May 2014

Factors Influencing Vaccination Decisions in African American Mothers of Preschool Age Children

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by

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A Dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy of Nursing
Department of Nursing
College of Nursing
University of South Florida

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Date of Approval:
November 25, 2013

Keywords: Childhood Immunizations, Disparities, Health Literacy, SHOTS survey, REALM

Dedication

I dedicate this dissertation to my family and friends who without their help, I would not have made it through the rigors of my doctoral journey. Most of all, I would like to give thanks to my Lord and Savior, Jesus Christ. For without him, I am nothing.

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ABSTRACT

Rates and coverage levels of immunizations of African-American children are reduced compared to other races. Few studies have identified factors that influence vaccination decisions of African-American mothers. This study assessed the mothers' vaccination decisions using a self-administered questionnaire and a screening instrument for determining health literacy. This instrument is called Rapid Estimate of Adult Literacy in Medicine (REALM). The sample was 92 African American mothers, recruited from a large metropolitan church in Jacksonville, Florida, who had at least one child under the age of seven. A cross-sectional research design was used to administer survey instruments to identify and interpret parental barriers and decision-making regarding childhood vaccination. The results of this study showed that the there was a decrease in scores across the levels of education which indicated that education had a significant impact on the parental perception for the vaccination of their children. Interventions can now be tailored to improve the childhood immunization rates and provide a foundation for developing effective childhood vaccination educational materials for this population.

CHAPTER ONE

INTRODUCTION

Vaccines are among the most cost-effective and successful public health treatments available for preventing diseases and death (Omer, Salmon, Orenstein, deHart, & Halsey, 2009). Vaccines provide protection to the individual who receives the vaccine, as well as the community by the prevention and reduction of the spread of the disease (herd immunity) (Stevenson, 2009). The vaccines stimulate a protective immune response against acute and chronic infectious disease. In the United States, childhood immunization programs have made an important contribution to the elimination of many vaccine-preventable diseases and have provided a significant reduction in the incidence of others (Stevenson; Kennedy, Pruitt, Smith, & Garrell, 2011). The timely delivery of childhood vaccinations helps to increase protection from vaccine preventable diseases while minimizing risks to the child and decreasing the chance of outbreaks of the disease (Agency for Healthcare Research & Quality, 2006).

The American Academy of Pediatrics, the Advisory Committee on Immunization Practices, and the American Academy of Family Physicians jointly recommend a standard vaccination schedule for people birth through adult, which is published and updated yearly by the Center for Disease and Control (CDC). (Table 1A). The CDC recommends the use of these vaccines in preschoolers to prevent and eliminate 17 vaccine-preventable diseases. It is recommended that preschool children receive approximately 15 of these vaccinations by the age of 19 months to maximize protection as early as possible while minimizing possible risks to the child (CDC, 2011).

Although the current rates of vaccine preventable diseases are at or near record lows, the protection of American children and adults remains a national priority (Harris, Hughbanks-Wheaton, Johnston, & Kubin, 2007; CDC, 2011). Despite progress, approximately 42,000 adults and 300 children in the United States die each year from vaccine-preventable diseases (US Department of Health & Human Services, 2010). Almost 11,000 US babies born each day will need to be immunized against 15 potentially deadly diseases before the age of two. Unfortunately, almost 23 percent of these two year olds will not have completed their series of recommended vaccinations before their second birthday (National Business Group on Health [NBGH], 2009). An economic analysis using published studies and hospital discharge data showed that without immunizations, over 23 million dollars would be needed annually to treat vaccine preventable diseases among all children born within one year (NBGH). The recommended childhood vaccination schedule saves almost ten billion dollars in direct medical costs and forty-three billion dollars in societal costs for all children born within one year, which includes reduced costs from lost productivity of their parents. The Centers for Disease Control and Prevention (2009) recommends obtaining maximum immunization coverage in all US populations, establishing effective partnerships, conducting reliable scientific research, implementing immunization systems, and ensuring continued vaccination safety.

Healthy People provides science-based, 10-year national objectives for improving the health of all Americans (Healthy People, 2010). One of the goals for Healthy People 2010 was the reduction of health disparities among all people in the United States, including the reduction of disparities in immunization rates that occur by race and ethnicity (Healthy People). Disparity is defined as a condition or fact of being unequal (Agency for Healthcare Research & Quality, 2006). Healthy People 2020 also has a goal of reducing health disparities.

Since the first iteration, the consecutive plans of Healthy People 2000 and Healthy People 2010 have identified emerging public health priorities and helped to align health-promotion resources, strategies, and research (Koh, 2010). A major goal of the 2010 plan focused on eliminating health disparities. Preliminary analyses indicate the goal of eliminating disparities remains unmet. The data show significantly improved immunization rates among children 19 to 35 months of age, from 72.7% in 1998 to 80.6% in 2006, with some progress in shrinking racial and ethnic disparities.

Although the goal of reducing health disparities in immunizations has remained a high priority for public and private institutions and organizations, disparities in immunization coverage levels and rates still exist among children and adolescents of different racial and ethnic groups (Niederhauser & Stark, 2005). African American children have lower coverage rates of childhood immunizations than white children (Niederhauser & Stark; Barker, Chu, Li, Shaw, & Santoli, 2006; Wooten, Luman, & Barker, 2007; Findley, Irigoyen, Stockwell, & Chen, 2008; Smith, Jain, Stevenson, Mannikko, & Molinari, 2009). In the 2008 National Immunization Survey (NIS) data, racial and or ethnic disparities for 4 doses of pneumococcal vaccine (PCV) and 4 doses of diphtheria, tetanus, and pertussis (DTaP) were observed but did not persist after controlling for poverty status. Race or ethnicity was associated with vaccination status in the 2009 NIS data, independent of poverty status, for Hepatitis A, of PCV, and DtaP. According to the Office of Minority Health, African American children aged 19 to 35 months had comparable rates of immunization for hepatitis, influenza, measles, mumps and rubella (MMR), and polio, but they were less likely to be fully immunized, when compared to non-Hispanic White children (US Department of Health & Human Services, 2010). Current rates of childhood immunizations of African American children in the US compared to White children can be found in Table 2A.

Parental choice to decline or delay childhood immunizations is recognized as an important factor in decreased administration of vaccinations. Such decisions are embedded in complex belief structures (Brown et al., 2010). Concerns about vaccination safety have increased, in part because of the decrease in the incidence of once-common vaccine preventable diseases and vaccines properties that cause the public to have elevated safety apprehensions (Gust, Darling, Kennedy, & Schwartz, 2008;Salmon et al., 2009). Parents are educated consumers with access to the internet, which facilitates their ability to swap and discuss information regarding immunization hazards and benefits, and as a result parents may delay or withhold immunizations out of fear (Burns, Walsh, & Popovich, 2010). When the childhood vaccination schedule is not followed as recommended, the child not only will fail to receive timely protection from vaccine preventable diseases at the time when they are most susceptible, but also are at an increased risk of never completing the full vaccination series (Guerra, 2007). Under-vaccinated children are more likely to have a mother who is young and African American (Luthy, Beckstrand, & Peterson, 2009).

Because most children depend on their parents to be in charge of their health care, it is likely that parental health literacy may also influence child health outcomes (Pati et al., 2010). When compared with adult health, the role of health literacy in child health care has been studied less comprehensively (DeWalt & Hink, 2009; Sanders, Thompson, & Wilkinson, 2007). Nonetheless, the divergence between complex health information and low parental health literacy skills may be a significant mediator of child health disparities and immunizations (Sanders, Shaw, Guez, Baur, & Rudd, 2009). In the United States, 36% of the adult population is unable to perform simple child preventive health tasks such as using the immunization schedule according to the 2003 National Assessment of Adult Literacy (NCES, 2006). The

widening gap between inadequate health literacy skills and progressively more complex health information may be partly accountable for preventable child health disparities (Sanders et al.). Underlying factors and barriers to immunizations are critical challenges that can be magnified when a parent has low literacy skills (Wilson, Baker, Nordstrom, & Legwand, 2008).

Statement of the Problem

The rates and coverage levels of childhood immunizations have consistently remained lower for African American preschool children than for whites. There remains a paucity of research that has assessed African American mothers' attitudes and concerns regarding vaccinations and how these may or may not affect decisions to have their children vaccinated. Thus, it is imperative that research was conducted that determined barriers that influenced African American mothers obtaining childhood immunizations for their preschool children. The influence of health literacy on African American mother's decisions to immunize preschool children may also contribute to a mother's decision to immunize her child.

Statement of the Purpose

The purpose of this cross-sectional descriptive study was to investigate factors that influence African American mothers' childhood vaccination decisions and to identify specific barriers to childhood immunizations in this sample including the influence of health literacy on the mother's decisions.

Specific Aims

The specific aims of this study were:

1. To describe the perceptions of barriers held by African American mothers towards immunization of pre-school children. This aim was met through the following research questions:

    a. To what extent was access to immunizations perceived as a barrier in initial immunizations or future immunizations?

    b. To what extent were concerns about vaccines perceived as a barrier in initial immunizations or future immunizations?

    c. To what extent did the perceived importance of vaccines serve as a barrier in initial immunizations or future immunizations?

2. To evaluate the relationship between health care literacy and perceived barriers to immunizations.

3. To assess the validity and reliability of the Searching for Hardships and Obstacles to Shots (SHOTS) instrument in a sample of African American women.

Definition of Relevant Terms

The following terms are defined and used throughout the study. The study definitions were found in previous research studies and government documents.

Vaccine(s).

Vaccines can be defined as either killed or significantly weakened antigens or parts of antigens that cause diseases that are not strong enough to produce the symptoms and signs of the disease but are strong enough for the immune system to produce antibodies against them (CDC, 2009).

Vaccination and/or Immunization

Vaccinations and/or Immunizations can be defined as the process of obtaining or receiving a vaccine (CDC, 2009).

The 4:3:1:3:3:1 vaccine series.

The 4:3:1:3:3:1 vaccine series is defined as ≥ four doses of diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP); ≥ three doses of poliovirus vaccine (IPV or OPV); ≥ one dose of measles, mumps and rubella vaccine (MMR); ≥three doses of hepatitis B vaccine (HepB); ≥ three doses of *Haemophilus Influenzae* type-B vaccine (Hib); and ≥ one dose of Varicella vaccine (Zhao & Luman, 2010).

Up-to-date vaccination status.

Up-to-date vaccination status can be defined as completion of the 4:3:1:3:3:1 vaccination series by 36 months of age (Mennito & Darden, 2010).

Health Disparity.

Healthy People 2020 define a *health disparity* as a particular type of health difference that is strongly linked with social, economic, and/or environmental disadvantage.

Health literacy.

Health literacy is defined as the degree to which individuals have the capacity to obtain process and understand basic health information needed to make appropriate health decisions and services needed to prevent or treat illness (Healthy People, 2010).

Perceived susceptibility.

Perceived susceptibility is defined as an individual's assessment of his or hers chances of getting a disease (Glanz, Lewis, & Lewis, 2002). The greater the perceived risk (vaccine-

preventable disease), the greater the likelihood the person will engage in behaviors to decrease the risk (vaccinations) (Painter et al., 2010).

Perceived severity.

Perceived severity is defined as an individual's judgment as to the severity of the disease (Glanz et al., 2002).

Perceived benefits.

Perceived benefits is defined as an individual's conclusion as to whether the new behavior is better than what they are already doing (Glanz et al., 2002). Perceived benefits are beliefs that vaccines will prevent vaccine preventable diseases (Painter et al., 2010).

Perceived barriers.

Perceived barriers is defined as an individual's opinion as to what will prevent them from adopting the behavior (Glanz et al., 2002). Any perceived barriers preventing vaccination (Painter et al., 2010).

SIGNIFICANCE TO NURSING

Despite the overall improvement in vaccination rates for children ages 19 through 35 months for the 4:3:1:3:3:3 series, it is still important to understand the factors that influence immunization status in minority populations (Mennito & Darden, 2010). Continuing research is needed to offer a direction for improving immunization rates among diverse racial or ethnic groups by validating the findings from smaller studies and replicating positive findings on different groups (Niederhauser & Stark, 2005). Parental decision-making concerning childhood vaccinations remains controversial and it is progressively more important for researchers to understand the variables involved in those decisions (Harris, Hughbanks-Wheaton, Johnston, &

Kubin, 2007). Increasing knowledge about the factors associated with parental immunization concerns and factors that influence vaccination decisions will inform the design of interventions that are tailored exclusively to such parents to improve their assurance in immunizations (Shui, Weintraub, & Gust, 2006). DeWalt and Hink (2009) recommend studies examining the role of health literacy in childhood health outcomes among parents who have children younger than seven years old. Pati et.al (2010) suggests that examining the role of health literacy may help to improve knowledge about how and which factors may affect immunization status.

This study contributed to a body of literature that lacks information on African American mothers' perceptions of barriers to childhood vaccinations. By evaluating African American mothers' vaccination attitudes and concerns and how these attitudes and concerns influence decisions to have their children vaccinated, interventions can be tailored to improve the childhood immunization rates in this population. By determining if health literacy plays a role in childhood vaccination decisions, this study provided a foundation of knowledge for developing appropriate childhood vaccination educational materials for this population. Examining the role of health literacy may also help to improve knowledge about how and if this factor contributes to the racial immunization disparity.

Theoretical Framework

The theoretical framework for this research was the Health Belief Model. Initially the model was developed in the 1950s by a group of social psychologists in an effort to explain the widespread failure of people to participate in programs to prevent and detect disease (Janz & Becker, 1984; Rosenstock, Strecher, & Becker, 1988; Glanz, Lewis, & Lewis, 2002). Later, the model was extended to apply to people's response to symptoms, diagnosed illness, and

compliance with medical regimens (Glanz et al.). For almost 50 years, the Health Belief Model (HBM) has been one of the most widely used psychosocial approaches to explaining health-related behaviors. The Health Belief Model has been applied to a broad range of health behaviors and subject populations. Three broad areas can be identified 1) Preventive health behaviors, which include health-promoting (e.g. diet, exercise) and health-risk (e.g. smoking) behaviors as well as vaccination and contraceptive practice 2) Sick role behaviors, which refer to compliance with recommended medical regimens 3) Clinic use, which includes physician visits for a variety of reasons (Glanz et al.).

For the purpose of this study, the six major health belief model constructs were used in the study design by assessing psychosocial mediators of vaccine acceptance or declination, (a) *perceived susceptibility* to vaccinations, (b) *perceived severity* to vaccinations, (c) *perceived benefits* of vaccination, (d) *perceived barriers* to vaccinations (e) *self-efficacy* for obtaining a vaccination, and (f) *cues to action* to vaccinate (Painter et al., 2010).

The study also includes the theory of reasoned action, in particular the Triandis model. This theory includes facilitating conditions (e.g., ease of getting to a clinic or health care facility for a vaccination) and behavioral intention, consisting of attitude about the activity (e.g., obtaining a vaccination is sensible); social influences (e.g., healthcare provider or family member recommends vaccination); and the value of the consequences of the activity (e.g., the vaccination prevents the disease) (Landis, Triandis, & Adampoulos, 1978; Nowalk, Zimmerman, Shen, Jewell, & Raymund, 2004). This intention-based theory describes factors that ultimately predict behavior, such as immunizations and provided the initial framework for the development of the SHOTS instrument (Niederhauser, 2010).

