

## ABSTRACT

Title of Thesis: THE CONCORDANCE OF INFLUENZA VACCINATION BEHAVIORS AMONG ADULTS AND CHILDREN RESIDING WITHIN THE SAME HOUSEHOLD IN THE DISTRICT OF COLUMBIA, MARYLAND, AND VIRGINIA

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**Background:** The distinctive barking sound of whooping cough and rubella's birth defects highlight vaccinations' importance as a public health initiative and medical advancement of the twentieth century. However, little research examines concordance of influenza vaccination uptake between same-household adults and children. **Methods:** A secondary data analysis of CDC's 2009 National H1N1 Flu Survey (NHFS) examined concordance between adults' influenza vaccination behaviors and responses to NHFS questions representing HBM constructs with the influenza vaccination of same-household children from the District of Columbia, Maryland, and Virginia (DMV). **Results:** Concordance existed between influenza vaccination statuses of adults and same-household children. HBM constructs of perceived susceptibility, severity, and the cue to action of physician vaccine recommendation were associated with more vaccinated children. **Conclusions:** This research highlights adults' influenza vaccination status impact on same-household DMV children. Future research is needed to examine parental influenza vaccination effects on influenza vaccination status of their biological children.

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ADULTS AND CHILDREN RESIDING WITHIN THE SAME HOUSEHOLD IN THE  
DISTRICT OF COLUMBIA, MARYLAND, AND VIRGINIA

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## **Chapter 1: Introduction**

To individuals who are old enough to remember the distinctive barking sound of whooping cough, heart and nerve problems caused by diphtheria, the neonatal deaths, miscarriages, and birth defects caused by rubella, children paralyzed by polio, or the many fatalities that occurred as a result of tetanus infections, the importance of vaccinations are very evident (Centers for Disease Control and Prevention, 2013). When considering the most important medical advancements of the twentieth century, it is difficult not to rank immunizations as the most significant. Vaccines are one of the most cost-effective public health initiatives that provide a benefit to the entire global population (Poland & Jacobson, 2001) and trigger a decline in the number of disease cases once a vaccine is licensed and administered (Vaccines.gov, n.d.; Immunization Action Committee, 2013).

The 2010-2011 influenza or “flu” season in the United States was record setting with the lowest and shortest peak of influenza like illness. However, 35 children died and the overall rate of hospitalization was 8.6 per 100,000 individuals (Centers for Disease Control [CDC], National Center for Immunizations and Respiratory Diseases [NCIRD], 2013a). Despite flu vaccine uptake rates of 40-50% in children and approximately 30% for adults during the 2009-2012 flu seasons (CDC/NCIRD, 2013b), minimal research has examined the concordance of flu vaccination uptake between adults and children from the same household.

## Statement of the research problem

As the percentage of children receiving crucial vaccinations continues to decline in certain regions of the United States and many infectious diseases are reemerging, it is important, especially from a public health perspective, to prevent this threat to herd immunity (Sifferlin, 2014). From 2006-2011, there were multiple states that did not have immunizations high enough to reach herd immunity thresholds for measles, mumps, rubella, diphtheria, pertussis and tetanus (Fischetti, 2013). An example of the impact that unvaccinated individuals have on society is the seven-year old, intentionally unvaccinated boy in San Diego, California who unknowingly contracted measles while travelling and then caused an immense outbreak upon return home (Sugerman et al., 2010). Eight-hundred and thirty-nine individuals were exposed, with 75% of the individuals who contracted the disease being unvaccinated, and the quarantine of 48 children too young to be vaccinated at the cost of approximately \$775 per child (Sugerman et al., 2010). In order to limit and reduce the number of unvaccinated children, it is critical to understand the epidemiology of the decreasing numbers of unvaccinated children as well as the parental rationale for whether or not they vaccinate their children. One way to advance our influenza-specific understanding is to delve into potential associations between parental influenza vaccine uptake and that of their children.

## Research question and hypotheses

The research study reported here investigated the concordance between the influenza vaccination behaviors among same household adults and children through a

secondary data analysis of the 2009 National H1N1 Flu Survey. The following research question guided this study:

**Research Question:** Are adults who received any flu vaccination (i.e., H1N1 or seasonal) in the past year more likely to have children in the same household receive at least one flu vaccination in that same year?

**Hypothesis 1:** Adult education level, race/ethnicity, employment status, insurance coverage, and household income influence the likelihood of a same household child receiving an influenza vaccine.

**Hypothesis 2:** Influenza vaccinated adults are more likely to have a same household child vaccinated against influenza.

**Hypothesis 3:** Adult perceived susceptibility, severity, benefits, and barriers to influenza and influenza vaccinations are associated with the likelihood of a same household child receiving an influenza vaccine.

**Hypothesis 4:** Adults who receive a physician recommendation for influenza vaccination are more likely to have same household children receive an influenza vaccine.

#### Definition of terms

The vaccine-related terminology and definitions listed below are essential to the study of vaccine behaviors, in general, and are germane to this research study, in particular.

*Active Immunity:* Protection against disease that is produced by an individual's own immune system. This type of immunity is often created by surviving a disease or receiving a vaccine and is usually permanent (Atkinson, Wolfe, & Hamborsky, 2012).

*Children:* Children are individuals who are younger than 18 years of age (CDC, 2012a).

*Herd Immunity:* This type of immunity is conferred when most members of a community are protected against a contagious disease and there is little opportunity for an outbreak

since a critical portion of the community is immunized against that disease. Thus, infants, immunocompromised and pregnant individuals who are ineligible to receive certain vaccines then become protected against the disease because its spread is contained (National Institute of Allergy and Infectious Disease [NIAID], 2010).

*Immunization:* The process by which a person or animal becomes protected against a disease. This term is often used interchangeably with either vaccination or inoculation (CDC, 2012).

*Immunocompetent:* The ability to produce a normal immune response (“Immunocompetent,” 1995).

*Immunoincompetent:* The inability of an individual to develop an immune response to an antigenic (e.g., virus) challenge (Immunoincompetent, 2009).

*Parent:* A biological father or mother or an individual who oversees the upbringing and care of a child or young adult who is not biologically related (Merriam-Webster, 2014).

*Vaccination:* The process of vaccination occurs when a killed or weakened infectious organism is injected into an individual in order to prevent disease (CDC, 2012).

*Vaccine:* A vaccine is a manufactured compound that produces immunity and results in the protection of the body from a specific disease. Vaccines are administered through needle injections, by mouth and aerosol means (CDC, 2012).

## Significance of the project

The influenza vaccination literature primarily focuses on the reasons underlying a *biological parent's* acceptance or refusal of vaccines for themselves and/or their children. The study reported here, however, is novel as it attempts to advance our understanding of the influenza vaccination uptake behaviors of District of Columbia, Maryland, and Virginia (DMV) adults and their decision whether or not to vaccinate children in the same household against influenza.

The subsequent chapters of this thesis address specific areas of the research study. In Chapter two, the theoretical model that underpinned the research, a review of the relevant literature on general adult and childhood immunization, vaccine decision making by adults, and influenza vaccinations are outlined. The research's methodological approach is presented in Chapter three and results are presented in Chapter four, while Chapter five summarizes the central findings of the study and their implications, limitations of this research, directions for future immunization research and interventions, as well as conclusions drawn from the study.

## **Chapter 2: Background**

### Theoretical model

There is a limited amount of literature that specifically uses a theoretical model to explain parental vaccination behavior and its impact on their children's vaccination rates. Nonetheless, the previous work of Flood et al., (2010), Malosh et al., (2014) and Hilyard et al., (2014) provide information on the use of a relevant theoretical model to guide this influenza study, the Health Belief Model.

