccine (Hep B). Next antigen needed is Haemophilus influenza type b vaccine (Hib) at 3% and inactivated poliovirus vaccine (IPV) at 2%.

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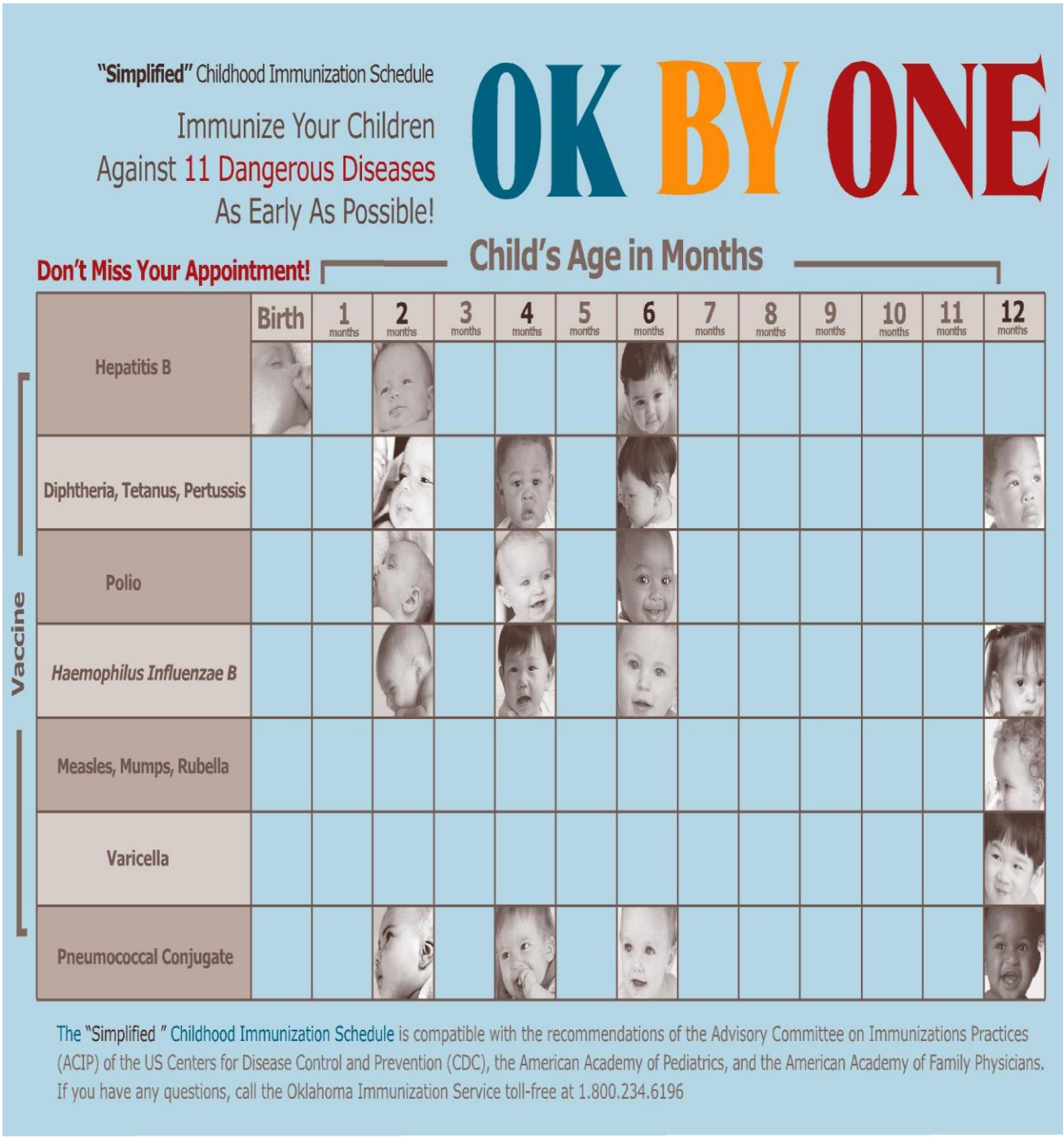
Appendix A