CHAPTER TWO: REVIEW OF LITERATURE

Introduction

The literature regarding factors influencing vaccination rates of African American children are reviewed. First, relevant preventive child health care policies and evidence-based guidelines regarding childhood vaccination schedules are reviewed. The literature review also includes studies examining the influence of racial disparities in health care as well as studies examining sociodemographic characteristics, health beliefs, provider communication on parental decision-making regarding childhood vaccinations and the influence of health literacy.

Preventive Health Services

Well-child visits help support timely immunizations and screening for health conditions and normal development. They also offer occasions for healthcare providers to answer parents' health-related questions and provide anticipatory guidance. Researchers have found associations between increased preventive child care or well-child visits and reductions in unnecessary hospitalizations, reductions in emergency department use, and improved child health (Selden, 2006). Currently the American Academy of Pediatrics (AAP) recommends well-child care visits at: three to five days, one month, two months, four months, six months, nine months, twelve months, fifteen months, eighteen months, twenty-four months, thirty months, three years, four years, and once a year thereafter (AAP,2008).

Selden (2006) examined national compliance rates of well-child visits recommendations using the Medical Expenditure Panel Survey (MEPS), which is a random household survey of

non-institutionalized civilians that is stratified and clustered. The MEPS tool was used to provide information over a two year period on preventive care on a variety of socioeconomic and health status measures for 8,894 children. Visit-level data over the study period were used to construct a well-child visit compliance measure equal to well-child visits as a percentage of age-specific recommendations from the AAP. Assessment of compliance included age, gender, race/ethnicity, health status, poverty, insurance coverage, eligibility for public coverage, parental education, family structure, insurance, citizenship and country of origin, language, urbanicity, and census division (Selden, 2006). During the study period, only 43.7% of children in the United States under the age of 18 had one or more well visits to a health care provider and 56.3% of the sample had no preventive health visits during a year long period. Caucasian children had a 10% higher compliance ratio with well visits than other racial minorities and ethnicities. Children without health insurance had compliance ratios of 35.3%, those with private insurance had compliance ratios of 63.1%, and those with public insurance had compliance ratios of 64.1%. Higher compliance rates were observed among children with college educated parents (74.3%), infants (83.2%), children in the New England census region of the US (94.6%), and the Middle Atlantic census region of the US (83.2%). Lower compliance rates were also observed among adolescents (49.2%), children who were not citizens of the US (43.2%), children in the West South Central US census region (44.9%), children in the East South Central US census region (48.8%), and the Mountain US census region (49.7%).

Using the same tool, investigators compared the receipt of preventive health services for children ages three to seventeen with and without special health care needs to identify predictors of these health care services for these children with special needs (Houtrow, Kim, Chen, & Newachek, 2007). A total of 18, 279 children were included in this comparative analysis and the

Child Preventive Health Supplement was also used to identify parental and caregiver recall of specific health screening measures and anticipatory guidance during the past year. The Child Preventive Health Supplement asks questions pertaining to whether the child had their height, weight, and/or blood pressure checked within the past year or had their vision checked. The researchers defined special needs as children who have or maybe at an increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health services beyond that is generally required by children (Houtrow et al.). A total of 3660 children in the sample were identified as special needs with Caucasians having the highest prevalence at 23.7%, followed by African Americans at 21.4%. According to the MEPS results, 89.6% of the respondents reported that their child had received preventive care within the last year. The parents of children of special needs reported more visits at 94.8% compared to children without special needs at 88.1% ($P<.001$). This contrasts with results by (Selden, 2006) who reported that less than half of children in the United States receive preventive health care. The study did not report receipt of care by special needs and without special needs by race or ethnicity. For the health screenings portion of the study, race was not a significant predictor. Parents of African American children with special needs were more likely than the parents of Caucasian children with special needs to report receipt of one or more topics of anticipatory guidance during a healthcare visit [95% CI: 1.06-1.76].

Policy Statements and Guidelines for Immunizations

The American Academy of Pediatrics (AAP) first issued its immunization statement calling for the universal immunization of all children for whom vaccines are not contraindicated (American Academy of Pediatrics [AAP], 2010). The AAP policy statement “Implementation of

the Immunization Policy" provided support for specific guidelines for increasing immunization rates and improving vaccination delivery systems. The recommendations included expansion and improving immunization financing through the Vaccines for Children (VFC) program, parent friendly vaccine information sheets (VISs), promotion of the standards for child and adolescent immunization practices and development of safer and combination vaccines (AAP, p. 1296).

Further recommendations incorporated into the AAP's original policy statement include parental reminders for upcoming visits, implementations of reminder/recall systems and prompts during all office visits to remind staff and parents about immunizations needed during that visit. Quality improvement recommendations include efforts, such as measuring practice-wide immunization rates over time and having standing orders in place for nurses, medical assistants, physician assistants, and other health care providers to administer immunizations, unless such order were prohibited by law or other state regulation (AAP, 2010).

The Advisory Committee on Immunization Practices recommends that pediatric vaccination providers adhere to the standards for child and adolescent vaccination practices published by the National Vaccine Advisory Committee (CDC, 2011). The National Vaccine Advisory Committee has a list of 17 standards relating vaccines and vaccination practices. Included in these are those vaccinations services must be readily available, coordinated with other health care services and provided in a medical home when possible. They also recommended that barriers to vaccination should be identified and minimized. Health care professionals are to review the vaccination and health status of patients at every encounter to determine which vaccines are indicated and simultaneously administer as many indicated vaccine doses as possible. The recommendations also suggested that parents/guardians and patients are to be educated about the benefits and risks of vaccination in a culturally appropriate

manner and in easy-to-understand language. The AAP also suggests using systems to remind parents/guardians, patients, and health care professionals when vaccinations are due and to recall those who are overdue. Another recommendation is for annual reviews of office or clinic based patient record reviews and vaccination coverage assessments.

The standards provide guidance on practices that eliminate barriers to vaccination, including eliminating preventable prerequisites for receiving vaccinations, eliminating missed opportunities to vaccinate, improving procedures to assess vaccination needs, increasing understanding about vaccinations among parents and healthcare providers, and improving management and reporting of adverse events (National Vaccine Advisory Committee, 2003). The standards set by the NVAC also acknowledge the importance of recall and reminder systems and using assessments to monitor clinic or office vaccination coverage levels.

Healthy People 2010 and Healthy People 2020 Goals

Healthy People, a government agency, provides science-based, 10-year national objectives for improving the health of all Americans. Healthy People 2020 goals for immunization and infectious diseases are rooted in evidence-based clinical and community activities and services for the prevention and treatment of infectious diseases (Healthy People, 2010). The generic goal for Healthy People 2020 is to improve immunization rates and reduce vaccine preventable infectious diseases.

There are specific goals for children below school age. One of the objectives is to achieve and maintain effective vaccination coverage levels for universally recommended vaccines among young children (Healthy People, 2010). An average of 2,777 confirmed and probable cases of pertussis were reported among children under ages one during the 2004 to 2008 period and the

Healthy People goal is a 10 percent improvement. The recommendation is for 4 doses of diphtheria-tetanus-acellular pertussis (DTaP) vaccine by 19 to 35 months of age and the goal is a 90 percent coverage rate. Currently, 82 percent of children aged 19 to 35 months received 4 or more doses of the combination of diphtheria, tetanus, and acellular pertussis antigens in 2012. The most recent data show that 80 percent of children aged 19 to 35 months received 3 or more doses of *Haemophilus influenzae* type b (Hib) vaccine in the first and second quarter of 2012, the target is also a 90 percent coverage rate.

The 3 doses of hepatitis B (Hep B), 1 dose of Measles, Mumps and Rubella (MMR), 1 dose of Varicella, and 3 doses of Polio vaccine for ages 19 to 35 months are all above the 90 percent target goal at 94 percent, 92 percent, 92 percent, and 94 percent respectively (Healthy People, 2010). However, Healthy People desires to increase the proportion of children aged 19 to 35 months who received the recommended doses of DTaP, polio, MMR, Hib, Hepatitis B, Varicella, and PCV vaccines to a target of 80 percent because the base line for this age group in who received these vaccinations in 2008 was 68 percent.

Race/Ethnic Health Disparities

Healthy People 2010 called for the elimination of health disparities among all segments of the population, including differences that occur by gender, race, or ethnicity, education or income, disability, or geographic location (US Department of Health and Human Services, 2000). Healthy People 2020 defines a health disparity as a particular type of health variation that is narrowly linked with social, economic, and/or environmental disadvantage. In the United States, there are many examples of health and healthcare disparities by race, ethnicity, socioeconomic status or other factors in areas such as childhood vaccinations (Barker, Chu, Li,

Shaw, & Santoli, 2006). Recognizing that continual health disparities are the manifestation and relationship of complex factors is critical to solving these problems.

> Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion (Healthy People, 2010, ¶ 4).

In the United States, the minority populations now comprise approximately 44 percent of the total population and are increasing in number faster than the Caucasian population (US Census Bureau, 2011). By the year 2030, it is expected that current minorities as a whole will become the majority of the US population, and if health equities are not adequately addressed then everyone will suffer through shared loss of economic capital, loss of human intellectual and leadership capital and social instability (US Department of Health & Human Services, 2010). The amount healthcare disparities contribute to the rising costs of health care is often unrecognized as is the potential for savings in reducing these disparities.

A recent study, *The Economic Burden of Health Inequalities in the United States*, issued by the Joint Center for Political and Economic Studies in September 2009, provides some insight into the costs associated with eliminating health disparities. This study included a sample of 26,312 people from the Medical Expenditure Panel Survey (MEPS) for the years 2002 – 2006 to estimate direct and indirect costs of health care disparities (LaVeist, Gaskin, & Richard, 2009). Their model of health care expenditures and costs was developed using the 2002 MEPS data. Then using this model, estimates for potential reductions in health care expenditures when health

disparities were eliminated in the 2003-2006 MEPS data were made. To compute these costs, data from the 2002 MEPS were used to develop a model to predict health care expenditures for adults. Predictions for health care spending using demographic, socioeconomic, location, and health status measures were also made. The demographic factors were age, race/ethnicity, and gender. The socioeconomic factors were education, income, and health insurance status. Health measures included the presence of chronic conditions such as diabetes, asthma, hypertension, myocardial infarction, angina, heart disease, stroke, emphysema, or arthritis. The researchers used MEPS data for the years 2002-2006 to estimate productivity loss associated with health disparities for racial and ethnic minorities. To compute these costs, analysis was made using data from the 2002 MEPS to develop a model of days of work lost for adults due to disability or illness. The researchers predicted disability days using demographic, socioeconomic, location, and health status measures.

The study concluded that the combined costs of health inequalities and premature death in the United States were 1.24 trillion dollars (LaVeist et al.). Additionally, the potential reduction in direct medical care expenditures if minority health disparities were eliminated would be 229.4 billion dollars. More than 59% of these excess expenditures were attributable to African Americans, who have the worst health profile among the racial/ethnic groups.

According to another pair of researchers, the largest gap in disparities research is that very few interventional studies have demonstrated significant reductions in health disparities (Rust & Cooper, 2007). It is suggested that the traditional experimental models of research that test only a single intervention, may not have the power to impact the complexity of co-morbid health disparities. When poverty, minority status, foreign language, no health insurance, and underserved communities all coexist, the inequalities are compounded, creating a scale of

disparities ranging from low-disparity populations to high-disparity populations. The majority of disparity research to date has not significantly reduced disparities at the community or population level. Rust & Cooper (2007) also recommend demonstrating that healthcare disparities can be reduced in not only health quality, but health outcomes as well.

There is not enough known about the national prevalence of racial/ethnic disparities in children's medical care (Flores & Tomany-Korman, 2008). The purpose of the Flores & Tomany-Korman cross-sectional study was to examine the prevalence of the disparity of access to care and use of medical services using the National Survey of Children's Health, a telephone survey. Data from a random sample of 102,353 parents of children under the age of 17 were included in the study with estimates based on sampling weights generalizing to the non-institutionalized population of children nationwide. Disparities in selected medical and health care measures were examined for the different races and ethnicities using multivariate analysis and were adjusted accordingly. Demographic variables analyzed included children's ages, number of people in the household, annual income, insurance status, and parental education. The dependent variables were child health status, dichotomized into *not excellent* or *very good* versus *excellent* or *very good*; child had seen a physician in the previous year versus they had not seen a physician in the previous year; and the child needed but did not receive a prescription in the last year versus the child was not given a prescription in the previous year.

The combined annual family income was less than 100% below the federal poverty level for 28. 8% of African American children compared to 8 % of Caucasian children ($P<0.001$) (Flores & Tomany-Korman). Caucasian children were reported to be in excellent or very good health status (90%) compared to African American children (79%) ($P<0.001$). African American children were also more significantly likely to have asthma (18%) and unmet prescription

medication needs (22.3%), than other race and ethnicities (P<0.001). The study concluded that minority children experience multiple disparities in medical health, access to care and usage of services. The researchers suggest that the reduction and elimination of racial/ethnic disparities in children may necessitate a more inclusive data collection, analysis, and monitoring of all of the major racial/ethnic groups and multiracial children, improvements in access to care and reducing unmet needs, and targeted community-based interventions.

Parental choice to decline or delay childhood immunizations is recognized as an important factor in decreased administration of vaccinations. Such decisions are embedded in complex belief structures (Brown et al., 2010). Concerns about vaccination safety have increased, in part because of the decrease in the incidence of once-common vaccine preventable diseases and vaccines properties that cause the public to have elevated safety apprehensions (Gust, Darling, Kennedy, & Schwartz, 2008 ;Salmon et al., 2009). Parents are educated consumers with access to the internet, which facilitates their ability to swap and discuss information regarding immunization hazards and benefits, and as a result parents may delay or withhold immunizations out of fear (Burns, Walsh, & Popovich, 2010). When the childhood vaccination schedule is not followed as recommended, the child not only will fail to receive timely protection from vaccine preventable diseases at the time when they are most susceptible, but also are at an increased risk of never completing the full vaccination series (Guerra, 2007). Under-vaccinated children are more likely to have a mother who is young and African American (Luthy, Beckstrand, & Peterson, 2009).

Since most children depend on their parents to be in charge of their health care, it is likely that parental health literacy may also influence child health outcomes (Pati et al., 2010). When

compared with adult health, the role of health literacy in child health care has been studied less comprehensively (DeWalt & Hink, 2009; Sanders, Thompson, & Wilkinson, 2007). Nonetheless, the divergence between complex health information and low parental health literacy skills may be a significant mediator of child health disparities and immunizations (Sanders, Shaw, Guez, Baur, & Rudd, 2009). In the United States, 36% of the adult population is unable to perform simple child preventive health tasks such as using the immunization schedule according to the 2003 National Assessment of Adult Literacy (NCES, 2006). The widening gap between inadequate health literacy skills and progressively more complex health information may be partly accountable for preventable child health disparities (Sanders et al.). Underlying factors and barriers to immunizations are critical challenges that can be magnified when a parent has low literacy skills (Wilson, Baker, Nordstrom, & Legwand, 2008).