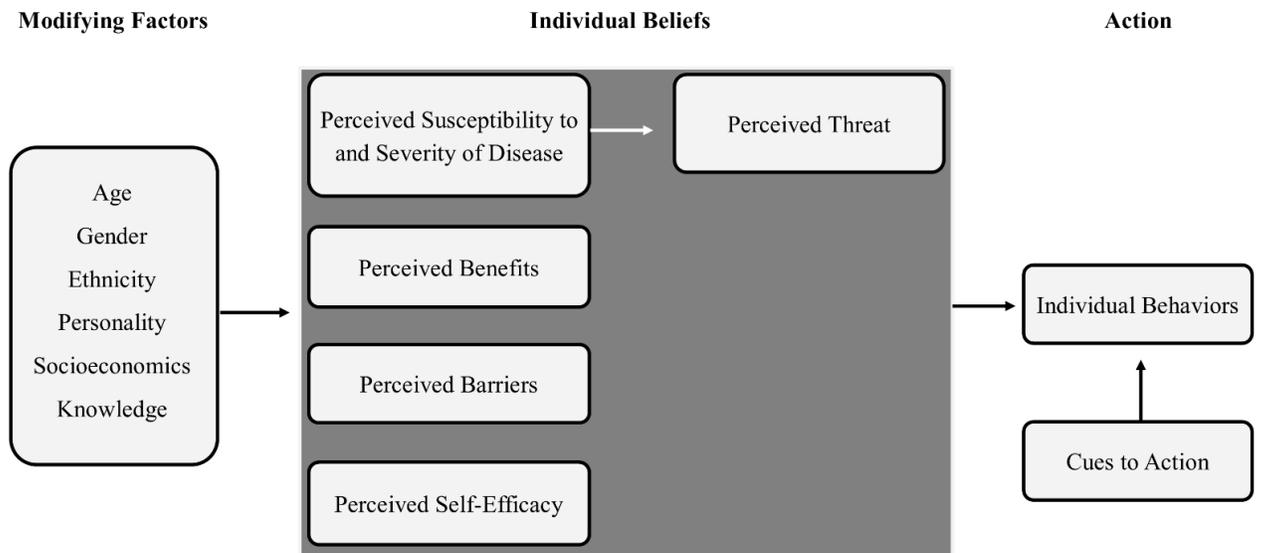
Originally developed by Hochbaum (1958) and built upon by Kegeles, Leventhal, and Rosenstock (1952), the HBM is one of the most widely used models in health behavior research, both to explain change and maintenance of individual health-related behaviors and as a guiding framework for health behavior interventions (Champion & Skinner, 2008; Rosenstock, 1974). During the decade of the 1950s, the model was used by social psychologists in the U.S. Public Health Service to explain the widespread failure of individuals who were participating in free or low-cost programs to detect tuberculosis (Hochbaum, Rosenstock, & Kegels, 1952; Rosenstock, 1974). At that time, the U.S. Public Health Service was more concerned with preventing disease, and sent mobile X-ray units into neighborhoods offering free chest X-rays to screen for tuberculosis; however, this screening program had limited success (Champion & Skinner, 2008; Hochbaum, 1958; Hochbaum et al., 1952; Rosenstock, 1974).

Since its inception, the HBM has been utilized to explain failure of individuals to accept preventative health behaviors for other diseases (e.g., cervical cancer, rheumatic fever, polio) including influenza (Rosenstock, 1974), and to assess, explain, predict, and enhance the utilization of health behaviors. Specifically, factors influencing parental

influenza vaccination decision making have been determined by use of HBM (Chen et al., 2011; Daley et al., 2007; Flood et al., 2010). Thus, HBM was selected for the research study reported here to explain how an *adult's* demographics, vaccination status, beliefs, knowledge, and physician recommendation for influenza vaccination influences that of children residing within the same household.

The HBM constructs – susceptibility, seriousness, benefits and barriers to a behavior, cues to action, and recently, self-efficacy – predict why people will take action to prevent, to screen for, or control illness conditions (Champion & Skinner, 2008). Figure 1 illustrates the relationships between certain modifying factors and the HBM constructs. Particular factors that influence general vaccine uptake and vaccination decision making by adults for their children such as perceived risk of contracting the disease (Flood et al., 2010; Weinstein et al., 2007), personal experience with vaccine-preventable diseases (Leask, Chapman, Hawe, & Burgess, 2006), benefit to community from receiving influenza vaccine (Leask et al., 2006), side effects of vaccine (Buyuktiryaki et al., 2014; Flood et al., 2010), and trust and advice of physicians (Harris, Maurer, & Lurie, 2009; Leask et al., 2006; Nichol, Lofgren, & Gapinski, 1992), are congruent with five HBM constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action, and are illustrated in Table 1. The sixth HBM construct, self-efficacy, described as the confidence that one can successfully carry out the behavior required to produce the desired outcomes (Bandura, 1997), was intentionally excluded from Table 1 since it was not included as a question in the 2009 National H1N1 Flu Survey.

Figure 1: Health Belief Model Components and Linkages



Champion & Skinner (2008)

Table 1: Health Belief Model Constructs and Related Factors that Influence Vaccination

| <b>HBM Construct</b>     | <b>Definition of HBM Construct<sup>1</sup></b>   | <b>Factors that Influence Vaccination Decisions</b>  |
|--------------------------|--|--|
| Perceived susceptibility | Beliefs concerning the likelihood of getting a disease or condition                              | · Perceived risk of contracting influenza (Flood et al., 2010; Weinstein et al., 2007)   |
| Perceived severity       | Feelings about the seriousness of contracting an illness and its consequences                    | · Personal experience with vaccine-preventable diseases (Leask, Chapman, Hawe, & Burgess, 2006)  |
| Perceived benefits       | Beliefs about the effectiveness of taking action to reduce the risk or seriousness of an illness | · Benefit to community from receiving influenza vaccine (Leask et al., 2006)<br>· Anticipated regret from not receiving influenza vaccine (Leask et al., 2006)   |
| Perceived barriers       | The belief that the costs of taking action are outweighed by the benefits                        | · Previous vaccine side-effects (Mills, Jadad, Ross, & Wilson, 2005)<br>· Doubt of influenza vaccine efficacy (Flood et al., 2010)<br>· Doubt of influenza vaccine safety (Flood et al., 2010)<br>· Side effects of vaccine (Buyuktiryaki et al., 2014; Flood et al., 2010)<br>· Difficulty accessing influenza vaccine (Mills et al., 2005) |
| Cues to action           | Factors that trigger action for behavior change  | · Trust and advice or recommendation of physicians (Harris et al., 2009; Leask et al., 2006; Nichol et al., 1992))<br>· Influence of social networks (Leask et al., 2006)<br>· Receipt of previous vaccination (Bish, Yardley, Nicoll, & Michie, 2011)   |

<sup>1</sup>Champion & Skinner, 2008

## Review of the relevant literature

Vaccines represent a prototypical example of preventative medicine and their potential impact to minimize disease prevalence, morbidity, and mortality. Over the past one-hundred years, mortality from diseases preventable by childhood vaccinations has decreased by 99% in the United States (Roush & Murphy, 2007). From the first immunizations against smallpox four centuries ago in China to the routine vaccinations administered in most developed nations today, vaccinations have helped control 14 major diseases: smallpox, diphtheria, tetanus, yellow fever, pertussis, poliomyelitis, *Haemophilus influenzae b*, measles, mumps, rubella, typhoid, rabies, rotavirus, and hepatitis B (Plotkin, 2011; Plotkin & Plotkin, 2013; College of Physicians of Philadelphia, 2014). Since the development of vaccinations, the public has received them either in awe of their ability to prevent catastrophic disease, or with skepticism of vaccine safety/effectiveness, or with outright opposition to vaccine use (Plotkin & Plotkin, 2013). This section provides an overview of the relevant literature concerning influenza vaccine recommendations, influenza morbidity and mortality, parental vaccination decision making, herd immunity and compulsory vaccinations in children, and parental issues related to the safety, ethics, acceptance and refusal of general childhood vaccinations and specifically influenza.