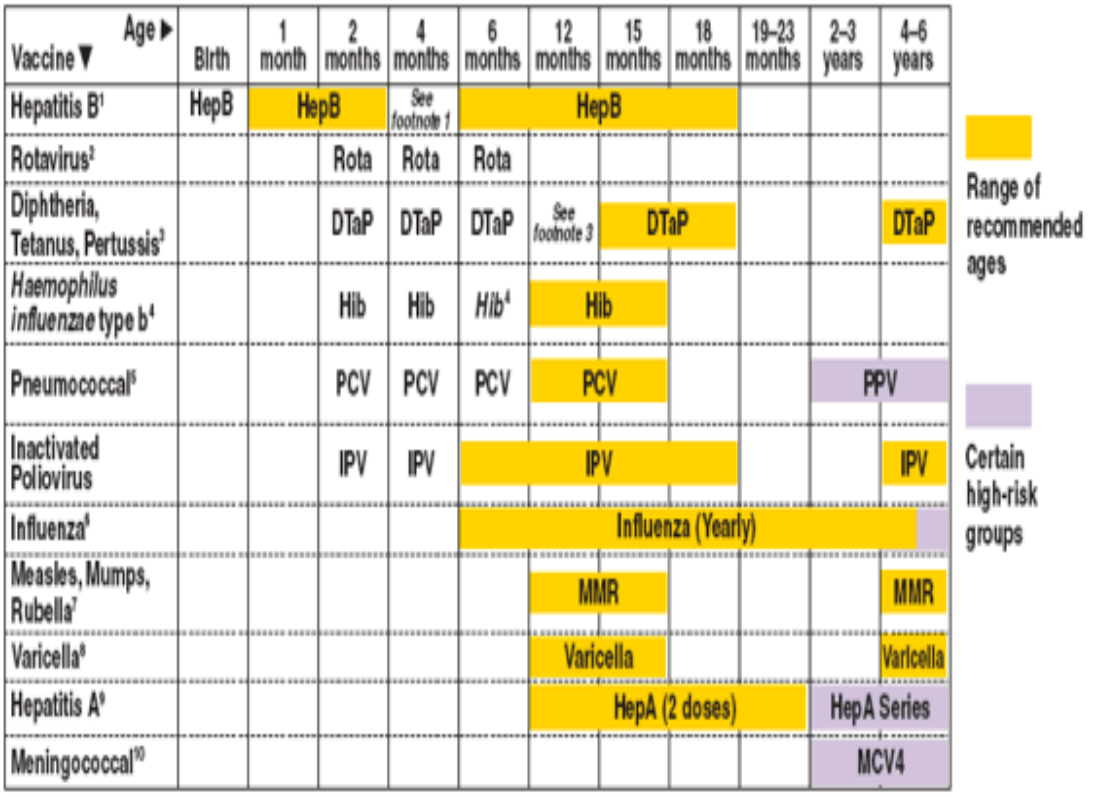

"Simplified" Childhood Immunization Schedule
Immunize Your Children
Against 11 Dangerous Diseases
As Early As Possible!
OK BY ONE
Don't Miss Your Appointment!
Child's Age in Months
Vaccine
Birth
1 months
2 months
3 months
4 months
5 months
6 months
7 months
8 months
9 months
10 months
11 months
12 months
Hepatitis B
Diphtheria, Tetanus, Pertussis
Polio
Haemophilus Influenzae B
Measles, Mumps, Rubella
Varicella
Pneumococcal Conjugate
The "Simplified" Childhood Immunization Schedule is compatible with the recommendations of the Advisory Committee on Immunizations Practices (ACIP) of the US Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics, and the American Academy of Family Physicians.
If you have any questions, call the Oklahoma Immunization Service toll-free at 1.800.234.6196