Most effective childhood vaccines work by protecting an individual prior to disease exposure. This is the reason that pre-exposure vaccinations for infants are the foundation of successful immunization programs (Booy et al., 2008). An investigation of clinical preventive measures widely recommended by the US Preventive Services Task Force states that childhood immunization was one of only three services that received a perfect score of 10 based on clinically preventable disease burden and cost-effectiveness (Pickering et al., 2009). Parents who refuse or delay vaccines make their community and children vulnerable to outbreaks of vaccine preventable diseases. More than one in ten parents of young children follow an alternative vaccination schedule that is not recommended by Centers of Disease Control and Prevention (Hensley, 2011).

Socioeconomic Factors Affecting Immunizations

Data from the NIS (1999-2003) have also been used to assess the role of socioeconomic factors in racial disparities in childhood immunizations (Wooten, Luman, & Barker, 2007). The objectives of this study were to examine the effects of socioeconomic factors on childhood immunization rates over a five year period. Effects were measured based on the child's up-to-date status of the 4:3:1:3:3 series of immunizations. Adjustments were made for the mother's education, household income, and family size. Approximately 14% of 19,529 children were African American. Throughout the study period, children who lived above poverty, those whose mothers had more than a high school education, or had married mothers were more likely to be vaccinated than children who lived below poverty, had mothers with less education, or had unmarried mothers. The results demonstrate the immunization rates for White children were consistently superior to those of African American children. For the years 1999 through 2003, the percentage rates for White children ranged from 79 to 85%, while African American children's rates for the same years ranged from 71 to 77%. This study offers support for the argument that higher socioeconomic measures of household income can be correlated with better health indicators and better access to healthcare.

A similar study by Smith, Jain, Stevenson, Mannikko, and Molinari (2009) evaluated the progress of timely vaccination coverage in low income households in the US. The evaluation of progress of timely vaccination coverage across the cohorts used statistical regression analysis to determine if estimates of the 4:3:1:3:3 vaccine series increased, decreased or remained the same. This study included NIS data of 232,318 children ages 19 to 35 months. Approximately 64% of the African American children were classified as low income versus only 25% of White children (Smith et al.). African American children were 18% of the sample.

The disparities in timely vaccination coverage for low versus high income children increased significantly between consecutive birth cohorts by approximately 0.4% for the DTaP vaccine and decreased significantly by approximately 0.3% for the MMR, Hep B, and Varicella vaccines (Smith et al.).

Zhao and Luman (2010) assessed progress in coverage rates for the 4:3:1:3:3:1 vaccine series (least four doses of DTaP, three doses of polio, one dose of MMR, three doses of Hib, three doses of Hep B, and one dose of Varicella vaccines) using the the data for 185,516 children included in the NIS during the 2000-2008 survey years by sociodemographic groups. The estimated coverage rates improved 19-25 percentage points for each of the population segments throughout the study period. Causasian children had significantly higher observed coverage levels than African Amerian children in six of the nine years of the study.

A preliminary pilot study with an objective of minimizing organizational barriers and increasing access to immunizations took place over a 7 month period in a multiethnic area of Hawaii (Niederhauser & Waters, 2007). The goal of the first phase of the study was to determine the specific needs of a community where the intervention would take place. The mothers of children (n=18) who were not fully immunized participated in semi-structured interviews. The sample included 39% Micronesian, 22% Samoan, 11% Filipino, 11% Marshallese, 6% Native Hawaiians, and 56% non-US citizens. The study did not include any African American mothers. Experts in the field, administered questions related to barriers to having their children immunized to mothers of children who were behind on their immunizations. Some of the reasons cited by the mothers included childcare, work commitments, transportation issues, substance abuse, and unawareness of the immunizations schedule.

Data from phase I of the study was used as the basis for the development of the pilot intervention study to increase access and decrease barriers to immunizations (Niederhauser & Waters, 2007).The intervention phase utilized a walk-in clinic with evening and weekend hours, staffed by a nurse practitioner who assessed the child, ordered the immunizations, as well as administered the immunization. The patients in this study that were seen at the clinic were given a picture personalized reminder calendar that contained a schedule of immunizations for that child. This study focused on reducing the barriers to immunizations included saving time at the visits by having the parents complete screening questionaires to possible complications to immunizations.

The outcome measures for the study included the numbers and types of immunizations given, immunization rates for children before and after the intervention, and parental satisfaction with the walk-in clinic (Niederhauser & Waters, 2007). Demographic data was also included. In the period of seven months, a total of 774 individual vaccinations were given, with each month having more immunizations than the previous, except for one month. The mean age of clients utilizing the clinic was 12.48 years old (SD=6.0). For this study, 90% of the clients were not up to date with their immunizations prior to accessing the clinic. The remaining 10% either were up to date (5%) or had no known immunziation status (5%). After their clinic visit, 53% were up to date with immunizations, 42% were considered in progress, and 5% were unable to be determined if they were up to date or not because they did not have completed immunization records. The overall up to date immunization status for all patients at the clinic improved significantly between the pre-intervention (42%) and post-intervention (65%) chart reviews ($x2=31.395$, $P<0.000$). The results of the satisfaction survey given to the parents so the research team could keep track of continued improvements of the intervention were positive, with most

parents stating they were pleased with the services and would return for follow-up visits. Although the study did not include any African American parents, the results of the focus groups and the intervention could be helpful in addressing barriers to childhood immunizations if it is determined that similar barriers exist in the African American population.

Using focus groups, the objective of a qualitative study was to explore the barriers to immunizations in parents of children who were not completely immunized by the age of two (Niederhauser & Markowitz, 2007). This study used purposive sampling and a total of 64 participants, including 2 African Americans, were chosen for 13 focus groups. Verbatim transcripts were analyzed to identify recurrent themes. There were a total of five core themes that emerged as barriers to childhood immunizations. The parental core theme included parental issues, parental beliefs, and knowledge. Decisions and choices made by the parents such as substance abuse, complex scheduling, lack of motivation, and living situations comprised the first portion of the parental issue theme. The second part of the parental issue theme was composed of issues that the parents perceived to have little control over such as forgetting about the vaccinations, difficulty getting the children to the clinic, work scheduling, past experience with vaccines, and a lack of parental support.

Parents also lacked knowledge about the vaccine schedules and misunderstood the importance of immunizations (Niederhauser & Markowitz, 2007). Beliefs that vaccines are a choice, mistrust of information, low risk of vaccine-preventable illness, preference for alternative medicine, and high risk-benefit ratio were reasons cited in the parental belief theme category as barriers to immunizations. Parents also feared the child would catch the disease from the vaccine, side effects, the number of vaccinations, and the trauma of the vaccination process for themselves and the child (Niederhauser & Markowitz). Organizational barriers identified

included: no reminder systems, lack of appointments and vaccines, clinic recommendations, and differences in health care provider recommendations for vaccinations (Niederhauser & Markowitz). Financial and transportation issues, childcare for other children, and the child being ill at the time for a vaccine were the other identified barriers to vaccinations (Niederhauser & Markowitz). The information on barriers to immunization, such as parental issues, fears, knowledge, and beliefs accounted for the bulk of the responses in the focus groups and can be used to target interventions to increase childhood immunization rates (Niederhauser & Markowitz).

As a follow-up to the study by Niederhauser and Markowitz (2007), a cross-sectional study was conducted to develop and assess the psychometric properties of an instrument designed to measure parental barriers to childhood immunizations based on the theory of reasoned action (Niederhauser, 2010). The items for the instrument were developed from literature on barriers to parental immunizations and from pilot qualiative studies (Niederhauser & Markowitz, 2007). A convenience sample of 20 parents reviewed the instrument for it's clarity, content, and readability. The initial 60 item instrument used a Likert scale from zero to four, reflecting the degree to which the item was perceived as a problem for parents to get their child's immunizations (0=not at all, 1= a little, 2= somewhat, 3= quite a bit, 4 = a lot). The higher the score, the more problematic the group of items was for parents obtaining vaccinations for their child. The survey contained three subscales which included access to shots, concerns about shots, and the importance of shots. Subscale means that were higher indicate a greater level of barriers.

After determining the sampling goal, the Searching for Hardships and Obstacles to Shots (SHOTS) survey was adminstered to 655 participants with a mean age of 31.4 and a mean annual income of $41,500. The sample included Caucasians 14%, Hawaiians 33%, Asians 38%, Pacific

Islanders 9%, and Others 6%. There were no African Americans in the study's sample. The scores were able to differentiate between children were up to date on their vaccinations versus those who were not . There was a significant difference in the total scale means for parental reports of up to date status for their children compared to those reporting that their children were not up to date ($t=5.12$, $p<0.000$). Children who were up to date had a mean subscale score of 4.7 compared to the children who were not up to date 13.4 in the Access to Shots subscale ($t=4.82$, $p<0.000$). For the Concerns About Shots subscale, children who were up to date had a mean score of 5.0; children who were not up to date had a mean score of 8.4 ($t=3.07$, $p=0.004$). Lastly, for the Importance of Shots subscale, the mean for the respondants whose children who were up to date was 1.6 and respondents reporting that their children who were not up to date was 4.3 ($t=3.23$, $p=0.002$).

The final SHOTS survey was reduced from 60 items to 23 items using factor analysis, demonstrating good reliability and validity for the total scale and subscales (Niederhauser, 2010). The findings from the study support the preliminary psychometric properties of the SHOTS as a measure of parental barriers to childhood immunizations and additional testing of the instrument with diverse populations in different locations will assist in further validation.

The Influence of Health Literacy on Childhood Immunization Rates

Health literacy can be defined as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Yin et al., 2009). Cheng, Dreyer, and Jenkins (2009) reports that up to 50% of all parents have difficulty reading and comprehending patient education materials, with many having trouble understanding medical advice that is crucial to the care of their child.

In the United States, 36% of the population is unable to complete the fundamental child preventive health tasks such as following the vaccination schedule, interpreting a growth chart, and following the recommendations from a preventive health brochure (US Department of Education, 2006). Some information and documents provided to adults regarding the care of their infants and children are often wordy and multi-paged, proving too difficult for most adults to use (Sanders, Shaw, Guez, Baur, & Rudd, 2009). The increasing gap between limited health-literacy skills and increasingly multipart health information may be responsible for preventable disparities in child health.

To determine if maternal health literacy influences early immunization status, a longitudinal prospective cohort study of 506 Medicaid-eligible mother infant dyads was assessed using multivariate logistic regression analysis (Pati et al., 2010). Immunization status for the infants at ages three and seven months were the outcomes of interest. Demographic information was collected and the short version of the Test of Functional Health Literacy in Adults was administered to the study's participants, of which 84% were African American. Maternal health literacy was inadequate or marginal in 23 % of these mothers; 31% had less than a high school education. At three months of age, 73% of the infants were up to date on their immunizations; however at seven months of age only 43% of the infants were current with their immunization schedule. In bivariate analysis, infants whose mothers had less than a high school education were more than three times as likely to be behind on their immunizations compared to mothers who had more than a high school education when their infants were three months of age. In addition, infants who received care in hospital-affiliated settings were four times more likely to be up to date than those that received care in private practices or community health centers at three and seven months of age. Furthermore, at seven months of age, infants who were third or

more in birth order or infants born to single mothers were more likely not to be up to date on their immunizations. Compared to infants who were not up to date at three months, children who were up to date at three months were 9.2 times more likely to be up to date at seven months. Although, maternal health literacy was not significantly associated with vaccination status at three months of age or seven months of age, the study found that maternal education and health literacy were strongly correlated and that maternal education significantly influences immunization status at three months of age. The researchers suggest their findings may reflect the influence of maternal education on decisions about initiation of vaccinations.

Comparatively, a mixed methods pilot study was conducted to assess the relationship between health literacy and a mother's ability to understand and communicate information about childhood immunizations (Wilson, Baker, Nordstrom, & Legwand, 2008). This study used a convenience sample of 30 mothers in an urban walk-in childhood immunization clinic in the Midwest region of the United States. The sample was primarily single African American mothers who earned less than $20,000 per year and were either Medicaid recipients or uninsured. The Rapid Estimate of Adult Literacy in Medicine (REALM) instrument was used to determine the mother's actual reading skills.. The mean REALM score showed a reading level equivalent to 7th or 8th grade for this sample. For the intervention, the investigators used the vaccine information sheets, which have a 9th and 10th grade reading level, for two vaccines to give the mother's verbal instructions about risks, benefits, and safety of the vaccines. The mothers were then asked to repeat in their own words the risks, benefits, and safety of the vaccines which were quantified and scored.

The younger mothers provided more correct answers, compared to the older mothers who provided more partially correct or incorrect answers (Wilson et al., 2008). Mothers with lower

literacy skills also provided more partially correct and incorrect answers. The mothers in the sample with lower literacy skills demonstrated a lack of knowledge and comprehension regarding vaccination safety, with fewer correct responses given for immunization safety than risks and benefits. Particularly important, low literacy was linked with limited vocabulary skills that also impacted understanding vital concepts, such as being able to communicate the risks, benefits, and safety of childhood vaccines. The unpredictability of the mother's capability to communicate important information regarding vaccines specifies the need to assess how to best assist parents in increasing their immunization knowledge and immunization communication skills. There was not a significant relationship noted between income and the ability to communicate about vaccines.

Parental Perceptions and Decisions

Parental acceptance and rejection of available immunizations is vital to both effective provider-parent communication concerning vaccination decisions and public health campaigns to optimize vaccination coverage (Sturm, Mays, & Zimet, 2005). A large amount of anti-vaccination media, action groups, and web sites may further make matters worse by broadcasting negative vaccine information and highlighting reasons for concern that often have no scientific evidence (Harris, Hughbanks-Wheaton, Johnston, & Kubin, 2007).

Using one-on-one interviews, a qualitative study (n=30) sought to determine parents' vaccination comprehension and decision-making thought processes (Downs, de Bruin, & Fischoff, 2008). The respondents of the study were primarily White with the remainder being African American, and Native American. This study primarily focused on the MMR vaccine. Twenty-four of the parents (80%) reported first learning about the vaccination from their

healthcare provider, with the others reporting having read about it first. When asked about drawbacks to getting their child vaccinated, 37% of the parents stated there were drawbacks which they rated as moderately serious. The better parents felt about how well vaccinations had been explained to them, the more they thought that not vaccinating their child would hurt other children. In general, parents trusted pro-vaccination communications more than anti-vaccination ones. When asked what source they would consult for more information on vaccinations, 33% of parents stated they would ask their healthcare provider or look for a government source while 70% said they would perform an internet search. The parents in this study were generally more favorable toward vaccination but had limited understanding of how vaccines actually work. When asked about the need for additional information, most parents would consult the internet before asking their health care provider which may make them vulnerable to false information. An important limitation of the study is that it included seven African American respondents but the results were not discussed in terms of race/ethnicity.