### *Influenza morbidity, mortality, and vaccine recommendations*

Although influenza morbidity and mortality varies annually, the range of flu-associated deaths between 1976-77 and 2006-07 flu seasons ranged from 3,000 to 49,000 individuals in the United States (Thompson et al., 2010). When the H1N1 vaccine became available in 2009, there was a limited supply, and the Advisory Committee on

Immunization Practices (ACIP) recommended that those at highest risk for complications from H1N1, such as pregnant women and anyone six months to 24 years of age were priority groups for receipt of the vaccine (National Center for Immunization and Respiratory Disease, CDC, 2009). Thus, the rate of influenza vaccine uptake from 2009-2010 to 2011-2012 influenza seasons were 40-50% in children and around 30% for adults (CDC/NCIRD, 2013b). Though the 2013-2014 ACIP recommendations for influenza vaccination recommended that anyone greater than six months of age, without contraindications, receive an influenza vaccine (CDC, 2013), individuals often make the decision to receive influenza vaccinations based on perceived risk of contracting the flu, anticipated regret, physician or nurse recommendation, previous vaccination behaviors and side effects (Buyuktiryaki, 2014; Harris, Maurer, & Lurie, 2009; Nichol et al., 1992; Weinstein et al., 2007). While there is literature exploring the rationale behind why individuals receive flu vaccinations and factors adults use in determining whether or not to vaccinate their children against childhood diseases, there is a dearth of information regarding whether or not parental uptake of influenza vaccines influences uptake in their children.

#### *Vaccination decision making*

While the proportion of the population that must be immunized to create herd immunity varies by disease, parental vaccine acceptance which ensures uptake in their children is critical in maintaining herd or community immunity (Brunson, 2013; Vaccines Today, 2013). Despite this immense impact on disease reduction, many factors are considered by parents when deciding if their children will be vaccinated. Associations between race (Bisha, Yardley, Nicoll, & Michie, 2011; Flood et al., 2010; Hilyard et al.,

2014), insurance coverage (Flood et al., 2010), perceived susceptibility (Bisha et al., 2011; Wheelock, Thomson & Sevdalis, 2013), perceived severity (Flood et al., 2010; Wheelcock et al., 2013), perceived benefits (Bisha et al., 2011), perceived barriers of vaccine safety (Bisha et al., 2011; Flood et al., 2010; Mills et al., 2005; Wheelcock et al., 2013), and physician recommendation (Flood et al., 2010; Hilyard et al., 2014; Wheelcock et al., 2013) have all been shown to influence with influenza vaccination uptake.

According to Brunson (2013), parents tend to fall into three vaccination decision making groups: 1) those who rely on social norms to determine if they will vaccinate their children, 2) those who rely on others (e.g., healthcare providers) for information or advice about vaccinations, and 3) those who seek out information on their own to determine whether or not they will vaccinate their children. Levels of trust, relationship and discussions with a pediatrician also influence parent's decision to vaccinate their child (Benin, Wisler-Scher, Colson, Shapiro, & Holmboe, 2006). Although research (e.g., Brunson, 2013 and Buyuktiryaki, 2014) has assessed parental knowledge, attitudes, and beliefs about vaccines, how healthcare providers impact parental decisions to vaccinate their children, and parental barriers to vaccination, much less has been written with respect to the factors that influence vaccination in adults and how these directly facilitate or hinder vaccination in children.

Adults, including parents, receive both anti- and pro-vaccination messages both of which they must consider when determining whether or not they will vaccinate their children. Claims that support vaccination tend to appeal towards logic, while those opposing vaccination are usually emotional in nature (Bean, 2011). Traditionally,

medical advice was primarily sought from healthcare providers, but print materials, radio, and television sources as well (Bean, 2011). These sources, having a fiscal stake, secured the veracity of the types of information and messages that were distributed (Bean, 2011). The Internet is a growing source for individuals to access information and currently, more than 72% of Internet users use the Internet to search for health-related information (Pew Research Center, 2013). Unfortunately for adults who use the Internet to research vaccination information, they are more likely to find anti-vaccination messages that contain unverified information, and could be misled when making vaccination decisions (Davies, Chapman, & Leask, 2002). Common themes of these anti-vaccination websites include but are not limited to safety and effectiveness, alternative medicines, civil liberties, vaccine conspiracies, and misinformation and falsehoods (Bean, 2011; Kata, 2010). Moreover, there has been a move towards using “expert” testimony on these vaccination websites, one example of which is that of the International Medical Council on Vaccination (International Medical Council on Vaccination, 2010), where they purport, “Hundreds of medical doctors are here to tell you the truth about vaccines. Protect yourself and your children.” While anti-vaccination messaging online includes themes such as the government regulating parenting, the pharmaceutical industry being profit driven, or cover-ups by physicians protecting their colleagues, all of which can compel adults’ decision not to vaccinate their children, there are those adults who hear these messages, yet choose to vaccinate their children (Leask et al., 2006).

When making the decision to vaccinate children, adults consider their strong trust of physicians, acceptance of medical expertise, personal experiences with vaccine preventable diseases, the influence of friends and family in their social networks, and the

benefit of vaccination to the community as a whole (Leask et al., 2006). Oftentimes, the ease in which adults are able to opt out of vaccinations for themselves can influence their decision not to vaccinate their children, as well (Calandrillo, 2004; Kleifgen & Silpe, 2010; National Conference on State Legislatures, 2012; Omer et al., 2006;). Thus, there are divergent perspectives on vaccination as noted by Cultural Perspectives on Vaccination: 1) individual rights versus the mission of public health, 2) religious standpoints and vaccine objections, and 3) suspicion and mistrust of vaccines, which are highlighted below (College of Physicians Philadelphia, 2014).

### *Individual rights versus public health's mission*

The concept of individual rights versus the mission of public health is often debated when considering vaccination uptake by individuals, especially for compulsory vaccinations in the United States, where vaccinations are required for school-aged children (Immunization Action Committee, 2013). The tension between the rights of individuals and public health's mission to "assure conditions in which people can be healthy," has been a longstanding issue in the United States (Institute of Medicine, 1988). For example, in 1905, the U.S. Supreme Court ruled in the case of *Jacobson vs Massachusetts* that, "upon the principle of self-defense, of paramount necessity, a community has the right to protect itself against an epidemic of disease which threatens the safety of its members," ensuring vaccination despite Reverend Jacobson's refusal due to concern about the safety of the smallpox vaccine (Jacobson v. Massachusetts, 1905; Padian et al., 2005). Since *Jacobson vs Massachusetts*, there have been numerous instances reported in research literature as well as popular culture where individuals preferred to abstain from vaccination for personal reasons including personal freedom,

religion, distrust and concerns about vaccine safety (Bean, 2011; Brown, 2013; Diekema, 2005; Gavett, 2011; Smith, Chu, & Barker, 2004). This idea of individual freedoms versus the mission of public health is still very relevant to parental vaccination decision making. As an example, in June 2014, a federal judge upheld a New York school policy banning non-immunized children from schools where another child has a vaccine-preventable disease (Mueller, 2014).