APPENDIX B

CDC CHILDHOOD RECOMMENDED IMMUNIZATION SCHEDULE-UNITED

STATED JANUARY 2008

FIGURE 1. Recommended immunization schedule for persons aged 0–6 years — United States, 2008 (for those who fall behind or start late, see the catch-up schedule [Table])



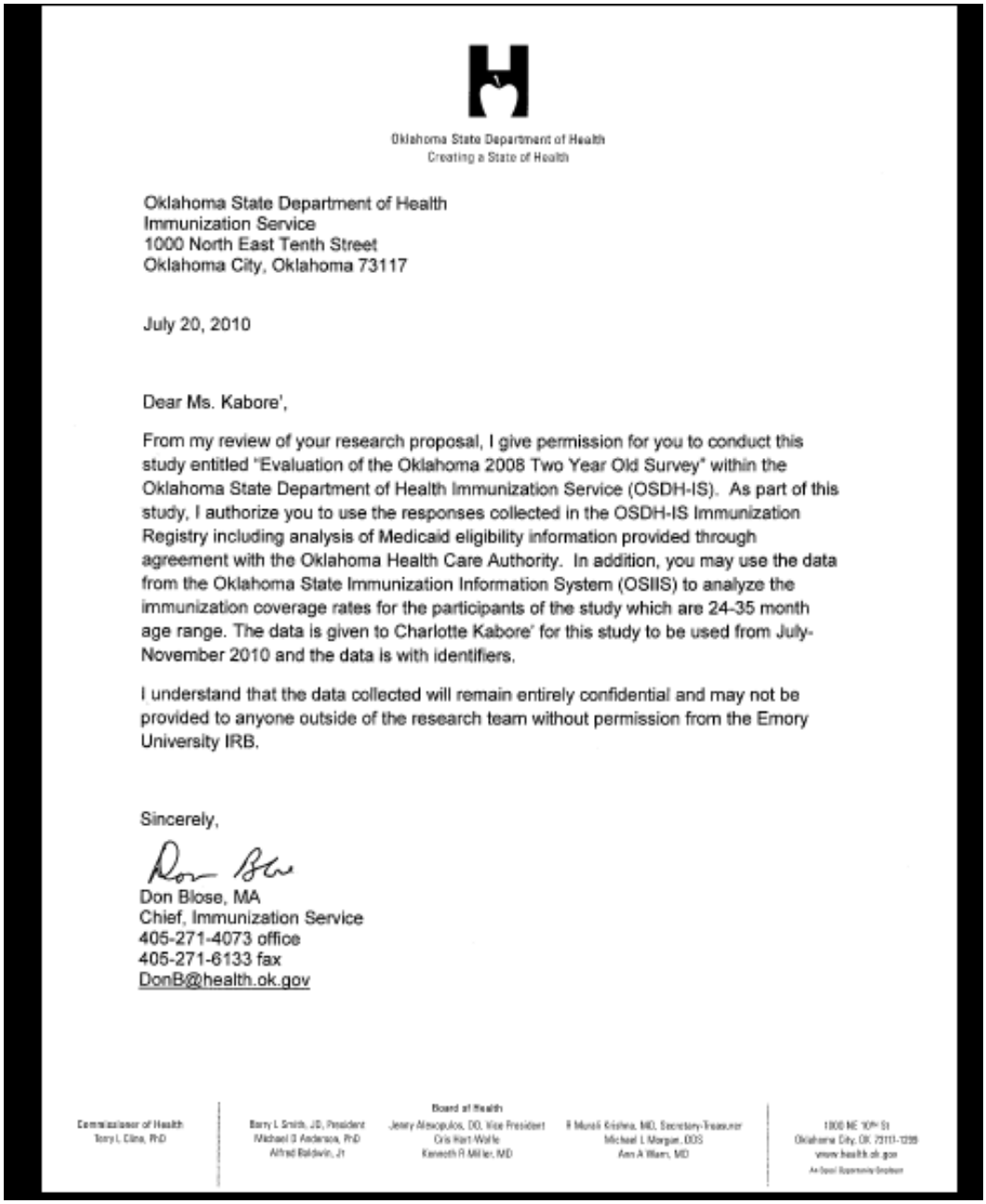
APPENDIX C

Catch-Up Schedule for Persons Aged 4 months-6 Years

CATCH-UP SCHEDULE FOR PERSONS AGED 4 MONTHS–6 YEARS					
Vaccine	Minimum age for Dose 1	Minimum interval between doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Hepatitis B[1]	Birth	4 weeks	8 weeks (and 16 weeks after first dose)		
Rotavirus[2]	6 weeks	4 weeks	4 weeks		
Diphtheria, Tetanus, Pertussis[3]	6 weeks	4 weeks	4 weeks	6 months	6 months[3]
Haemophilus influenzae type b[4]	6 weeks	4 weeks if first dose administered at age <12 months; 8 weeks (as final dose) if first dose administered at age 12–14 months; No further doses needed if first dose administered at age ≥15 months	4 weeks[4] if current age <12 months; 8 weeks (as final dose)[4] if current age ≥12 months and second dose administered at age <15 months; No further doses needed if previous dose administered at age ≥15 months	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months	
Pneumococcal[5]	6 weeks	4 weeks if first dose administered at age <12 months; 8 weeks (as final dose) if first dose administered at age ≥12 months or current age 24–59 months; No further doses needed for healthy children if first dose administered at age ≥24 months	4 weeks if current age <12 months; 8 weeks (as final dose) if current age ≥12 months; No further doses needed for healthy children if previous dose administered at age ≥24 months	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months	
Inactivated Poliovirus[6]	6 weeks	4 weeks	4 weeks	4 weeks[6]	
Measles, Mumps, Rubella[7]	12 months	4 weeks			
Varicella[8]	12 months	3 months			
Hepatitis A[9]	12 months	6 months			
CATCH-UP SCHEDULE FOR PERSONS AGED 7–18 YEARS					