A cross-sectional study using multivariable analysis was designed to examine and identify attitudes and knowledege about vaccinations in 228 postpartum mothers (Wu et al., 2007). A pre-tested survey tool based on the results of a qualitative study was adminstered to the mothers. The study's sample was 67% White, 11% African American, and 17% Hispanic. The majority of mothers planned to have their child vaccinated (96%), some did not want their child vaccinated (1%), others were unsure (0.5%), and some mothers stated their child would receive some vaccines (2%). According to this study, 29% of these mothers were worried about vaccinating their infants and 31% of the mothers were worried about vaccinations causing death in their infants. Twenty three percent of these mothers also worried that the vaccines would not be effective. The characteristics of mothers who were less trustful about vaccinations in this

study were planning to breastfeed, had an income below $40,000 but did not receive any benefits from Women Infants and Children (WIC), and had just delivered their first child. Overall knowledege about vaccinations was also poor, with the mothers scoring poorly with matching vaccinations with the disease that the vaccine prevents. Ten percent of the mothers in this study believed that autism was a proven side effect of the MMR vaccine and eight percent thought that vaccines caused immunological complications.

The findings of mistrust in the medical community and fear of social rejection have been reported in other studies. Using six focus groups, the objective of one qualitative study was to examine the vaccine safety concerns of African American mothers who, in spite of concerns, had their children immunized (Shui, Kennedy, Wooten, Schwartz, & Gust, 2005). A total of 53 mothers participated in this study with 55% of the sample being between the ages of 25 and 34 years old. More than half (51%) of the sample had a college education or higher. The reasoning behind these mothers concerns included doubts about the safety and need of vaccinations, mistrust of the medical community and a lack of information. The respondents did not consider their healthcare providers as partners in the wellbeing of their children and believed that the providers did not always act in their best interests. Specifically relating to the African American community, these mothers feared experimentation and some feared that African American children may receive lower quality vaccines than other races. The African American mothers in this study felt as if they were forced to immunize because of daycare and school requirements. The mothers also questioned the necessity of some vaccines, especially Varicella and influenza, stating some of the vaccine-preventable diseases are not life threatening or severe.

As a follow-up to the focus group study, an additional mixed methods study was conducted in two phases to determine differences in race/ethnicity and attitudes about vaccine

safety (Shui, Weintraub, & Gust, 2006). In the first phase of the study, 2937 respondents' answers to a survey were analyzed using bivariate and logistic regression to measure the prevalence of parents with high-level immunization safety concern, determine demographic characteristics and attitudes, and to determine the factors that influence these parents to immunize their children. A total of 21% of the respondents had high concern regarding immunizations, with 40% of these respondents being African American, 32% being Hispanic, and 15 % of White parents. Lower education and income were also significantly associated with high level concerns regarding immunizations. The attitudes that were significantly linked with vaccination concern were the desire for more information about vaccine ingredients, worry about autism or other learning disabilities, lack of trust in the health care provider, and disagreeing that the health care provider was easy to talk to. Reasons for given for having their child vaccinated regardless of concern was risk of the child getting a disease (72%), requirements for daycare or school (17%), and health care provider recommendation (8%). The second phase of the study was to further explore differences found in phase one by race/ethnicity and compare the attitudes to those of non-Hispanic Whites. When compared with White parents, African American parents were more likely to want more knowledge about vaccine ingredients, had lower trust in their health care provider, disagreed that their health care provider was easy to talk to, and agreed that daycare and school immunization laws influenced their vaccination decision.

In periods of unfamiliarity with vaccine-preventable diseases, even parents of immunized children may be concerned with the risks of immunization. Parents with the highest levels of concern, such as the African American parents in this study, may be most likely to stop having their children immunized if their concerns are not addressed (Shui et al., 2006). These parents

were also more likely to have pessimistic attitudes towards their child's healthcare provider, particularly lacking trust and not finding them easy to talk to.

Similarly, using data from the National Immunization Survey (NIS) (2003-2004), the goals of a cross-sectional study were to obtain national estimates of the proportions of parents with indicators of vaccine doubt, identify factors associated with those parents, identify the vaccines that prompt doubt and the reasons why, and to describe the main reasons why parents may change their mind about delaying or refusing a vaccination for their child (Gust, Darling, Kennedy, & Schwartz, 2008). The study used interviews for 3924 respondents. The proportion of parents who had no vaccine doubt indicators was 71% and 28 % had vaccine doubt indicators. Among the 28% who had vaccine doubt indicators, 8% accepted the vaccinations even though they were unsure, 13% delayed their child's vaccinations, and 6% reported refusing vaccinations. African American parents had the highest proportion of unsure at 11% and the second highest proportion of refusal at 2%. Being unsure was significantly associated with maternal age, maternal race/ethnicity, child's age; census region and vaccination safety concerns. Having delayed vaccination status was significantly associated with the number of children in the household, child's age, maternal marital status, and vaccination safety. Refusal status was significantly associated with vaccination safety concerns, child's age, and maternal race/ethnicity.

Synthesis and Research Gap

Many factors may affect the rates of vaccinations for children of preschool age that could protect them from vaccine-preventable diseases and illnesses. The studies reviewed indicate that African American children are more likely to be behind on their childhood immunizations or

under-immunized than White children (Barker et al., 2006; Findley et al., 2008; Wooten et al., 2007;Dominguez et al., 2004). The reasons for or factors involved in the disparities in immunizations between African American children and White children cited were varied and included missed opportunities, socioeconomic status, census region of the US, maternal age and education, maternal marital status, having more than one child in the household, and type of vaccination provider. The studies using data from the National Immunization Survey do not account for factors such as health insurance status, parental beliefs, cultural opinions of childhood vaccinations and the healthcare delivery system and thus limit the ability to fully account for racial disparities in immunization (Wooten et al.). Qualitative analyses and studies should be performed to determine perceived access to care or ease of obtaining immunizations, which could enlighten city and state-specific policies to improve the state of equality and make it feasible for all children to receive their immunization on time, regardless of the community where they live (Findley et al.).

Parental beliefs and perceptions also influence childhood vaccination rates. In studies reviewed, the parents cited trust and mistrust in their healthcare providers as reasons for vaccinating or delaying their child's vaccinations (Luthy et al., 2009; Benin et al.; 2006 Shui et al.;2006 Shui et al., 2005). African American mothers were more likely not to trust their healthcare providers and had more vaccination concerns compared to other races. The mothers in these studies had poor immunization knowledge, a need for more knowledge regarding vaccinations and a greater need for culturally appropriate communication between themselves and their child's healthcare provider. Many of the studies reviewed did not include any African American women, or did not use samples representative of the diversity among mothers. In order

to reduce parental barriers to immunizations, identification of the unique barriers specific to the population and setting must take place.

It is still unclear the role maternal health literacy may play in childhood immunization disparities. While it was shown that some African American mothers had lower health literacy levels, it cannot be determined if this plays a significant role in the disparity between African American and White immunization levels (Sanders et al., 2007;Wilson et al., 2008; Yin et al., 2009). The study by Pati et al (2010) showed that maternal health literacy was not a significant factor in the up-to-date status of infants at three or seven months of age, but this study took place in Pennsylvania which has a low disparity in immunization coverage rates (Findley et al., 2008). There is a need for a study to determine the unique factors and barriers that African American mothers encounter when trying to obtain childhood immunizations for their children and the role health literacy may play in the disparity between African American and White children of preschool age.

Implications for Research

Future studies should aim to determine what distinctive factors influence vaccination decisions in African American mothers. Not only will this help to improve vaccination rates in African American children, it will also help to improve herd immunity. Healthcare providers, nursing researchers, educators, and administrators can all benefit from the knowledge that such research can produce. Tailored interventions that include positive messages rather than negative messages may be constructed from the results of a study that focuses on this unique population. Information gathered can also be used to provide awareness about websites providing misinformation and help steer mothers to the legitimate websites since a study showed that 70%

of mothers use websites to obtain vaccination information. It would be optimal to provide immunization information prior to the mother's delivery, since it has been shown that these mothers respond more to information received earlier rather than at a later date.

It would also be important to assess whether African American children that receive healthcare services from an African American healthcare provider have higher immunization rates than those who do not. Since evidence shows that minority patients are more trusting of minority healthcare providers (The Sullivan Commission, 2004). The ability to trust their healthcare provider can be vital to the development of a good client-provider relationship.

CHAPTER THREE: METHODS

This chapter includes a description of the study design, sample, setting, and instruments used to carry out the research. The sample characteristics, recruitment methods, and study procedures are also described. Finally, the methodology used for data analysis and evaluations for the study's outcomes is provided.

Study Design

A cross-sectional research design was used to administer survey instruments to study participants to collect and interpret parental barriers and decision-making regarding childhood vaccination decisions. The study also assessed maternal health literacy.

Study Setting and Sample

The recruitment of a planned target sample size of 100 participants for the study took place in a large metropolitan area of northeastern Florida with a population of approximately 1.3 million. Over 30% of this population is African American. The recruitment area included a 10,000 member inner-city African American church in which the members span a wide range of income categories.

Participants for the study were selected by convenience sampling. The target population for the study's sample was African American mothers who were at least 18 years of age who have at least one child under the age of seven years old. The rationale behind the age range was that children are most likely to be behind on their immunizations prior to entering school.

Exclusion criteria were any mother who was not of African American race/ethnicity or did not have children under the age of seven.

Human Subject Protection

Prior to starting the study, church staff was approached and permission was sought to conduct the study. All survey materials and plans were submitted to the University of South Florida's Institutional Review Board (IRB) for approval. For the purpose of recruitment, IRB approved flyers were distributed and placed in the church after approval from the office managers and coordinators. The flyer included contact information for the researcher and the purpose of the study. The flyer also contained information regarding compensation for the participant's time and information. The researcher was in contact with the office managers of the selected locations during this recruitment time period to identify any problems or concerns regarding this process. An effort was made to form a contact relationship within the church in efforts to posting an announcement about the study in the church's weekly or monthly bulletin. Participants were recruited from a large inner city church which has over 10,000 members.

Procedures

The process of informed consent began during initial contact and continued for the duration of their participation. The information conveyed through flyers, recruitment letters, pre-screening phone calls, as well as written informed consent documents and discussions were written at a level understandable to the study participants (i.e. 4th grade reading level or lower). An explanation of the purposes of the research, the expected duration of the respondent's participation, and a description of the procedures to be followed were included. An explanation of whom to contact for answers to pertinent questions about the research and research subjects'

rights was provided. A statement that participation was voluntary was included, as well as that refusal to participate did not involve any penalty or loss of benefits to which the subject was otherwise entitled, and that the subject may discontinue participation at any time without penalty or loss of benefits to which the subject was otherwise entitled. There were no known risks for to the participation in this study, and there were no known benefits except minimal compensation provided to participants for their enrollment in the study.

The participants were briefed about the study and completed and provided written informed consent. Participants who agreed to participate in the survey were provided with the SHOTS and demographic survey to be completed on-site and placed into a sealed envelope. For the SHOTS survey, there was no identifying information collected on the actual survey, only demographic information. After completing the SHOTS and demographic survey, the respondents were individually taken into another room to complete the REALM survey to ensure privacy. All study material and information was secured in a locked file cabinet and participants could withdraw from the study at any time. Participants were offered a $15 gift certificate for time and participation.

Instruments

Searching for Hardships and Obstacles to Shots Survey

Perceived barriers to immunizations were measured by the Searching for Hardships and Obstacles to Shots (SHOTS) survey (Niederhauser, 2010). This is a self-administered questionnaire written at a fourth grade reading level that takes approximately five to ten minutes to complete. The survey consisted of 23 items, and each item is rated on an ordinal scale from zero to four reflecting the degree to which the item is considered to be a problem for the parent.

There are three subscales; Access to Shots subscale (0-48) has 12 questions, Concerns to Shots subscale (0-24) six questions, and Importance of Shots subscale (0-20) five questions. The total combined barrier to SHOTS score is obtained by adding all the scores together; total scores can range from 0-92. The higher the combined score, the more troublesome that set of items is for parents getting their child immunized. The internal consistency reliability of the SHOTS instrument has been supported with a Cronbach's alpha of .93. The initial testing of the SHOTS tools showed promise of good validity, but further testing in other populations and studies is needed to further support construct validity. The SHOTS survey had not been tested in an African American population.

Rapid Estimate of Adult Literacy in Medicine

The Rapid Estimate of Adult Literacy in Medicine (REALM) is a screening instrument used to assess an adult's ability to read common medical words and lay terms for body parts and illnesses (Davis et al., 1993). This tool was designed to assist medical professionals in estimating a patient's literacy level so that the correct level of patient education materials or oral instructions can be provided. The test takes approximately two to three minutes to administer and score. The REALM uses cumulative scoring from zero to sixty. A score of 0-18 is equivalent to a third grade reading level or below, 19-44 fourth to sixth grade reading level, 45-60 seventh to eighth grade reading level, and 61-66 a high school reading level. This tool has been correlated and validated against other standardized health literacy tools. The REALM correlated well (p <.0001) with other tests such as the Wide Range Achievement Test-Revised (r=.88 to .96) (Davis et al., 1993). Test-retest reliability was 0.99.

Demographic Survey

The demographic information that was collected included mother's age, children's age, number of children in the home, maternal marital status, and maternal education level. It also included child's health insurance status, and child's healthcare provider status. This demographic survey was developed by the principal investigator.

Intention to Immunize

This assessment of intention included both first immunizations and future immunizations, and was made using an ordered continuum of response categories, "strongly agree" "agree", "undecided", "disagree", and "strongly disagree" with respect to intention to vaccinate. The question assessed whether the mother or caregiver of the child had already obtained immunizations for the child as well as if they were planning to immunize or continue to immunize the child. This question was included with the demographic questionnaire and also developed by the principal investigator.

Data Analysis Plan

In accordance with the Specific Aims, the primary variable of interest was the participant's self-reported intention, or lack thereof, to have their child vaccinated. This assessment of intention includes both first immunizations and future immunizations, and was made using a categorical definition of "no", "maybe", "probably" and "definitely" with respect to intention to vaccinate.

For Aim#1, analysis of variance (ANOVA) was used with intention to vaccinate (categorical) used as the classification variable to compare mean scores on the SHOTS and its three individual subscales. Variables used in the models included demographic characteristics associated with intention to vaccinate (i.e. potential confounding variables). Thus, the ANOVA models compared adjusted means on the SHOTS and SHOTS subscales between the respective classes (categories) of intention to vaccinate.

For Aim # 2 Pearson correlation coefficients were calculated between scores on the REALM and scores on the SHOTS and its three individual subscales. This was followed by use of a one-way ANOVA to compare the means on the REALM score for the mothers or caregivers intention to vaccinate or continue to vaccinate their child or children.

For Aim #3, coefficient alphas were calculated to estimate internal reliability consistency of the SHOTS and its three subscales within the sample of African American mothers. In addition, item analyses were conducted among all 23 items of the SHOTS to examine for sufficient range of response. To assess the criterion-related validity of the instrument, an independent-samples t-test was conducted to compare mean scores for each group of vaccination categories, hypothesizing a significant difference between groups which would provide evidence of validity.