### *Acceptance and refusal of vaccinations*

Approximately three million children's lives are spared annually due to childhood immunizations (André, 2003). This is attributed to vaccinations preventing certain diseases such as measles, mumps, polio, diphtheria, and tetanus. Furthermore, over the past twenty years, there has been a revitalization of anti-vaccination movements in certain developed nations (e.g., United States, Japan, Australia, and Europe) (André, 2003), which has resulted in a growing number of adults making the conscious decision not to vaccinate their children (Blume, 2006; Tafuri, Gallone, Cappelli, Prato, & Germinario, 2013). Currently, twenty U. S. states allow exemption from vaccinations of public-school children in grades K-12, for personal beliefs or philosophical reasons that are not restricted to religious beliefs and can include moral or other beliefs (Johnson, 2013). Necessity, effectiveness, and safety of the vaccines as well as individual liberties are among the key reasons why adults choose not to immunize their children (Johnson, 2013; Omer, Salmon, Orenstein, deHart, & Halsey, 2009).

The influence of the anti-vaccination movement has further served to disrupt public health efforts at immunization, and have resulted in increased morbidity and mortality from vaccine preventable diseases (Poland & Jacobson, 2001). This is evident

in recent cases where the lack of immunizations in immunocompetent individuals, who are able to be vaccinated, causes morbidity in those who are immunoincompetent and are unable to be vaccinated (Craft, 2014). While opposition to vaccines has been present throughout vaccine history, the increasing use of the Internet, as a source of medical information (Bean, 2011), has helped increase public concern about vaccine safety, opposition to mandates for vaccination, and the number of individuals who decide not to be vaccinated (Bean, 2011; Davies et al., 2002; Poland & Jacobson, 2001; Zimmerman et al., 2005).

### *Mistrust and safety of vaccines*

Concerns that adults raise relating to vaccine safety stem from vaccine misinformation, apprehension with the way the vaccines are developed, their side-effects, and their ability to potentially cause increased risk of diseases such as autism, cancer or autoimmune diseases (Poland & Jacobson, 2001). However, as the prevalence of vaccine preventable diseases decreases, a shift has occurred causing more adults to believe the low disease risk and complications from communicable diseases are less severe than the side effects of vaccines (Evans et al., 2001; Raithatha, Holland, Gerrard, & Harvey, 2003; Timmermans, Henneman, Hirasings, & Van der Wal, 2005).

Online anti-vaccination information and misinformation, which can augment pre-existing anxiety about whether or not to vaccinate, further increases vaccine distrust (Downs, de Bruin, & Fischhoff, 2008). For example, the now retracted Wakefield and colleagues' 1998 study reported an association between autism and the Measles, Mumps, and Rubella (MMR) vaccine. Despite numerous studies contradicting this association

(Dales, Hammer, & Smith, 2001; DeStefano & Thompson, 2004; Farrington, Miller, & Taylor, 2001; Taylor et al., 1999), the initial study, media coverage, and celebrity support of it facilitated adults delaying or refusing vaccination for their children (Bedford & Elliman, 2010; Gross, 2009; Larson, Cooper, Eskola, Katz, & Ratzan, 2011; Nield, 2008; Omer et al., 2009; Poland, 2011). Regardless of the retraction, decreasing numbers of vaccinated individuals had already impacted herd immunity, with communities experiencing outbreaks of diseases, such as measles, where low numbers of children were vaccinated (Eggertson, 2010; Novella, 2010).

#### Summary of the literature

Vaccines are a classic example of preventative medicine and its ability to minimize the incidence, prevalence, morbidity, and mortality of diseases like influenza. Despite its ability to minimize morbidity and mortality from influenza each year, flu vaccine uptake still remains low at less than 50% (Lu et al., 2013). Individuals often make the decision to receive influenza vaccinations based on perceived risk of contracting the flu, anticipated regret, physician or nurse recommendation, previous vaccination behaviors and vaccine side effects. Yet, adults are continually exposed to both anti- and pro-vaccination messages, which are increasingly occurring via the Internet. Unfortunately, the majority of the online vaccination information is anti-vaccination in nature and contains unverified information, which can lead to misinformation when making vaccination decisions. Although there is literature that explores the rationale behind factors influencing parental influenza vaccination decision making, the literature that specifically addresses adult uptake of influenza vaccine and its influence on same household children could not be ascertained by this researcher.

### Chapter 3: Methods

This chapter focuses on the study sample, the research design and measurement, as well as the variables used in the conduct of the research's data analyses. An in-depth discussion of the analysis process is also provided.

#### Study sample, design, and measurement

The research for this thesis began with a secondary data analysis of the Centers for Disease Control and Prevention (CDC)–funded National 2009 H1N1 Flu Survey (NHFS), a component of the annual National Flu Survey; however, this analysis proved to be beyond the scope of a Masters' thesis, due to the need for extensive NHFS data modification. Though the intent of the original study was to investigate the concordance of influenza vaccination behaviors between U.S. *parents and their children*, the aim of the thesis shifted to focus solely on an examination of the concordance between U.S. *adults and same household children* as the parental relationship could not be established. Upon further examination of the NHFS dataset and its electronic format, it was determined that a more feasible analysis was needed, which was subsequently conducted on the data from a subset of NHFS adults and children who resided within the same household in the District of Columbia, Maryland, and Virginia (DMV). These data were in the public domain and available online, thus a request from the CDC to use the data was not necessary. The data were downloaded directly from the CDC website ([http://www.cdc.gov/nchs/nis/data\\_files\\_h1n1.htm](http://www.cdc.gov/nchs/nis/data_files_h1n1.htm)) as computerized electronic data available in ASCII format. This study reported here was approved in March 2014 by the University of Maryland Institutional Review Board (570905-1).

## The National 2009 H1N1 Flu Survey (NHFS)

The NHFS provided within flu season, state and national data on adults and children, six months and older, for both H1N1 and seasonal influenza. The goals of the NHFS were to assist health officials to determine the uptake of H1N1 and seasonal influenza vaccinations, to monitor and therefore improve influenza vaccination rates, and to monitor nationwide flu resources. NHFS data collection was conducted by the University of Chicago via list-assisted, random digit dialing using both landline and cellular telephone numbers (Centers for Disease Control and Prevention [CDC], National Center for Immunization and Respiratory Diseases [NCIRD], and National Center for Health Statistics [NCHS], 2012a). NHFS data collection occurred from October 2009 to June 2010.

### Obtaining the NHFS sample

Four procedures were employed to acquire the NHFS sample. First, statistical models were used to determine the number of telephone numbers needed in each state. Second, the telephone numbers from each state were divided into replicates that were released evenly, every quarter, for each sampling area. Third, an automated procedure eliminated a segment of the non-working and residential landline telephone numbers, and finally, a national database was utilized to match the sampled landline telephone numbers with functioning mailing addresses. Two weeks prior to conducting the nationwide household interviews, letters were mailed to a percentage of previously called landlines where an address was obtained to provide survey details and encourage participation. Mailing addresses were not obtained for cellular phones, so letters were not mailed to these households (Centers for Disease Control and Prevention (CDC), National Center

for Immunization and Respiratory Diseases (NCIRD), and National Center for Health Statistics (NCHS), 2012a).

The NHFS interviewers followed a prescribed script to conduct the survey using the telephone data collection instrument CATI - Computer Assisted Telephone Interviewing. CATI minimized errors by allowing interviewers time to resolve potential data discrepancies during the interview process, while the respondent was on the phone call. The survey tool consisted of nine sections whose content included screening questions to identify and select an eligible adult and child if applicable, adult questions about knowledge, concerns and behaviors, demographic and socioeconomic information, household characteristics, and adult and child history of chronic conditions and respiratory illness and H1N1 and seasonal flu vaccination history. A successful CATI screening identified at least one age eligible adult per household and whether the household was primarily using a landline or cellular phone. If the household had at least one child <18 years, he or she was randomly selected as the person to which the NHFS child-related questions were directed. A unique household identifier was assigned to each adult and child from the same household. It must be noted that the relationship between the adult and child was unavailable in the public dataset. Thus, there was no way of determining if this adult was the biological parent of the child. Moreover, other types of adult/child relationships (e.g., grandparent, aunt, or uncle) could not be established.