Tetanus, Diphtheria/ Tetanus, Diphtheria, Pertussis[10]	7 years[10]	4 weeks	4 weeks if first dose administered at age <12 months; 6 months if first dose administered at age ≥12 months	6 months if first dose administered at age <12 months	
Human Papillomavirus[11]	9 years	4 weeks	12 weeks		
Hepatitis A[9]	12 months	6 months			
Hepatitis B[1]	Birth	4 weeks	8 weeks (and 16 weeks after first dose)		
Inactivated Poliovirus[6]	6 weeks	4 weeks	4 weeks	4 weeks[6]	
Measles, Mumps, Rubella[7]	12 months	4 weeks			
Varicella[8]	12 months	4 weeks if first dose administered at age ≥13 years; 3 months if first dose administered at age <13 years			

APPENDIX D

Letter and Data Use agreement From Oklahoma



Oklahoma State Department of Health
Creating a State of Health

Oklahoma State Department of Health
Immunization Service
1000 North East Tenth Street
Oklahoma City, Oklahoma 73117

July 20, 2010

Dear Ms. Kabore',

From my review of your research proposal, I give permission for you to conduct this study entitled "Evaluation of the Oklahoma 2008 Two Year Old Survey" within the Oklahoma State Department of Health Immunization Service (OSDH-IS). As part of this study, I authorize you to use the responses collected in the OSDH-IS Immunization Registry including analysis of Medicaid eligibility information provided through agreement with the Oklahoma Health Care Authority. In addition, you may use the data from the Oklahoma State Immunization Information System (OSIIS) to analyze the immunization coverage rates for the participants of the study which are 24-35 month age range. The data is given to Charlotte Kabore' for this study to be used from July-November 2010 and the data is with identifiers.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Emory University IRB.

Sincerely,

Don Blose, MA
Chief, Immunization Service
405-271-4073 office
405-271-6133 fax
DonB@health.ok.gov

Commissioner of Health
Terry L. Cline, PhD

Board of Health
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Jenny Alexopulos, DO, Vice President
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Ann A. Waers, MD

1000 NE 10th St
Oklahoma City, OK 73117-1299
www.health.ok.gov