Statistical Power

A target sample size of 100 participants was selected to meet the study aims. For Aim #1, assuming a distribution of 50 mothers with an intention to vaccinate and remaining mothers with no intention to vaccinate, the target sample size of 100 participants would provide 80% power (with 2-sided type I error rate of 0.05) to detect a “medium” effect size of 0.57. If the sample

was unbalanced in terms of distribution as follows: 60/40, 70/30, and 80/20, the detectable effect sizes at 80% power would be 0.58, 0.62, and 0.72, respectively. This reflects “medium” to “large” detectable effect sizes consistent with the study aims.

For Aim #2, a target sample size of 100 would provide 80% power to detect a non-zero correlation coefficient of 0.28 or higher. This represents a “small” to “medium” detectable effect.

For Aim # 3, and assuming adequate internal reliability consistency (coefficient alpha) of 0.70, a target sample size of 100 participants would yield a 95% confidence interval ranging from 0.58 to 0.79, indicating adequate precision.

CHAPTER FOUR: RESULTS

This chapter presents the study findings of examining factors that influence the vaccination decisions of African American mothers of preschool age children in the Jacksonville area of Florida. The study results include description of socio-demographic characteristics of the participants, summary of the mother's intention or continuance of immunizations, a comparison of means for the Searching for Hardships and Obstacles To Shots (SHOTS) total score and the three individual subscales, the correlation between the Rapid Estimate of Adult Literacy in Medicine scores and the Searching for Hardships and Obstacles To Shots scores, and internal reliability consistency of the Searching for Hardships and Obstacles To Shots and the three subscales within the sample of African American mothers, The study results are presented by each of the research aims.

Sample

Ninety-two eligible African American females who had at least one child under the age of seven volunteered to take part in and were included in the study. Thus, the final sample nearly achieved the planned sample size of 100 mothers. All participants were recruited from a large metropolitan predominately African American church in Jacksonville, FL. Participants were also included in the study if they were the primary caregiver of the child, such as a grandmother or aunt. These participants met the inclusion criteria which consisted of considering themselves African American and having or being the primary caregiver of at least one child aged seven and under prior to taking part in the study. Participants then completed the investigator-developed demographic form, the SHOTS survey, and the verbal REALM instrument. There were two

(2.2%) participants who had missing values for child's healthcare provider and marital status, six (6.5%) participants had missing values for age, and one (1.1%) participant had a missing value for child's insurance status on the demographic survey. They were not excluded from the final analysis because these were not the primary variables of interest.

The demographic assessment of the study participants included age range of the caregiver, age of child or children, number of children in the home, marital status, child's health insurance status, child's health care provider status, mother's educational level, and mother's occupation. The distribution by frequency and percentage of the participants is presented in Table 1. All of the participants identified themselves as African American or Black, as this was a part of the pre-screening questionnaire and inclusion criteria. The median age category of respondents' was 30 to 35 years most had one or two children in the home, and nearly half were married.

The respondent's present occupation was not analyzed or interpreted due to a large number of responses that were unable to be categorized. The ages of the children in the home were not analyzed or interpreted because the inclusion criteria consisted of the respondents having at least one child of preschool age (≤7 years old).

Intention to Immunize

In accordance with the specific aims, the primary variable of interest was the participant's self-reported intention, or lack thereof, to have the child vaccinated. This assessment of intention included both first immunizations and future immunizations, and was quantified using a five-point Likert-type scale of "5-strongly agree", "4-agree", "3-undecided" "2-disagree" and "1-strongly disagree" with respect to intention to vaccinate. The possible scores on this item ranged from one to five. (Table 2)

Table 1.
Demographic Characteristics of the Study Sample

Variable	Frequency (N)	Percentage (%)
Age of Caregiver		
18-21	3	3.5
22-25	8	9.3
26-30	14	16.3
30-35	39	45.3
36-40	10	11.6
40-45	6	7.0
45+	6	7.0
Mother's Education		
Junior High School	1	1.1
High School	22	23.9
College	61	66.3
Grad School	8	8.7
Marital Status		
Single	35	38.9
Married	43	47.8
Divorced	9	10.0
Cohabitating	3	3.3
Child's Health Insurance Status		
Private health insurance	57	62.4
Public health insurance	34	37.4
Child's Healthcare Provider		
Private clinic	72	80.0
Public clinic	15	16.7
No clinic	3	3.3

Table 2.
Intention of Parents/Caregivers Toward Immunization

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	1	1.1	1.1	1.1
Disagree	0	0	0	0
Undecided	4	4.3	4.3	5.4
Agree	12	13.0	13.0	18.5
Strongly agree	75	81.5	81.5	100.0
Total	92	100.0	100.0	

All of the respondents (n=92) for the study reported having already obtained immunizations for their child or children. Because the vast majority of the respondents reported to strongly agreeing to have or to continue to have their child or children immunized, the five responses were condensed into two categories. The two categories were entitled “strongly agree” and “agree or lower”. The results of frequencies using these two categories can be found in Table 3. The demographic characteristics for both groups can be found in Table 4 which shows that the majority of the respondents were between the ages of 30-35, the strongly agree group had more married respondents, and the educational level of respondents of both groups were high.

Table 3.
Parent/Caregiver Intention of Vaccination in Two Categories

	Frequency	Percent
Agree or lower	17	18.5
Strongly agree	75	81.5
Total	92	100.0

Table 4.
Demographics by Vaccination Group

	Agree or Lower (n=17)		Strongly Agree (n=75)	
Variables	Frequency	Percentage	Frequency	Percentage
Age of Caregiver				
18-21	0	0.0	3	4.0
22-25	3	5.8	5	6.7
26-30	3	5.8	11	14.7
30-35	7	41.0	32	42.7
36-40	4	23.5	6	8.0
40-45	0	0.0	6	8.0
45+	0	0.0	6	8.0
Marital Status				
Single	9	52.9	26	34.7
Married	6	35.2	37	49.3
Divorced	1	5.8	8	10.7
Cohabitating	1	5.8	2	2.7
Mother's Education				
Junior High School	0	0.0	1	1.3
High School	6	35.3	16	21.3
College	11	64.7	50	66.7
Grad School	0	0.0	8	10.7
Child's Healthcare Provider				
Private clinic	10	58.8	62	82.7
Public clinic	7	41.2	8	10.7
No clinic	0	0.0	3	4.0

Searching for Hardships and Obstacles to Shots (SHOTS) survey

Perceived barriers to immunizations were measured by the Searching for Hardships and Obstacles to Shots (SHOTS) survey. The survey consisted of 23 items, and each item is rated on an ordinal scale from zero to four reflecting the degree to which the item is considered to be a problem for the parent. The SHOTS survey was analyzed to determine the frequency and percent of parents' responses to SHOTS items by level of agreement. The results of this analysis were

categorized into three categories: agree or strongly agree, neutral, or disagree or strongly disagree. If the respondent chose agree or strongly disagree, this meant they viewed the item to not be problem for them. The results of this analysis can be found in table 5. As seen in the table, the two items rated with the highest percentage of problem were: "If something happened to my child after a shot, I would feel like it was my fault" (21.7%) and "I worry about how safe shots are "(20.6%).

Table 5.
Frequency and Percent of Parents' Responses to SHOTS Items by Level of Agreement

	Rating of Not a Problem					
	Agree or Strongly Agree		Neutral		Disagree or Strongly Disagree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Didn't know when my child needed to get their shot	81	88.1	1	1.1	10	10.9
Did not know where to take child for shots	82	89.1	0	0	10	10.9
No available appointments at clinic	82	89.2	1	1.1	9	9.8
The shots cost too much	79	85.9	3	3.3	10	10.9
The clinic/facility wasn't open at a time I could go	81	88.1	2	2.2	9	9.7
I didn't have a ride to the clinic	85	92.4	1	1.1	6	6.6
I didn't have someone to take care of my other children	83	90.2	1	1.1	8	8.7
My child was sick and could not get their shots	83	90.2	2	2.2	7	7.6
The clinic wait was too long	74	80.4	4	4.3	14	14.2
I couldn't get time off from work	77	83.7	3	3.3	11	11.9
Getting my child in for shots is too much trouble	86	93.5	0	0	6	6.5
I just forgot	80	86.9	3	3.3	9	9.8
I'm scared of the side effects of the shots	69	75	8	8.7	15	16.3
I worry about the number of shots my child gets at one time	66	71.8	10	10.9	16	17.4
I worry about what is in the shots	62	67.4	12	13	18	19.5
I worry my child may get sick from the shot	66	71.7	11	12	15	16.3
If something happened to my child after a shot, I would feel like it was my fault	67	62	15	16.3	20	21.7
I worry about how safe shots are	62	67.3	11	12	19	20.6
I don't believe in getting kids shots	75	81.5	5	5.4	12	13
I don't think keeping my child up-to-date on shots is important	79	85.9	3	3.3	10	10.9
I don't think the shots work to prevent diseases	82	89.1	0	0	10	10.8
My health care provider told me NOT to get my child his/her shots	83	90.2	1	1.1	9	9.8
I don't think kids shots are important	80	87	1	1.1	11	12

Research Aim # 1: The Perceptions of Barriers Held by African American Mothers towards Immunization of Pre-School Children

Mean scores on the SHOTS and the three subscales Access, Concerns, and Importance for the two groups from the vaccinate variable was conducted using an ANOVA. The group statistics can be found in Table 6. The range for the total SHOTS score was 0 to 92. The range for the Access to Shots subscale was 0-48, the Concerns about Shots subscale was 0-24, and the Importance of Shots subscale was 0-20. The higher the composite scores, the more problematic that group of items are for parents getting their children immunizations. There was a significant difference between scores for vaccinate group 1 (agree or lower) (M=16.06, SD=7.12) and scores for the vaccinate group 2 (strongly agree) (M=4.15, SD=5.64); conditions t (90) =7.48, $p < .001$. In order to further understand the participants' perceptions of the importance of immunizations and their feelings towards safety, ability to access resources, and need for immunizations, an analysis of each item was performed. For the Access subscale, the agree or lower group had the most problem with the clinic wait times and the strongly agree group had the most problem with the cost of the shots. For the Concerns subscale, shot safety was the major concern for the agree or lower group and the strongly agree group scored the highest on "If something happened to my child after a shot, I would feel like it was my fault". The Importance subscale showed that "I don't believe in getting my kids shots" item had the highest mean score for each group. The results are shown in Table 7, 8, and 9.

Table 6.
Scores on SHOTS Survey and Subscales According to Group Classification

	Agree or Lower (n=17)		Strongly Agree (n=75)		
	Mean Score	SD	Mean Score	SD	P
SHOTS Access	15.18	17.33	2.85	7.66	.000
SHOTS Concerns	16.06	7.11	4.15	5.63	.000
SHOTS Importance	8.65	7.05	1.11	3.63	.000
SHOTS Total Score	39.88	25.73	8.11	13.49	.000

Table 7.

Access Subscale to Searching for Hardships and Obstacles to Shots Means by Vaccination Level

	Agree or Lower*			Strongly Agree**			Total	
Access Item ***	Mean Score	SD	Percent of Sum	Mean Score	SD	Percent of Sum	Mean Score	SD
Didn't know when my child needed to get their shot	1.35	1.90	54.8	.25	.84	45.2	.46	1.18
Did not know where to take child for shots	1.35	1.90	59.0	.21	.86	41.0	.42	1.20
No available appointments at clinic	1.12	1.80	48.7	.27	.89	51.3	.42	1.15
The shots cost too much	1.41	1.80	52.2	.29	.96	47.8	.50	1.22
The clinic/facility wasn't open at a time I could go	1.18	1.70	54.1	.23	.83	45.9	.40	1.10
I didn't have a ride to the clinic	1.00	1.66	70.8	.09	.50	29.2	.26	.90
I didn't have someone to take care of my other children	1.24	1.75	67.7	.13	.55	32.3	.34	.99
My child was sick and could not get their shots	1.06	1.60	52.9	.21	.68	47.1	.37	.97
The clinic wait was too long	1.82	1.85	50.8	.40	.94	49.2	.66	1.28
I couldn't get time off from work	1.41	1.70	49.0	.34	.93	51.0	.54	1.18
Getting my child in for shots is too much trouble	.88	1.65	62.5	.12	.59	37.5	.26	.92
I just forgot	1.35	1.84	50.0	.31	.92	50.0	.50	1.20

Note.*n=17 (18.5%) **n=75 (81.5%) *** Possible range for each item is 0 to 4.

Table 8.

Concerns Subscale to Searching for Hardships and Obstacles to Shots Means by Vaccination Level

	Agree or Lower*			Strongly Agree**			Total	
Item	Mean Score	SD	Percent of Sum	Mean Score	SD	Percent of Sum	Mean Score	SD
I'm scared of the side effects of the shots	2.65	1.54	55.6	.48	1.07	44.4	.88	1.44
I worry about the number of shots my child gets at one time	2.18	1.67	42.0	.68	1.19	58.0	.96	1.41
I worry about what is in the shots	2.71	1.40	43.8	.79	1.23	56.2	1.14	1.46
I worry my child may get sick from the shot	2.82	1.55	51.1	.61	1.05	48.9	1.02	1.44
If something happened to my child after a shot, I would feel like it was my fault	2.82	1.07	43.2	.84	1.31	56.8	1.21	1.48
I worry about how safe shots are	2.88	1.36	46.7	.75	1.23	53.3	1.14	1.50

Note.*n=17 (18.5%) **n=75 (81.5%) *** Possible range for each item is 0 to 4.

Table 9.
Importance Subscale to Searching for Hardships and Obstacles to Shots Means by Vaccination Level

	Agree or Lower*			Strongly Agree**			Total	
Importance Item***	Mean Score	SD	Percent of Sum	Mean Score	SD	Percent of Sum	Mean Score	SD
I don't believe in getting kids shots	1.94	1.60	58.9	.31	1.00	41.1	.61	1.29
I don't think keeping my child up-to-date on shots is important	1.94	1.78	70.2	.19	.77	29.8	.51	1.23
I don't think the shots work to prevent diseases	1.76	1.64	66.7	.20	.75	33.3	.49	1.14
My health care provider told me NOT to get my child his/her shots	1.12	1.80	54.3	.21	.83	45.9	.38	1.12
I don't think kids shots are important	1.88	1.87	68.1	.20	.82	31.9	.51	1.26

Note.*n=17 (18.5%) **n=75 (81.5%) *** Possible range for each item is 0 to 4.

Prior to running a one-way analysis of variance (ANOVA), a boxplot was used to identify outliers and a Shapiro-Wilk Test for Normality to determine whether the data were normally distributed for levels of education. There were outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box. However, the outlying values were not extreme; thus, the principal investigator chose to keep all of the data in its original form and without transformation and run a one-way ANOVA for education. Of note, the data were relatively normally distributed with parametric statistical methods appropriate given that non-normality does not affect Type I error rate substantially and the one-way ANOVA can be considered robust to non-normality (Maxwell & Delaney, 2004).