The NHFS was conducted in 51 geographical strata representing the 50 states and the District of Columbia. Certain geographical areas were oversampled to include Hispanics, African-Americans, and Asians (CDC, NCIRD, and NCHS, 2012a). The interviews were conducted in both English and Spanish, with interpretation services for

other languages available through Language Line, a three-way telephone communication service that can translate from English to more than two-hundred languages (CDC, NCIRD, and NCHS, 2012a; Language Line Solutions, 2014).

#### NHFS survey questions

The survey consisted of one-hundred questions about the respondents' current H1N1 and seasonal influenza vaccination status, their intent to be vaccinated during the current flu season, and their attitudes, behaviors, and opinions related to flu vaccination. Demographic information included age, education, employment, and state of residence. In addition, another demographic question, a four level race/ethnicity question, which combined race and ethnicity, was asked. Health conditions that increase the risk of influenza-related complications were also asked (CDC, NCIRD, and NCHS, 2012a).

Adults were queried about their behaviors, knowledge, and beliefs concerning both H1N1 and seasonal influenza vaccines. Adults who indicated their or their same household child's receipt of H1N1 or seasonal flu vaccine were asked where they received the vaccine. Adults who specified that they or the same household child did not receive either vaccine were asked why they refused. Please note, the secondary data analysis for this research study focused only on Sections B, F, CF, and D of the NHFS survey (Appendices A, B, C and D), which included data about adult H1N1 and seasonal flu vaccination history, knowledge, concerns, and behaviors, as well as child H1N1 and seasonal flu vaccination history, and demographic and socioeconomic information (For the complete 2009 NHFS, see [ftp://ftp.cdc.gov/pub/Health\\_Statistics/NCHS/Dataset\\_Documentation/NIS/nhfs/nhfspuf\\_QUEX.PDF](ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NIS/nhfs/nhfspuf_QUEX.PDF)).

## NHFS data analyses

The analyses of the NHFS data were conducted using the Statistical Package for the Social Sciences (SPSS) version 22; however, the data were not originally in an appropriate format for use with SPSS and additional, sequential steps had to be taken as outlined in Table 2.

Table 2: Additional Steps in Analysis Process

| Step | Process   |
|------|---|
| 1    | Statistical Analysis System (SAS) Input Statement program utilized to open the dataset in SAS.  |
| 2    | Stat/Transfer used to convert data to a SPSS dataset.   |
| 3    | SPSS Dataset split into households with surveys completed by adults only and those completed for both an adult and child.   |
| 4    | Dataset further restricted by removing cases where complete flu vaccination data was not available for paired adults and children from the same household as well as those cases where the households were in states outside the DMV. |
| 5    | “Anyflu” variable created as a composite of H1N1 and seasonal influenza vaccination status.   |
| 6    | Dataset was restructured where variables for adults and children from the same household were placed on the same row of the dataset to enable intra-household comparisons for analysis.   |
| 7    | Variables were computed to collapse multiple variables into five individual variables with multiple values.   |

Frequencies were computed on the demographic data, and the behaviors, knowledge, and beliefs about influenza, vaccine refusal rationale, and physician recommendation for both H1N1 and seasonal influenza vaccines are reported. Cohen’s kappa ( $\kappa$ ) (Landis & Koch, 1977) was calculated to examine the association between both H1N1 and seasonal influenza vaccination statuses in adults and children from the same DMV household. Chi square ( $\chi^2$ ) (Field, 2013) was used to detect an association between influenza vaccination status from paired household adults and children and to answer the

research question. Associations between the variables *vaccinated adult* and *vaccinated child*, *non-vaccinated adult* and *non-vaccinated child*, as well as *non-vaccinated adult* and *vaccinated child* were investigated. Additionally, the variables that specified whether or not the child's vaccination status was dependent on other factors - adult vaccination status, knowledge, attitudes, and beliefs about influenza, physician recommendation, race, gender, income, education and insurance status - were explored. Tables were generated to illustrate the socio-demographics of the survey respondents and further elucidate the association of adult influenza vaccination factors with influenza immunization in same household children.

NHFS variables: The DMV data analysis

NHFS variables included questions dealing with the type and number of H1N1 and seasonal influenza vaccines and if respondents were members of a high-risk group - e.g., individuals with asthma, heart, kidney, or liver conditions, diabetes, sickle cell anemia, neurological or neuromuscular conditions, or weakened immune systems. The variables selected for this analysis of paired households in the DMV included socio-demographics - race, gender, age, income, household characteristics, insurance status, and education level, as well as those variables that pertained to the five HBM constructs: perceived susceptibility, severity, benefits, barriers, and cues to action. These variables were selected for this analysis as the influenza vaccine literature reports these to be associated with vaccine uptake for individuals, not with adult and child concordance within the same household (Bish et al., 2011; Buyuktiryaki et al., 2014; Flood et al., 2010; Harris et al., 2009; Leask et al., 2006; Mills et al., 2005; Nichol et al., 1992; Weinstein et al., 2007). The operational definitions of selected variables and sample

questions from the 2009 NHFS dataset used in the analysis are shown in Table 3, while the NHFS questions corresponding to the Health Belief Model constructs are found in Table 4. The modifying factors, starred in Table 3, are selected from the 2009 NHFS are specific to influenza vaccination behaviors, influence individuals' perceptions of H1N1 and seasonal influenza susceptibility and severity, as well as the benefits of and barriers to influenza vaccination. Table 3 also shows selected NHFS survey questions that relate to each modifier.

Table 3: Operational Definitions of Selected Variables and Sample Questions used in the DMV Analysis of Paired Households

| Category of Selected Variables         | Description of Variables  | Sample Question that Addresses the Variable   |
|--|---|---|
| Individual level demographic variables |   |   |
| Sex*                                   | Gender  | Now I have some general questions. I am required to ask this. Just to confirm, are you male or female?  |
| Race*                                  | White alone<br>Black alone<br>All other races alone (Asian, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, and other races)<br>Multi-racial persons | Which of the following categories describes your race?  |
| Ethnicity                              | Hispanic<br>Non-Hispanic  | Are you of Hispanic or Latino origin?   |
| Employment status                      | Whether individuals are employed are not  | Are you currently...? (employed for wages, self-employed, out of work, homemaker, student, retired, unable to work)   |
| Age-group                              | Age   | Could you tell me how old you are?  |
| Marriage status                        | Marital status  | Are you now married, widowed, divorced, separated, or have you never been married?  |
| Education level*                       | Level of education achieved   | What is the highest grade or year of school you have completed?   |
| Insurance status*                      | Whether or not an individual has insurance coverage   | Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?   |
| Adult demographic variables            |   |   |
| Household Income*                      | Total combined family income for a given year   | Please think about your total combined family income during 2008 for all members of the family. Include money for jobs, social security, retirement income, unemployment payments, public assistance, and so forth. Also include income from interest, dividends, net income from business, farm, rent, or any other money income received. Can you tell me that amount before taxes? |
| State of Residence                     | Location of household   | In what city, county, and state do you live?  |
| Vaccination variables                  |   |   |
| H1N1 flu vaccine received              | Did individuals receive H1N1 vaccine  | Since September 2009, have you had an H1N1 flu vaccination? There are two types of H1N1 Flu vaccinations. One is a shot, and the other is a spray, mist or drop in the nose.  |
| Seasonal flu vaccine received          | Did individual receive seasonal flu vaccine   | Since August 2009, have you had a seasonal flu vaccination? There are two types of seasonal flu vaccinations. One is a shot   |

\* Modifying factors for the Health Belief Model Constructs

Table 4: HBM Constructs and Related NHFS Survey Questions

| HBM Construct            | Definition of HBM Construct  | Sample Survey Questions Related to HBM Constructs   |
|--------------------------|--|---|
| Perceived susceptibility | Beliefs about the chances of getting a condition                               | <ul style="list-style-type: none"> <li>• If you [had not gotten/do not get] a seasonal flu vaccination this fall or winter, what [would have been/are] your chances of getting sick with the seasonal flu?</li> <li>• Before you got the H1N1 flu vaccination, did you think your chances of getting sick with the H1N1 flu were very high, somewhat high, somewhat low, or very low?</li> </ul>  |
| Perceived severity       | Beliefs about the seriousness of a condition and its consequences              | <ul style="list-style-type: none"> <li>• How concerned are you about the H1N1 flu?</li> <li>• How concerned are you about seasonal flu?</li> </ul>  |
| Perceived benefits       | Beliefs about the effectiveness of taking action to reduce risk or seriousness | <ul style="list-style-type: none"> <li>• How effective do you think the seasonal flu vaccination [was/is] in preventing the seasonal flu?</li> <li>• How effective do you think the H1N1 flu vaccination is in preventing the H1N1 flu?</li> </ul>  |
| Perceived barriers       | Beliefs about the material and psychological costs of taking action            | <ul style="list-style-type: none"> <li>• There are many reasons why people don't get flu vaccinations. What is the main reason you [will not get/will probably not get/have not yet gotten] an H1N1 flu vaccination this flu season?</li> <li>• There are many reasons why people don't get flu vaccinations. What is the main reason you [will not get/will probably not get/have not yet gotten] a seasonal flu vaccination this flu season?</li> <li>• How worried [were/are] you about getting sick from the H1N1 flu vaccine?</li> <li>• How worried [were/are] you about getting sick from the seasonal flu vaccine?</li> </ul> |
| Cues to action           | Factors that activate behavior change  | <ul style="list-style-type: none"> <li>• Since August 2009, did your doctor or other health professional personally recommend that you get an H1N1 flu vaccination or a seasonal flu vaccination?</li> </ul>  |

<sup>1</sup>Champion & Skinner, 2008

## Chapter 4: Results

This research study investigated the concordance of influenza vaccination behaviors between adults and children from the same District of Columbia, Maryland and Virginia (DMV) household by conducting a secondary data analysis of the 2009 National H1N1 Flu Survey (NHFS) dataset. A total of 137,609 households were contacted and successfully screened for an age-eligible adult. As a result, 56,656 individuals completed the adult household interview, yielding 14,288 households that had at least one child between the ages of six months and 17 years (CDC, NCRID, and NCHS, 2012). Among these adult-child households, also known as paired households, a total of 909 paired households were located in the DMV. The research question that this study aimed to answer was: Are adults who received any flu vaccination (i.e., H1N1 or seasonal) in the past year more likely to have children in the same household receive at least one flu vaccination in that same year? The results that are pertinent to this research question are outlined below and include: 1) adult, child and paired household socio-demographics; 2) H1N1 vaccination status; 3) seasonal influenza vaccination status; 4) combined H1N1 and seasonal influenza vaccination status; and 5) adult responses to the HBM constructs.

### Adult, Child and Paired Household Socio-demographics

Table 5 provides detailed information on the socio-demographic characteristics of the entire sample of DMV adults and children. Adults were mostly female, non-Hispanic White, and between the ages of 35 and 44 years old. They also tended to be insured, married, employed, and college graduates. The children were more likely to be non-Hispanic White, male, between six months and nine years of age, and had health insurance. The majority of respondents completed the survey in English. The socio-

demographics of the surveyed households (Table 6) illustrate that more households had two adults and one child present with a household annual income of  $\geq$ \$75,000.

Table 5: Adult and Child Paired Household Socio-demographics

| Characteristics                        | Adults      | Children    |
|--|-------------|-------------|
| <b>Gender</b>                          |             |             |
| Male                                   | 329 (36.2%) | 458 (50.4%) |
| Female                                 | 580 (63.8%) | 451 (49.6%) |
| <i>Total</i>                           | 909         | 909         |
| <b>Age Group, y</b>                    |             |             |
| 6 months– 9 years                      | —           | 486 (53.5%) |
| 10-17 years                            | —           | 423 (46.5%) |
| 18-34                                  | 232 (25.5%) | —           |
| 35-44                                  | 321 (35.3%) | —           |
| 45-54                                  | 261 (28.7%) | —           |
| 55-64                                  | 76 (8.4%)   | —           |
| 65+                                    | 19 (2.1%)   | —           |
| <i>Total</i>                           | 909         | 909         |
| <b>Race and Ethnicity</b>              |             |             |
| Hispanic                               | 71 (7.8%)   | 87 (9.6%)   |
| Non-Hispanic, Black Only               | 211 (23.2%) | 212 (23.2%) |
| Non– Hispanic, White Only              | 558 (61.4%) | 514 (56.5%) |
| Non– Hispanic, Other or Multiple Races | 69 (7.6%)   | 96 (10.6%)  |
| <i>Total</i>                           | 909         | 909         |
| <b>Health Insurance Coverage*</b>      |             |             |
| Yes                                    | 441 (48.5%) | 471 (51.8%) |
| No                                     | 46 (5.1)    | 19 (2.1%)   |
| Missing                                | 0 (0.0%)    | 419 (46.1%) |
| <i>Total</i>                           | 909         | 909         |

| Characteristics                    | Adults      | Children    |
|------------------------------------|-------------|-------------|
| <b>Work Status</b>                 |             |             |
| Employed                           | 654 (71.9%) | —           |
| Unemployed                         | 46 (5.1%)   | —           |
| Not in Labor Force                 | 198 (21.8%) | —           |
| Refused                            | 1 (0.1%)    | —           |
| Missing                            | 10 (1.1%)   | —           |
| <i>Total</i>                       | 909         | —           |
| <b>Marital Status</b>              |             |             |
| Married                            | 648 (71.3%) | —           |
| Not Married                        | 245 (27.0%) | —           |
| Missing                            | 16 (1.8%)   | —           |
| <i>Total</i>                       | 909         | —           |
| <b>Language Used for Interview</b> |             |             |
| English                            | 876 (96.4%) | 876 (96.4%) |
| Spanish                            | 19 (2.1%)   | 19 (2.1%)   |
| Other                              | 14 (1.5%)   | 14 (1.5%)   |
| <i>Total</i>                       | 909         | 909         |
| <b>Education, y</b>                |             |             |
| < 12                               | 54 (5.9%)   | —           |
| 12                                 | 119 (13.1%) | —           |
| Some College                       | 193 (21.2%) | —           |
| College Graduate                   | 528 (58.1%) | —           |
| Missing                            | 15 (1.7%)   | —           |
| <i>Total</i>                       | 909         | —           |

\* Question added to 2009 NHFS in January 2010

Table 6: Paired Household Characteristics (n=909)

| Characteristics                 |  | n (%)       |
|---------------------------------|--|-------------|
| Number of Adults in Household   |  |             |
| 1                               |  | 122 (13.4%) |
| 2                               |  | 606 (66.7%) |
| 3                               |  | 133 (14.6%) |
| 4                               |  | 48 (5.3%)   |
| Number of Children in Household |  |             |
| 1                               |  | 414 (45.5%) |
| 2                               |  | 334 (36.7%) |
| 3                               |  | 161 (17.7%) |
| Poverty Status*                 |  |             |
| > \$75,000                      |  | 469 (51.6%) |
| ≤ \$75,000; Above Poverty Line  |  | 267 (29.4%) |
| Below Poverty Line              |  | 78 (8.6%)   |
| Unknown                         |  | 95 (10.5%)  |

\*Poverty line was based on the number of adults and children reported in the household, reported household income, and the 2008 Census poverty thresholds. The poverty line was calculated for each household using the number of individuals reported and exact household income or by using the midpoint of established income if survey respondent answered the entire cascade of income questions (CDC, NCRID, and NCHS, 2012).