The distribution of all three SHOTS subscales and total SHOTS score were similar across all levels of education After performing a one-way ANOVA, it was determined that the assumption of homogeneity of variances was violated, as assessed by Levene's Test of Homogeneity of Variance for all three SHOTS subscales and total SHOTS score across the level

of education ($p \leq .05$). This means that the standard one-way ANOVA cannot be interpreted. Instead a Welch ANOVA was used. If the equal variances test reveals that the group variances are significantly different, the one-way ANOVA can yield an inaccurate P-value; the probability of a false positive may be greater than five percent. The most common option is Welch's ANOVA which is based on the usual ANOVA *F* test but, the means are weighted by the reciprocal of the group mean variances. Using this method, the SHOTS Access, Concerns, and Total scales were statistically significantly different between levels of education as shown in Table 10.

Table 10.
Welch's ANOVA based on Educational Level

Scale	Education Level	N	Mean	SD	*df*	F	*p*
SHOTS-Access	HS	22	12.05	17.28	2,88	6.55	.000
	UG	61	3.25	7.66			
	GS	8	.25	.46			
	Total	91	5.11	11.18			
SHOTS-Concerns	HS	22	7.41	7.79	2,88	.96	.035
	UG	61	6.48	7.80			
	GS	8	3.13	2.85			
	Total	91	6.41	7.52			
SHOTS-Importance	HS	22	4.59	6.90	2,88	2.85	.063
	UG	61	2.11	4.83			
	GS	8	.00	.00			
	Total	91	2.53	5.32			
SHOTS-Total	HS	22	24.05	27.22	2,88	4.34	.000
	UG	61	11.84	17.78			
	GS	8	3.38	3.11			
	Total	91	14.04	20.55			

Note. HS=High School, UG=Undergraduate College, GS=Graduate School

The Games-Howell post-hoc test was performed to compare possible combinations of group differences, provide confidence intervals for the differences between group means, and examine whether the differences were statistically significant for education. The robust tests of

equality could not be performed for the SHOTS Importance sub-scale because at least one group had zero variance. For the SHOTS Access subscale, there was a decrease in scores across the levels of education. The higher the education the lower mean scores for the SHOTS Access subscale. Games-Howell post-hoc analysis revealed that the decrease from high school to graduate school, college to graduate school, was statistically significant for the Access and Importance subscales. For the SHOTS total score, Games-Howell post-hoc analysis revealed that the decrease from high school to graduate school, as well as the decrease from college to graduate was also statistically significant as shown in Table 11. The SHOTS Concerns subscale did not reveal any significant differences among educational levels.

Table 11.
Post-Hoc Analysis for Education Variables

Scale	Educational Level (I)	Educational Level (J)	Mean Difference (I-J)	SE	*p*
Shots Access	High School	College	8.80	3.81	.07
		Grad School	11.80*	3.69	.01
	College	Grad School	2.99*	.99	.01
Shots Concerns	High School	College	.93	1.94	.88
		Grad School	4.28	1.94	.09
	College	Grad School	3.35	1.42	.07
SHOTS Total	High School	College	12.21	6.23	.14
		Grad School	20.67*	5.91	.01
	College	Grad School	8.46*	2.53	.00

Note. *The mean difference is significant at the 0.05 level.

A one-way ANOVA was conducted to examine whether means scores on the SHOTS total instrument and its three individual subscales differed by age groups. Participants were initially classified into seven groups: ages 18 to 21 (*n*= 3), ages 22 to 25 (*n*= 8), ages 26 to 30 (*n*= 14) ages 31 to 35 (*n* = 38), ages 36 to 40 (*n*= 10), 40 to 45 (*n*= 6) and 46 and older (*n*=6). Due to small numbers in some categories, the groups were collapsed into two groups consisting of ages 30 and below (*n*=25) and ages 31 and older (*n*=61). As seen in table 12, mean age was similar

and not statistically different across age groups for the SHOTS total instrument and the 3 subscales.

Table 12.
ANOVA by Age of Participants

Scale	Age	*n*	Mean	SD	*df*	*F*	*p*
SHOTS-Access	Age						
	≤30	25	5.72	12.811	1		
	Age					.026	.87
	≥31	61	5.28	10.946	84		
	Total	86	5.41	11.443	85		
SHOTS-Concerns	Age						
	≤30	25	5.92	7.303	1		
	Age					.199	.66
	≥31	61	6.74	7.889	84		
	Total	86	6.50	7.689	85		
SHOTS-Importance	Age						
	≤30	25	3.00	6.384	1		
	Age					.143	.71
	≥31	61	2.51	5.075	84		
	Total	86	2.65	5.453	85		
SHOTS-Total	Age						
	≤30	25	14.64	23.441	1		
	Age					.001	.98
	≥31	61	14.52	20.084	84		
	Total	86	14.56	20.973	85		

A one-way ANOVA was conducted to examine whether means scores on the SHOTS total instrument and its three individual subscales differed by marital status. Participants were initially classified into five groups: Single (*n*= 34), Married (*n*= 43), Divorced (*n*= 9) Widowed (*n* = 0), and Cohabitating (*n*=3). Due to small numbers in some categories, the groups were collapsed into two groups consisting of co-habitating/married (*n*=46) and single/divorced (*n*=44). As seen in Table 13, mean marital status was similar and not statistically different across marital groups for the SHOTS total instrument and the three subscales.

Table 13.
ANOVA by Marital Status

Scale	Marital Status	N	Mean	SD	*df*	*F*	*p*
SHOTS-Access	Single/Divorced	44	7.09	13.30	1	2.39	.13
	CH/Married	46	3.46	8.58	88		
	Total	90	5.23	11.23	89		
SHOTS-Concerns	Single/Divorced	44	6.43	7.25	1	.00	.98
	CH/Married	46	6.39	7.96	88		
	Total	90	6.41	7.58	89		
SHOTS-Importance	Single/Divorced	44	3.36	6.41	1	1.99	.16
	CH/Married	46	1.78	4.01	88		
	Total	90	2.56	5.35	89		
SHOTS-Total	Single/Divorced	44	16.89	23.83	1	1.47	.23
	CH/Married	46	11.63	16.87	88		
	Total	90	14.20	20.62	89		

Note. CH=Co=habituating.

A one-way ANOVA was conducted to determine if the SHOTS total scores and three individual subscales were different for the groups of healthcare provider. Participants were initially classified into three groups: private clinic (*n* =72), public clinic (*n* = 14), and no clinic (*n*=3). Due to small numbers in some categories, the groups were collapsed into two groups consisting of private health clinic (*n*=72) and public health clinic (*n*=18). As seen in Table 14, means were similar and not statistically different across health clinic groups for the SHOTS Concerns and instrument and the 3 subscales.

Table 14.
ANOVA by Clinic Type

Scale	Clinic	N	Mean	SD	*df*	*F*	*p*
	Private	72	3.69	9.03	1		
SHOTS-Access	Public	18	11.39	16.40	89	3.02	.07
	Total	90	5.23	11.23	90		
	Private	72	5.82	7.42	1		
SHOTS-Concerns	Public	18	8.78	7.94	89	3.51	.16
	Total	90	6.41	7.58	90		
	Private	72	2.15	4.92	1		
SHOTS-Importance	Public	18	4.17	6.72	89	1.94	.25
	Total	90	2.56	5.35	90		
	Private	72	11.67	18.48	1		
SHOTS-Total	Public	18	24.33	25.75	89	4.03	.06
	Total	90	14.20	20.62	90		

A one-way ANOVA was conducted to examine whether means scores on the SHOTS total instrument and its three individual subscales differed by type of healthcare provider. Participants were initially classified into three groups: Private health insurance (*n*=57), public health insurance (*n*=34) and no health insurance (*n*=0). Due to no scores for no health insurance, the groups were collapsed into two groups consisting of Private health insurance (*n*=57) and public health insurance (*n*=34). As seen in Table 15, means were similar and not statistically different across health insurance groups for the SHOTS total instrument and the 3 subscales.

Table 15.
ANOVA by Health Insurance Type

Scale	Insurance Type	N	Mean	SD	*df*	*F*	*p*
SHOTS-Access	Private health insurance	57	3.63	8.647	1		
	Public health insurance	34	7.79	14.225	88	7.24	.13
	Total	91	5.19	11.172	89		
SHOTS-Concerns	Private health insurance	57	5.25	6.621	1		
	Public health insurance	34	8.26	8.656	88	2.23	.09
	Total	91	6.37	7.543	89		
SHOTS-Importance	Private health insurance	57	1.93	5.102	1		
	Public health insurance	34	3.53	5.620	88	2.06	.18
	Total	91	2.53	5.328	89		
SHOTS-Total	Private health insurance	57	10.81	17.725	1		
	Public health insurance	34	19.59	23.811	88	5.72	.07
	Total	91	14.09	20.533	89		

Research Aim 2: Evaluation of the Relationship between Health Care Literacy and Perceived Barriers to Immunizations

For Aim # 2 Pearson correlation coefficients were calculated between scores on the REALM and scores on the SHOTS and its three individual subscales (Table 16). There was no correlation (r =.004) between the REALM score and the SHOTS access subscale. There was a small, non-significant positive correlation (r = .123) between the REALM score and the SHOTS Concerns subscale. There also was a lack of association between the REALM score, SHOTS Importance subscale and SHOTS total score. Thus, there was little to no evidence of an association between REALM scores and scores on the SHOTS and its three individual subscales.

A one-way ANOVA was also conducted to determine if the REALM total scores were different for the two groups of vaccination. The means for REALM total scores were similar and not statistically different across the groups of vaccinate as seen in Table 17.

Table 16.
Pearson Correlation Matrix among REALM Scores and SHOTS

Item	Realm Score	SHOTS-Access	SHOTS-Concerns	SHOTS-Importance	SHOTS-Total
Realm Score	-				
SHOTS-Access	-.004	-			
SHOTS-Concerns	.123	.434**	-		
SHOTS-Importance	.080	.799**	.542**	-	
SHOTS-Total	.064	.911**	.744**	.893**	-

** Correlation is significant at the 0.01 level (2-tailed)

Table 17.
ANOVA based on REALM Score

Group	*df*	F	*n*	*p*	Mean	SD
Strongly Agree	1,89	1.12	74	.29	64.6	4.96
Agree or Lower			17		63.3	1.54
Total	90		91		63.54	4.54

Research Aim # 3: Reliability and Validity of the SHOTS survey

For Aim #3, coefficient alphas were calculated to estimate internal reliability consistency of the SHOTS and the three subscales within the sample of African American mothers. In addition, an item analysis was conducted among all 23 items of the SHOTS to examine for sufficient range of response. The SHOTS questionnaire was employed to measure different, underlying constructs. One construct, 'SHOTS access', consisted of 12 questions. The scale had a high level of internal consistency, as evidenced by a Cronbach's alpha of 0.96. The SHOTS concerns scale (n =6) also had a high level of internal consistency, as evidenced by a Cronbach's alpha of 0.93. In addition, the SHOTS importance scale (n= 5) also had a high level of internal consistency, as evidenced by a Cronbach's alpha of 0.93.

To assess the criterion-related validity of the instrument, an independent-samples t-test was conducted to compare mean scores for each group of vaccination categories. The SHOTS scores were able to differentiate between mothers who “strongly agreed” to have their child or children immunized and those belonging to the vaccination category “agreed or lower” to have their children immunized. There was a significant difference between scores for vaccinate group 1 (agree or lower) (M=16.06, SD=7.12) versus scores for the vaccinate group 2 (strongly agree) (M=4.15, SD=5.64) P <.05, which was provided in Table 5.

CHAPTER FIVE: DISCUSSION, IMPLICATIONS AND CONCLUSION

This chapter presents a discussion of the literature review and results obtained from the statistical analyses. It is separated into four sections. The first segment presents the deductive interpretations of the findings; the second section highlights limitations and weaknesses of the study; the third section discusses implications of study, and the final section describes conclusion from the research.

Discussion

The aim to reduce the existing health disparities due to the lack of or decrease in immunizations is a significant issue in the U.S today. This issue is more prevalent among children and youth belonging to diverse racial and ethnic groups (Niederhauser & Stark, 2005). Similarly, it was shown that compared to white children, African American children have lower coverage rates of childhood immunizations (Findley, Mannikko, & Molinari, 2009; Luman, & Barker, 2005; Shaw, & Santoli, 2006). According to previous studies, various factors were identified that may influence the low rates of vaccination in African American children. However, this study was conducted specifically to evaluate the various factors which direct the African American mothers' childhood vaccination decisions and to recognize the specific barriers to childhood immunizations in this sample, including the influence of health literacy on the mother's decisions. The literature indicates that there is evidence to suggest that under-

vaccinated children are more likely to have a mother who is young and African American (Luthy, Beckstrand, & Peterson, 2009).

The chief focus of this study was to investigate the African American mothers' intention to have their children vaccinated. Based on the results of this study, it was determined that a majority of the mothers (n=92) were willing to have their children vaccinated. The results from this sample of African American mothers were similar to the multi-racial sample of mothers in the findings of Gust, Darling, Kennedy, & Schwartz, (2008) and Salmon et al. (2009), who found that recently, the issue regarding vaccination safety has greatly improved since the public has increased concerns regarding their safety, which is contributed by various resources such as the internet, communication, and awareness of the immunization hazards and benefits (Burns, Walsh, & Popovich, 2010). However, these findings were inconsistent with the preexisting literature where the predominately white mothers showed less concern toward vaccination due to various issues. As opposed to the finding of this study, Brown et al. (2010) reported that the low rate of vaccination in the children was due to the fact that more and more parents were delaying the immunizations of children owing to certain complex beliefs.

Barriers to Immunizations

Based on the results of the study, when the level of education was analyzed, it was seen that the there was a decrease in SHOTS scores across the levels of education which indicated that education has a significant association with parental perception for vaccinating their children. The higher the mothers 'education their lower means scores for education. These results were consistent with the finding of Shui, Weintraub, and Gust (2006) who reported that a lower education level and income are major factors associated with high level concerns regarding immunizations.

However, SHOTS concerns scores did not differ statistically by marital status. Previous literature, from the National Immunization Survey (NIS) (2003-2004) states that the marital status of the mother has a substantial impact on her decision for immunization. SHOTS total scores across levels of age were not statistically significant, whereas the literature has shown that under-vaccinated children have increased chances of having a young mother (Luthy, Beckstrand, & Peterson, 2009). On the other hand, another study stated that younger mothers gave more comprehensive answers compared to the older mothers (Wilson et al., 2008).