### Sociodemographic Influence on Influenza Vaccination

Hypothesis 1: Adult education level, race/ethnicity, employment status, insurance coverage, and household income influence the likelihood of a same household child receiving an influenza vaccine.

Table 7 indicates that age, race/ethnicity, education, and insurance coverage were associated with their influenza vaccination status for the adults. Vaccinated adults were more likely to be non-Hispanic white (61.4%), 44 years old or younger (60.8%), college graduates (58.1%), and have health insurance (48.5%). Though there were more females than male respondents, gender was not statistically significant for adults or children. The

vast majority of the adults completed the interview in English (96.4%). Only the variables for age and insurance coverage were associated with influenza vaccination in the same household children. Slightly more than half (53.3%) of the vaccinated children were between the ages of nine months and nine years of age; slightly more than half of which (51.8%) were insured.

Table 7: Adult and Child Sociodemographics and Influenza Vaccination

| Characteristics                              | Adults n (%)                      |   |                    | Children n (%)                      |   |                    |
|--|-----------------------------------|---|--------------------|-------------------------------------|---|--------------------|
|  | Vaccinated <sup>1</sup><br>Adults | Non-<br>Vaccinated <sup>2</sup><br>Adults | $\chi^2$ , p-value | Vaccinated <sup>1</sup><br>Children | Non-<br>Vaccinated <sup>2</sup><br>Children | $\chi^2$ , p-value |
| <b>Gender</b>                                |                                   |   |                    |                                     |   |                    |
| Male   | 150 (34.0%)                       | 179 (38.2%)                               | 1.763, .184        | 256 (48.9%)                         | 202 (52.5%)                                 | 1.159, .282        |
| Female                                       | 291 (66.0%)                       | 289 (61.8%)                               |                    | 268 (51.1%)                         | 183 (47.5%)                                 |                    |
| <i>Total</i>                                 | 441                               | 468                                       |                    | 524                                 | 385   |                    |
| <b>Age Group, y</b>                          |                                   |   |                    |                                     |   |                    |
| 6 months–<br>9 years                         | —                                 | —   | 9.603, .048        | 324 (61.8%)                         | 162 (42.1%)                                 | 34.809, <.001      |
| 10-17 years                                  | —                                 | —   |                    | 200 (38.2%)                         | 223 (57.9%)                                 |                    |
| 18-34  | 94 (21.3%)                        | 138 (29.5%)                               |                    | —                                   | —   |                    |
| 35-44  | 168 (38.1%)                       | 153 (32.7%)                               |                    | —                                   | —   |                    |
| 45-54  | 129 (29.3%)                       | 132 (28.2%)                               |                    | —                                   | —   |                    |
| 55-64  | 38 (8.6%)                         | 38 (8.1%)                                 |                    | —                                   | —   |                    |
| 65+  | 12 (2.7%)                         | 7 (1.5%)                                  |                    | —                                   | —   |                    |
| <i>Total</i>                                 | 441                               | 468                                       |                    | 524                                 | 385   |                    |
| <b>Race and Ethnicity</b>                    |                                   |   |                    |                                     |   |                    |
| Hispanic                                     | 22 (5.0%)                         | 49 (10.5%)                                | 11.483, .003       | 53 (10.1%)                          | 34 (8.8%)                                   | 3.064, .216        |
| Non-Hispanic,<br>Black Only                  | 82 (18.6%)                        | 129 (27.6%)                               |                    | 110 (21.0%)                         | 102 (26.5%)                                 |                    |
| Non– Hispanic,<br>White Only                 | 303 (68.7%)                       | 255 (54.5%)                               |                    | 301 (57.4%)                         | 213 (55.3%)                                 |                    |
| Non– Hispanic,<br>Other or<br>Multiple Races | 34 (7.7%)                         | 35 (7.5%)                                 |                    | 60 (11.5%)                          | 36 (9.4%)                                   |                    |
| <i>Total</i>                                 | 441                               | 468                                       | 524                | 385                                 |   |                    |

<sup>1</sup> Adults and children who have received H1N1, seasonal influenza, or both vaccines

<sup>2</sup> Adults and children who have not received an H1N1 or seasonal influenza vaccine

Table 7: Adult and Child Sociodemographics and Influenza Vaccination (continued)

| Characteristics                    | Adults n (%)                      |   |                    | Children n (%)                      |   |                    |
|------------------------------------|-----------------------------------|---|--------------------|-------------------------------------|---|--------------------|
|                                    | Vaccinated <sup>1</sup><br>Adults | Non-<br>Vaccinated <sup>2</sup><br>Adults | $\chi^2$ , p-value | Vaccinated <sup>1</sup><br>Children | Non-<br>Vaccinated <sup>2</sup><br>Children | $\chi^2$ , p-value |
| <b>Work Status</b>                 |                                   |   |                    |                                     |   |                    |
| Employed                           | 324 (73.5%)                       | 330 (70.5%)                               | 5.424, .247        | —                                   | —   | —                  |
| Unemployed                         | 16 (3.6%)                         | 30 (6.4%)                                 |                    | —                                   | —   |                    |
| Not in Labor<br>Force              | 94 (21.3%)                        | 104 (22.2%)                               |                    | —                                   | —   |                    |
| Refused                            | 1 (0.2%)                          | 0 (0.0%)                                  |                    | —                                   | —   |                    |
| Missing                            | 0 (0.0%)                          | 4 (0.86%)                                 |                    | —                                   | —   |                    |
| <i>Total</i>                       | 441                               | 468                                       |                    | —                                   | —   |                    |
| <b>Marital Status</b>              |                                   |   |                    |                                     |   |                    |
| Married                            | 340 (77.1%)                       | 308 (65.8%)                               | 15.843, <.001      | —                                   | —   | —                  |
| Not Married                        | 92 (20.9%)                        | 153 (32.7%)                               |                    | —                                   | —   |                    |
| Missing                            | 9 (2.0%)                          | 7 (1.5%)                                  |                    | —                                   | —   |                    |
| <i>Total</i>                       | 441                               | 468                                       |                    | —                                   | —   |                    |
| <b>Language Used for Interview</b> |                                   |   |                    |                                     |   |                    |
| English                            | 436 (98.9%)                       | 440 (94.0%)                               | 15.644, <.001      | 504 (96.2%)                         | 372 (96.6%)                                 | .242, .886         |
| Spanish                            | 2 (0.5%)                          | 17 (3.6%)                                 |                    | 12 (2.3%)                           | 7 (1.8%)                                    |                    |
| Other                              | 3 (0.7%)                          | 11 (2.4%)                                 |                    | 8 (1.5%)                            | 6 (1.6%)                                    |                    |
| <i>Total</i>                       | 441                               | 468                                       |                    | 524                                 | 385   |                    |
| <b>Education, y</b>                |                                   |   |                    |                                     |   |                    |
| < 12                               | 12 (2.7%)                         | 42 (9.0%)                                 | 28.165, <.001      | —                                   | —   | —                  |
| 12                                 | 54 (12.2%)                        | 65 (13.9%)                                |                    | —                                   | —   | —                  |
| Some College                       | 78 (17.7%)                        | 115 (24.6%)                               |                    | —                                   | —   | —                  |
| College Graduate                   | 288 (65.3%)                       | 240 (51.3%)                               |                    | —                                   | —   | —                  |
| Missing                            | 9 (2.0%)                          | 6 (1.3%)                                  |                    | —                                   | —   | —                  |
| <i>Total</i>                       | 441                               | 468                                       |                    | —                                   | —   | —                  |
| <b>Health Insurance Coverage*</b>  |                                   |   |                    |                                     |   |                    |
| Yes                                | 254 (57.6%)                       | 187 (40.0%)                               | 30.134, <.001      | 310 (59.2%)                         | 161 (41.8%)                                 | 27.105, <.001      |
| No                                 | 14 (3.2%)                         | 32 (6.8%)                                 |                    | 8 (1.5%)                            | 11 (2.9%)                                   |                    |
| Missing                            | 173 (39.2%)                       | 249 (53.2%)                               |                    | 206 (39.3%)                         | 213 (55.3%)                                 |                    |
| <i>Total</i>                       | 441                               | 468                                       |                    | 524                                 | 385   |                    |