Relationship between Health Literacy and Barriers

The second aim of the study was to evaluate the relationship between health care literacy and perceived barriers to immunizations using the Rapid Estimate of Adult Literature in Medicine. Based on the findings of the study, it was concluded that there were not significant relationships between health literacy and barriers to immunizations. The findings of the study were inconsistent with research conducted by Sanders, Shaw, Guez, Baur, & Rudd, (2009). Being that this study's sample had a higher educational level, this may account for the difference in results. Similarly, the National Center for Education Statistics (2006) also concluded that the difference between complex health information and decreased level of parental health literacy skills is a major factor of causing child health problems and delay in immunizations. Moreover it was estimated in the 2003 National Assessment of Adult Literacy of United States, that 36% of the adult population lacks the ability to perform even simple child preventive health tasks, among which use immunization schedule is the biggest issue. Similarly, Pati et al., 2010) stated in his study that, mothers having a lower literacy skills exhibited a lack of knowledge and understanding regarding vaccination safety. Moreover, they had less knowledge regarding immunization safety's risks and benefits. These mothers had limited vocabulary skills regarding

the vital concepts, such as being able to communicate the risks, benefits, and safety of childhood vaccines.

Validity and Reliability of SHOTS

The third aim of the study was to estimate the reliability and validity of the SHOTS survey. As described, this instrument is designed to identify apparent barriers which come up regarding immunizations (Niederhauser, 2010). The survey is quick and quite easy to understand. It is formulated at the fourth grade reading level that takes approximately five to ten minutes for completion. There are total 23 items evaluated in the survey, and depending on the degree, the severity of problem is considered for the parent by addition of the subscales. The three subscales of the SHOTs survey include, access to shots subscale (0-48), concerns to shots subscale (0-24), and importance of Shots subscale (0-20). The reported Cronbach's alpha of .93 in the study supports the internal consistency reliability of the SHOTS instrument in the study population.

Initially, when the testing of the SHOTS tools was done, it produced positive results regarding the validity. Factor analysis was done in the initial study to provide support for construct validity. For criterion-related validity the SHOTS scores were able to differentiate between the children who were up-to-date with their immunizations from those who were not. However, in order to support the validity of the survey, there is still need for further testing among more populations and studies. Therefore, in this study the SHOTS survey was tested for validity specifically in this African American sample, and as a result it was deduced that the scores on this survey would be reliable and valid based on the results. These findings of the study

were consistent with Niederhauser (2010), who was of the opinion that the SHOTS instrument was reliable for determination of the immunization status.

Theoretical Framework

For the purpose of this study, the six major health belief model constructs were used to direct the development of the study by assessing psychosocial mediators of vaccine acceptance or declination, (a) *perceived susceptibility* to vaccinations, (b) *perceived severity* to vaccinations, (c) *perceived benefits* of vaccination, (d) *perceived barriers* to vaccinations (e) *self-efficacy* for obtaining a vaccination, and (f) *cues to action* to vaccinate. The focus of the study was primarily the perceived barriers to vaccination, which were measured by calculating the scores on the SHOTS subscales. These subscale scores and differences in scores also measured the other constructs of the Health Belief Model using the questions in the SHOTS survey and demographic survey. By doing this, we were able to determine which areas were most problematic for the women and how their demographic variables did or did not factor into the results.

Using the Triandis model of the Theory of Reasoned Action to identify the factors that influence African American mother's vaccination decisions for their preschool children offered insight into how previous and continued vaccination history can relate to the likelihood of getting their child or children vaccinated (Landis et.al, 1978). The addition of the habit variable in the Triandis model offered a view into how preceding vaccination history can correspond to vaccination reception and the probability of getting their child vaccinated in the future. The Triandis model includes attitudes, perceived consequences, and social influences which were measured in the SHOTS survey. By analyzing the results of the study, we determined how those constructs from the model can be applied to the potential barriers of the mothers or caregivers

getting vaccinations for their child. This theory also includes facilitating conditions such as ease of getting to a clinic for a vaccination and behavioral intention, consisting of attitude about the activity like obtaining a vaccination was prudent. The social influences including healthcare provider recommended vaccination and the value of the consequences of the activity, such as the vaccination prevents the disease were measured in this study. Using the results of this study we could determine how the differences in SHOTS total score and the three subscales differed among the two groups of women by their vaccination intent for their child.

Implications for Nursing

The aim of this study was to gain increased knowledge of the perceptions of women of African American descent who were primary caretakers towards immunizing their children. This study did not demonstrate that health literacy had a significant relationship as a barrier to the immunization of children in this community. All of the respondents reported having already obtained some immunizations for their child or children, however nearly 20% did not strongly agree to continue to get their child or children immunized. A large majority of those reporting that they did not strongly agree to further immunizations were among the least educated surveyed. The finding that the level of education did play a role in the primary caretaker's decisions to immunize their children was of particular interest in that other factors surveyed such as marital status and age did not.

Implications for Future Research

The implications for further research from this study are multifold. The study result regarding educational status presents the need to deduce through exploration as to why education might play such a pivotal role in ensuring that female caretakers within the African American

community continue to have their children immunized. With the advents of this study, certain implications in the field of research are likely to take place. The aim of the study was to gain the perception of African American women regarding the vaccination of their children; therefore as more of similar studies are introduced, it can help to raise the level of awareness regarding vaccination among other races and ethnicities that have the same beliefs as these African American mothers. All of the respondents reported having previously obtained immunizations for their child or children, however almost 20% failed to strongly agree to continue to get their child or children immunized. Further research is needed to explore factors that influence mothers and their beliefs in regards to immunizations. According to the analysis of this study, the higher educated women are getting the message that immunizations are important and also have fewer problems with access and concerns with immunizations. Future studies can be done in this population to determine when and where they are receiving their information. This will assist women who do not strongly agree to vaccinate their children. In addition further research can be done in other populations of women, such as those living in rural areas, of different ethnicities and races, and women who do not attend church. . Potential research questions to pose would include:

1. Is there a level of education that a parent or caretaker needs to achieve prior to having the perception that immunizations are enough of a priority to continue to have their children immunized?
2. Is there an internal drive, characteristic, personality type difference that exists between the parents or primary caretakers who pursue a higher education level and those who do not that might prevent them from perceiving that immunizations are important?

3. Is there a difference in the types of healthcare related services received by parents or caretakers with a higher education level and those with a lower education level and how does this impact their decisions regarding immunizations?
4. Would this study have similar results if offered to minority women populations or are these results limited to female African Americans?
5. Would this study have similar results if offered to females who are primary caretakers within the general population including minority and non-minority participants?
6. Would this study have similar results for males who are parents or primary caretakers in the African American, other minority, and non-minority populations?
7. Is there a difference in the amount of prenatal or postnatal care and/or education among parents and caretakers in this population and is linked to the amount of higher education they possess?
8. Do these parents or primary caretakers all have access to library services, internet providers, smart technology, cable television and what role might this play in perceiving that immunizations are a priority?
9. Is there any preconceived bias or prejudice towards immunizations, health care services, or health care providers that exists within this population that influences their decision making towards immunizations?
10. Would there be similar results if the study were done on African American women who do not attend church or who live in rural areas?
11. Are the parents or primary caretakers immunized?

12. Are parents and caregivers with higher education levels educating their children about immunizations by modeling or self-perception versus an external source of information and are these children more inclined to continue this perception later in life?
13. Are parents and caregivers with lower education levels educating their children about immunizations by modeling or self-perception versus an external source of information and are these children more inclined to continue this perception later in life?

Implications for Education

Given that health literacy did not show a significant relationship with barriers to immunizations in this sample, but education was a factor, education should be focused on addressing the concerns regarding vaccinations. Immunization education should be aimed towards the parents and caregivers with lower educational levels. A variety of methods should be implemented to specifically cater to this population. The traditional methods of education such as brochures and handouts may not be as informative as previously thought. Perhaps other methods such as using social media such as Twitter and Facebook, can enhance the educational experience regarding vaccines. This generation of women may need something or someone they can relate to such as a celebrity with a young child, who may help relieve some of their concerns or fears by providing factual vaccination information. To increase their knowledge base, the education can be provided pre-conception, prenatally, and during the post-natal period. Educational programs can be provided in church by peers in their same age groups, to target women such as the respondents in this study. Information provided in such sessions, could afford additional education regarding the vaccination schedule and information to help alleviate concerns.

Immunizations are a vital part of herd immunity and the cornerstone to preventive care in every community in the United States. This study can provide insight towards gearing education to a special population. According to this study, the most educated primary care providers in this African American community feel very strongly about having their children immunized and continuing to keep up their children's immunizations. This group also appeared to have fewer concerns regarding immunizations or with having access to them. This was not the case for less educated African American female caregivers. There are several implications that this fact could have in education.

1. Did this educated population have concerns about immunizations at any time? If so, what changed their perception about immunizations? Did education play a role in this change?
2. Are there currently community resources or classes being offered to parents and caregivers with lower education levels about the importance of vaccinating their children?
3. Do parents and caretakers with lower education levels have access to community resources or know about community resources?
4. What is the best method to present immunization education to parents and caregivers with lower education levels and when should it be implemented? Is this subgroup less inclined to learn from traditional education methods such as brochures or handouts versus social media such as phone apps or face-book? Would this population benefit from having a peer or celebrity with whom they might relate or see as a role model provide vaccination education?
5. When should immunization education to parents and caregivers with lower education levels be presented? Is this something that should be done in middle school or primary

school? Are these caretakers dropping out of high school and completing a GED? Should this be done during prenatal care or postnatal care? Would these women benefit from having an educational session in their church?

6. Are traditional healthcare providers failing to relay information to African American female care-takers that they perceive as being un-educated?
7. Is the material being presented to African American female parents or caretakers designed at too high an education level to be understood by people with a lower education level?

Implications for Practice

This study can greatly influence the quality of practice and healthcare provision. The findings of this study imply that is essential to have a certain amount of communication between parents, nurses, and pediatric healthcare providers. The items on the Access sub-scale that scored higher such as long wait times, increased cost, forgetting, and not knowing when and where to take the child/children for vaccinations can all be learning opportunities for healthcare providers. Pediatric offices ought to consider having vaccination only appointments, increasing their hours outside of the traditional nine to five office hours. This can help lower the costs associated with the visits, as well as shorten wait times. These healthcare service providers can also provide reminder text-messages to help parents keep up with immunization schedules. The development and usage of a phone application can also assist parents to uphold the vaccination schedule, provide reminders, and reliable education. A reliable source of information readily at their fingertips can also help to alleviate some of the concerns regarding immunizations, as shown in this study, the Concerns sub-scale had the highest scores compared to the Access and Importance sub-scales.

Strengths of Study

It is essential to include the strength of a study as it is believed that good research provides far more than the critical appraisal of a series of articles, it also includes the limitations and the strengths of the study as, by the identification of these factors, the future research can easily be governed (Cormack, 1991). Equally, Polit & Beck (2010) also believe that the importance of these findings should be acknowledged within the overall strengths and limitation in the study.

The strength of this study stems from the fact that this study is one of its kind, as it is a quantitative study which focuses on the broad perspective of determining the various factors that serve as barriers for the African American mothers in achieving vaccination for their pre-school children. A similar past study focused only on the maternal literacy (Pati et al., 2011) and trust in mothers' attitudes regarding vaccination as the causative factor. This study used a quantitative method of study, as it carefully analyzes the certain concepts and variables of a study. Not only did the results provide an in depth understanding to the identification of the actual barriers, but it also provided a statistical inference. Moreover, the study employs an easy and simple 4th grade level survey form to its participants, making it easier for them to understand and attempt accordingly.

Furthermore, there is evidence to suggest that the role of health literacy in child health care has been studied less comprehensively than health literacy in adult health (DeWalt & Hink, 2009; Sanders, Thompson, & Wilkinson, 2007), whereas one of the aims of this study was to determine the relationship among parent's healthcare literacy and vaccination perception for their children. The study was one of its kind as it specifically targeted African American mothers with various demographics, which gave a better understanding of the significant insights of

immunization concerns of the African American mothers and the factors affecting their concerns about immunizations.

This study also employed the use of SHOTs survey as the primary measurement instrument. It is a newer research tool which is used to determine the perceived barriers to immunizations. With the introduction of this survey in the study, the validity and reliability for use of this tool in African American mothers is enhanced.

Limitations of the Study

While conducting a dissertation, it is not possible to include every aspect of the topic, and often certain issues are left unaddressed. However, it is desirable to highlight the shortcomings of the literature as it facilitates further research and exploration of that topic. Nieswiadomy (1993) also believed that it is essential for the researcher to openly acknowledge the limitations of a study.

The limitations of this study include having a highly educated group of women that attend one church. The research lacked diversity among the participants as it did not include African Americans from all backgrounds. It only examined the views of the African American mothers from a certain area, and hence the participants were not representative of a national or local sample of African American mothers. As a result, this is likely to limit the generalizability of the findings in the research. The respondents were also attendees of one church. If there was an underlying religious issue that affected the responses that should also be taken into consideration.

Beyond the African American mothers in this sample, the findings of the study could not be applied to a larger population. Despite the inclusion of certain demographic characteristics in

the study, there were no comparison groups which would help to ascertain whether the differences related to these demographics were authentic or not. Moreover, this study consisted of individuals who were volunteers, therefore it was not possible to determine which individuals were willing to take part in the study themselves, and which were not; there was no information regarding the individuals refusing to be included in the study. Mothers who did not vaccinate their children may not have volunteered to be a respondent in this study, thus biasing the results.

Conclusion

As a result, it can be concluded that although decreasing, a disparity in US still remains today regarding the immunization status of African American children. These children have lower rates of immunization as compared to white children. Therefore, owing to the health disparity in the African American children, it is essential to address this issue. The major factors being analyzed in this study by the use of the SHOTS survey were various demographic factors of these mothers, including socio-demographic characteristics of the participants, such as age, age of child or children, number of children in the home, marital status, child's health insurance status, child's health care provider status, mother's educational level, and mother's occupation, as a result it was determined that only one of these factors had an effect on the decisions of the mother regarding vaccination of their children. The mother's education had a significant effect on whether the child was vaccinated or not. The other factors were not found to be significant.

In addition, the second aim of the study was to observe the impact of the health literacy rate of the mothers, which also produced insignificant results. As a result, it can be concluded that in order to improve the vaccination rate of the African American children today, the first step is to approach the mothers and alter their complex beliefs regarding the misconceptions of vaccination. Moreover, it is also recommended that these mothers should be given increased

awareness and education regarding the safety and hazards of immunization. This study also discussed implications of the study for research, practice and education.

In addition, based on the findings of the study it was also determined that education plays a significant role in how barriers to immunization are perceived. Hence, this research opens gates for prospective studies in the importance of immunization in African American children.

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Table 1A. Recommended Immunization Schedule for Children Aged 0 Through 6 Years—United States 2013

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	Hep B	Hep B			Hep B						
Rotavirus			RV	RV	*						
Diphtheria, Tetanus, Pertussis			DTaP	DTaP	DTaP		DTaP				DTaP
Haemophilus influenzae B			Hib	Hib	Hib	Hib					
Pneumococcal			PCV	PCV	PCV	PCV					
Inactivated Poliovirus			IPV	IPV		IPV					IPV
Influenza								Yearly			
Measles, Mumps, Rubella						MMR					MMR
Varicella						Varicella					Varicella
Hepatitis A						HEP A (2 doses)§					HEP A Series§
Meningococcal											MCV4§

Adapted from Centers of Disease Control website http://www.cdc.gov/vaccines
Note: Shaded boxes indicate the vaccine can be given during shown age range
*If Rotarix is administered at ages 2 and 4 months, a dose at 6 months is not indicated.
§Hepatitis A vaccine is recommended for high-risk children older than 2 years. Hep A vaccine must be given at least 6 months apart. Children with certain medical conditions may also need a dose of meningococcal vaccine (MCV4).

Note: Hep B= Hepatitis B vaccine, RV= Rotavirus vaccine, DTaP= Diphtheria, Tetanus, & Pertusis vaccine, Hib= *Haemophilus influenzae* B vaccine, PCV= Pneumococcal vaccine, IPV= Inactivated Poliovirus vaccine, MMR= Measles, Mumps, & Rubella vaccine, Hep A= Hepatitis A vaccine, and MCV4= Meningococcal vaccine

Table 2A Estimated Vaccination Coverage with Individual Vaccines and Vaccination Series Among Children 19-35 Months of Age by Race/Ethnicity—US, National Immunization Survey, 2010. Comparison of White children to African American children. Adapted from the NIS 2012 results http://www.cdc.gov/vaccines/stats-surv/nis/default.htm#nis

Vaccine	US National	White only, non-Hispanic	Black only, non-Hispanic
3+DTaP[¥]	94.3±0.7	94.8±0.8	94.0±1.6
4+DTaP[‡]	82.5±1.2	83.6±1.5	79.6±3.1
3+Polio[§]	92.8±0.7	93.0±0.9	92.9±1.8
1+MMR[ll]	90.8±0.8	90.9±1.0	90.9±2.1
Hib-PS[¶]	93.3±0.7	93.7±0.9	91.1±2.2
Hib-FS**	80.9±1.2	82.2±1.4	77.5±3.3
3+HepB[††]	89.7±0.9	89.3±1.1	89.7±2.2
HepB Birth dose[‡‡]	71.6±1.4	69.2±1.6	74.9±3.6
1+Var[§§]	90.2±0.8	89.8±1.0	90.4±2.1
3+PCV[‖‖]	92.3±0.8	92.7±1.0	91.2±2.0
4+PCV[¶¶]	81.9±1.1	83.5±1.4	77.1±3.5
1+ HepA***	81.5±1.1	79.4±1.4	83.1±2.9
2+HepA[†††]	53.0±1.5	52.6±1.8	52.0±3.9
Rotavirus[‡‡‡]	68.6±1.4	70.5±1.6	60.4±4.0
4:3:1[§§§]	80.5±1.2	81.3±1.5	77.9±3.2
(4:3:1:3*)[‖‖‖]	76.0±1.3	76.8±1.7	72.5±3.5
4:3:1:3*:3:1[¶¶¶¶]	71.9±1.4	72.4±1.7	68.4±3.6
4:3:1:3*:3:1:4****	68.4±1.4	69.3±1.7	64.8±3.8

[†] Children in the Q1/2012-Q4/2012 National Immunization Survey were born from January 2009 through May 2011.
[¥] 3 or more doses of any diphtheria and tetanus toxoids and pertussis vaccines (DTaP/DTP/DT).
[‡] 4 or more doses of DTaP.
[§] 3 or more doses of any poliovirus vaccine.
[ll] 1 or more doses of measles-mumps-rubella vaccine.
[¶] Primary series Hib: ≥2 or ≥3 doses of Hib vaccine depending on product type received.
** Full series Hib: ≥3 or ≥4 doses of Hib vaccine depending on product type received (includes primary series plus the booster dose).
[††] 3 or more doses of hepatitis B vaccine.
[‡‡] 1 or more doses of hepatitis B vaccine administered from birth through age 3 days.
[§§] 1 or more doses of varicella at or after child's first birthday, unadjusted for history of varicella illness.
[‖‖] 3 or more doses of pneumococcal conjugate vaccine (PCV).
[¶¶] 4 or more doses of PCV.
*** 1 or more doses of Hepatitis A vaccine.
[†††] 2 or more doses of Hepatitis A vaccine.
[‡‡‡] ≥2 or ≥3 doses of Rotavirus vaccine, depending on product type received (≥2 doses for Rotarix® [RVI] or ≥3 doses for RotaTeq® [RV5]).
[§§§] 4 or more doses of DTaP, 3 or more doses of poliovirus vaccine, and 1 or more doses of any MMR vaccine.
[‖‖‖] 4:3:1 plus the full series Hib.
[¶¶¶¶] 4:3:1 plus full series of Hib vaccine, 3 or more doses of HepB vaccine, and 1 or more doses of varicella vaccine.
**** 4:3:1 plus full series Hib vaccine, 3 or more doses of HepB, 1 or more doses of varicella vaccine, and 4 or more doses of PCV

Appendix A: Demographic form

Do you consider yourself African American? _____

Do you plan to have or continue to have your child/children immunized? (Strongly agree) (Agree) (Undecided) (Disagree) (Strongly disagree)

Have you already obtained immunizations for your child/children? _____

Age: (18-21) (22-25) (26-30) (30-35) (36-40) (40-45) (45+)

Age of child/children: _____

Number of children in the home: _____

Marital status: (single) (married) (divorced) (widowed) (cohabitating)

Child's health insurance status: (private health insurance) (public health insurance) (no health insurance) _____

Child's healthcare provider: (private clinic) (public clinic) (no clinic) _____

How many years of education have you completed (elementary, middle school/junior high school, high school, and college)? _____

What is your present occupation? _____

Appendix B: Searching for Hardships and Obstacles to Shots (SHOTS) Survey

Searching for Hardships and Obstacles to Shots (SHOTS) Survey

Below is a list of things that may cause problems for parents getting their children shots. On a scale of 0 to 4, with 0 being "not a problem at all" to 4 being a "very big problem", please CIRCLE your answers. NOTE: In this survey "'clinic" refers to the place you get your child his or her shots.

	Not a Problem				Very Big Problem
1. I didn't know when my child needed to get his/her shots	0	1	2	3	4
2. I didn't know where to take my child to get his/her shots	0	1	2	3	4
3. There were no appointments available at the clinic for shots	0	1	2	3	4
4. The shots cost too much	0	1	2	3	4
5. The clinic/facility wasn't open at a time I could go	0	1	2	3	4
6. I didn't have a ride to the clinic	0	1	2	3	4
7. I didn't have someone to take care of my other children	0	1	2	3	4
8. My child was sick and could not get his/her shots	0	1	2	3	4
9. The clinic wait was too long	0	1	2	3	4
10. I couldn't get time off from work	0	1	2	3	4
11. Getting my child in for shots is too much trouble	0	1	2	3	4
12. I just forgot	0	1	2	3	4
13. I'm scared of the side effects of the shots	0	1	2	3	4
14. I don't believe in getting kids shots	0	1	2	3	4
15. I worry about the number of shots my child gets at one time	0	1	2	3	4
16. I worry about what is in the shots	0	1	2	3	4
17. I don't think keeping my child up-to-date on shots is important	0	1	2	3	4
18. I don't think the shots work to prevent diseases	0	1	2	3	4
19. I worry my child might get sick from the shot	0	1	2	3	4
20. My health care provider told me NOT to get my child his/her shots	0	1	2	3	4
21. If something bad happened to my child after a shot, I would feel like it was my fault	0	1	2	3	4
22. I worry about how safe shots are	0	1	2	3	4
23. I don't think kids shots are important	0	1	2	3	4

Appendix C: Rapid Estimate of Adult Literacy in Medicine (REALM) Instructions

RAPID ESTIMATE OF ADULT LITERACY IN MEDICINE

(REALM) Examiner's Instruction Sheet

Terry Davis, PhD, Michael Crouch, MN, Sandy Long, PhD

The Rapid Estimate of Adult Literacy in Medicine (REALM) is a screening instrument to assess an adult patient's ability to read common medical words and lay terms for body parts and illnesses. It is designed to assess medical professionals in estimating a patient's literacy level so that the appropriate level of patient education materials or oral instructions may b3 used. The test takes two to three minutes to administer and score. The REALM has been correlated with other standardized tests (Family Medicine, 1993: 25:391-5).

Directions to the Examiner:

1. Examiner should say to the patient:
   "This survey is to help us figure out the best type of patient education materials to give you. The survey only takes 2 to 3 minutes to do"
2. Give the patient a laminated copy of the "REALM" Patient Word List.
3. Examiner should hold an unlaminated "REALM" Score Sheet on a clipboard at an angle so that the patient is not distracted by your scoring procedure.
4. Examiner should say:
   "I want to hear you read as many words as you can from this list. Begin with the first word on List 1 and read aloud. When you come to a word you cannot read, do the best you can or say "blank" and go on to the next word."
5. If the patient takes more than five seconds on a word say "blank" and point to the next word, if necessary, to move the patient along. If the patient begins to miss every word; have him/her pronounce only known words.
6. Count as an error any word not attempted or mispronounced. Score by:
   - (/) after each mispronounced word.
   - (-) after each word not attempted.
   - (+) after each word pronounced correctly.
7. Count the number of correct words for each list and record the numbers in the "SCORE box. Total the numbers and match the total score with its grade equivalent in the table below.
8. Record the "Realm" generated reading level on the Examiner's Score Sheet and in the Education/Learning History section of the Social and Patient Education History assessment form in the Medical Record.

GRADE EQUIVALENT

Raw Score	Grade Range	
0-18	3rd Grade and Below	Will not be able to read most low literacy materials; will need repeated oral instructions, materials composed primarily of illustrations, or audio or video tapes.
19-44	4th to 6th Grade	Will need low literacy materials; may not be able to read prescription labels.
45-60	7th to 8th Grade	Will struggle with most patient education materials.
61-66	High School	Will be able to read most patient education materials.

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Red Lake, MN 56671
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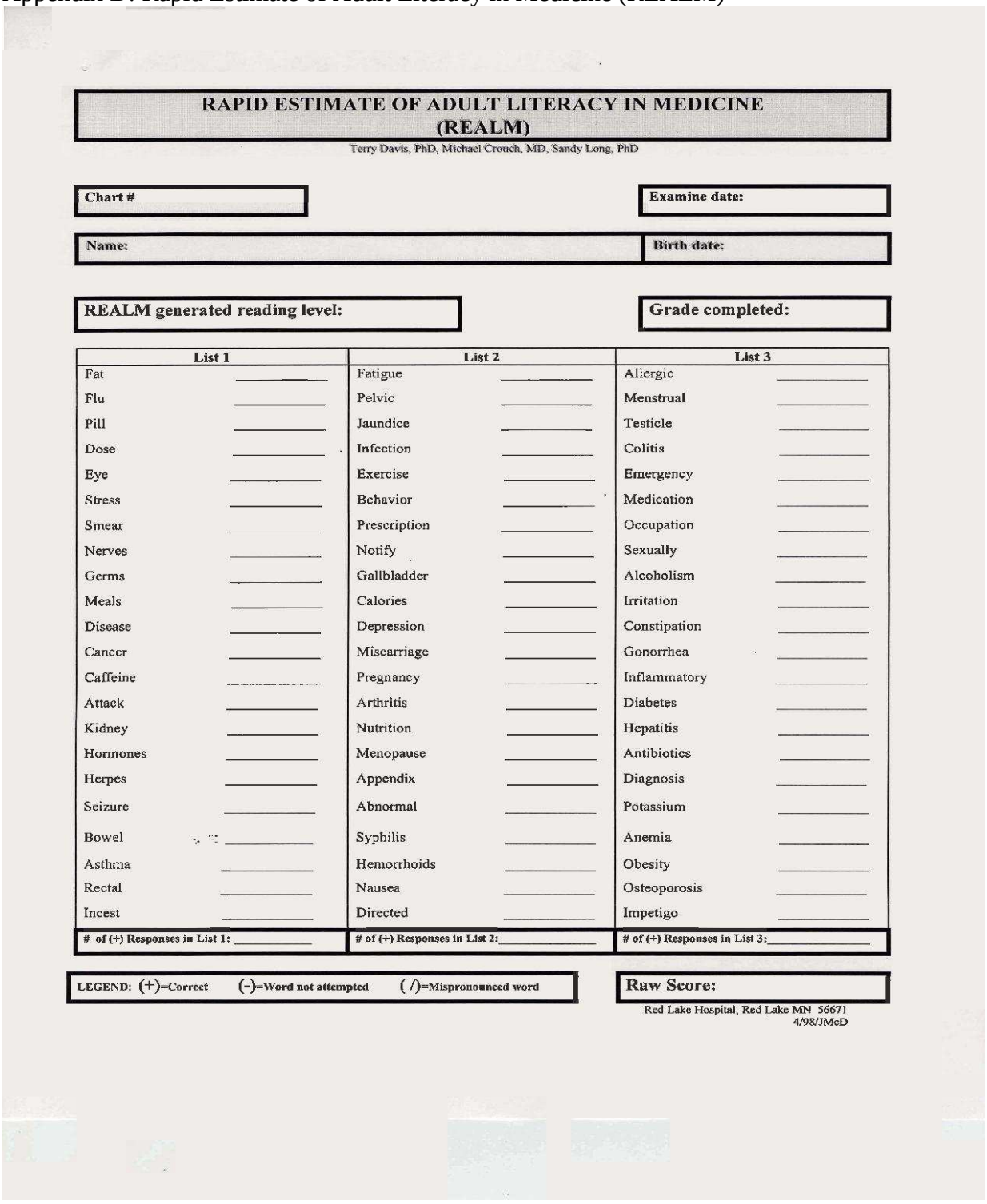
Appendix D: Rapid Estimate of Adult Literacy in Medicine (REALM)



RAPID ESTIMATE OF ADULT LITERACY IN MEDICINE (REALM)

Terry Davis, PhD, Michael Crouch, MD, Sandy Long, PhD

Chart #	**Examine date:**
Name:	**Birth date:**
REALM generated reading level:	**Grade completed:**

List 1		List 2		List 3	
Fat		Fatigue		Allergic	
Flu		Pelvic		Menstrual	
Pill		Jaundice		Testicle	
Dose		Infection		Colitis	
Eye		Exercise		Emergency	
Stress		Behavior		Medication	
Smear		Prescription		Occupation	
Nerves		Notify		Sexually	
Germs		Gallbladder		Alcoholism	
Meals		Calories		Irritation	
Disease		Depression		Constipation	
Cancer		Miscarriage		Gonorrhea	
Caffeine		Pregnancy		Inflammatory	
Attack		Arthritis		Diabetes	
Kidney		Nutrition		Hepatitis	
Hormones		Menopause		Antibiotics	
Herpes		Appendix		Diagnosis	
Seizure		Abnormal		Potassium	
Bowel		Syphilis		Anemia	
Asthma		Hemorrhoids		Obesity	
Rectal		Nausea		Osteoporosis	
Incest		Directed		Impetigo	
# of (+) Responses in List 1:		**# of (+) Responses in List 2:**		**# of (+) Responses in List 3:**	

LEGEND: (+)=Correct (-)=Word not attempted (/)=Mispronounced word

Raw Score:

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