<sup>1</sup> Adults and children who have received H1N1, seasonal influenza, or both vaccines

<sup>2</sup> Adults and children who have not received an H1N1 or seasonal influenza vaccine

\* Question added to 2009 NHFS in January 2010

## Adult Influenza Vaccination Influence on Same Household Child Vaccination Status

The manner in which the influenza vaccination status of adults influences that of a same household child was the focus of Hypothesis 2: Influenza vaccinated adults are more likely to have a same household child vaccinated against influenza. The majority of adults and children did not receive an H1N1 vaccine (75.1% and 62.4%, respectively) or a seasonal influenza vaccine (57.9% and 54.5%, respectively). Roughly one quarter of the children (25.5%) received both the H1N1 and seasonal influenza vaccines; whereas, 18.5% of adults received both vaccines. More adults and children were vaccinated against seasonal influenza (42.1% and 45.5%, respectively) than H1N1 (24.9% and 37.6%, respectively). These results are illustrated in Table 8.

Table 8: Individual Influenza Vaccination Status

| <b>Vaccination Status</b>                          |  | <b>Adults n (%)</b> | <b>Children n (%)</b> |
|--|--|---------------------|-----------------------|
| <b>H1N1 Flu Vaccination</b>                        |  |                     |                       |
|  | No   | 683 (75.1%)         | 567 (62.4%)           |
|  | Yes  | 226 (24.9%)         | 342 (37.6%)           |
|  | <i>Total</i>                                 | 909 (100.0%)        | 909 (100.0%)          |
| <b>Seasonal Flu Vaccination</b>                    |  |                     |                       |
|  | No   | 526 (57.9%)         | 495 (54.5%)           |
|  | Yes  | 383 (42.1%)         | 414 (45.5%)           |
|  | <i>Total</i>                                 | 909 (100.0%)        | 909 (100.0%)          |
| <b>Combined H1N1 and Seasonal Flu Vaccinations</b> |  |                     |                       |
|  | No Flu Vaccinations Received                 | 468 (51.5%)         | 385 (42.4%)           |
|  | Received either H1N1 or Seasonal Flu Vaccine | 273 (30.0%)         | 292 (32.1%)           |
|  | Received both H1N1 and Seasonal Flu Vaccines | 168 (18.5%)         | 232 (25.5%)           |
|  | <i>Total</i>                                 | 909 (100.0%)        | 909 (100.0%)          |

To investigate the second hypothesis, adult vaccination status for H1N1, seasonal, and combined influenza were analyzed against the similar vaccination status in the same household child. The statistically significant correlations between adults' H1N1, seasonal, and combined influenza vaccination status and that of their same household children are presented below.

The H1N1 vaccination status for both the adults and children is shown in Table 9. A moderate association was observed between the H1N1 vaccination status of adults and children from the same household. Approximately 19% of households had adults and children who received an H1N1 vaccine. In slightly more than half of the households (56.1%), neither the adults nor the children received an H1N1 vaccine. Further, in 6.3% of households the adults received the H1N1 vaccine and the children did not and 19.0% of households where children received the H1N1 vaccine the adults did not. Three times as many children received the H1N1 vaccine (18.6%) as compared to adults (6.3%).

Table 9: H1N1 Vaccination Status<sup>1</sup>

|                                      |     |            | Children Receiving H1N1 Vaccine |       | Total  |
|--------------------------------------|-----|------------|---------------------------------|-------|--------|
|                                      |     |            | No                              | Yes   |        |
| <b>Adults Receiving H1N1 Vaccine</b> | No  | Count      | 510                             | 173   | 683    |
|                                      |     | % of Total | 56.1%                           | 19.0% | 75.1%  |
|                                      | Yes | Count      | 57                              | 169   | 226    |
|                                      |     | % of Total | 6.3%                            | 18.6% | 24.9%  |
| <b>Total</b>                         |     | Count      | 567                             | 342   | 909    |
|                                      |     | % of Total | 62.4%                           | 37.6% | 100.0% |

<sup>1</sup>  $\kappa = .419$ , 95% CI [.359, .479],  $p < .0005$

Table 10 demonstrates the correlation between the seasonal influenza vaccination status of same household adults and children. Both the adult and child received the seasonal influenza vaccine in 28.5% of the paired households. The adults and children in 30.9% of the households had discordant seasonal influenza vaccination statuses. Specifically, in 13.6% of these households, the adults received the seasonal influenza vaccination when the children did not, while in 17.1% of households the children received the seasonal influenza vaccine when adults did not. In 40.8% of the households neither the adult nor the child received a seasonal influenza vaccine. If the adult received the seasonal influenza vaccine, two times more children were vaccinated than were not vaccinated.

Table 10: Seasonal Influenza Vaccination Status<sup>1</sup>

|  |     |            | Children Receiving Seasonal Influenza Vaccine |       | Total  |
|--|-----|------------|---|-------|--------|
|  |     |            | No  | Yes   |        |
| <b>Adults Receiving Seasonal Influenza Vaccine</b> | No  | Count      | 371   | 155   | 526    |
|  |     | % of Total | 40.8%   | 17.1% | 57.9%  |
|  | Yes | Count      | 124   | 259   | 383    |
|  |     | % of Total | 13.6%   | 28.5% | 42.1%  |
| Total  |     | Count      | 495   | 414   | 909    |
|  |     | % of Total | 54.5%   | 45.5% | 100.0% |

<sup>1</sup>  $\kappa = .377$ , 95% CI [.316, .438],  $p < .0005$

Table 11 depicts the association between the H1N1 and seasonal influenza vaccinations received by adults and children from the same household. Specifically, in 11.2% of households, both the adults and the children received the H1N1 and seasonal flu vaccinations. In 31.8% of households, if the adult did not receive an H1N1 or seasonal flu vaccine, the children also did not receive either of these vaccines. Moreover, in 14.4% of households where adults received either the H1N1 or seasonal flu vaccine, so did the same household children.

Table 11: Combined H1N1 and Seasonal Influenza Status<sup>1</sup>

|                                    |  |            | Flu Vaccinations Received – Children |  |  | Total  |
|------------------------------------|--|------------|--------------------------------------|--|--|--------|
|                                    |  |            | No Flu Vaccinations Received         | Received either H1N1 or Seasonal Flu Vaccine | Received both H1N1 and Seasonal Flu Vaccines |        |
| Flu Vaccinations Received – Adults | No Flu Vaccinations Received                 | Count      | 289                                  | 120  | 59   | 468    |
|                                    |  | % of Total | 31.8%                                | 13.2%  | 6.5%   | 51.5%  |
|                                    | Received either H1N1 or Seasonal Flu Vaccine | Count      | 71                                   | 131  | 71   | 273    |
|                                    |  | % of Total | 7.8%                                 | 14.4%  | 7.8%   | 30.0%  |
|                                    | Received both H1N1 and Seasonal Flu Vaccines | Count      | 25                                   | 41   | 102  | 168    |
|                                    |  | % of Total | 2.8%                                 | 4.5%   | 11.2%  | 18.5%  |
| Total                              |  | Count      | 385                                  | 292  | 232  | 909    |
|                                    |  | % of Total | 42.4%                                | 32.1%  | 25.5%  | 100.0% |

<sup>1</sup>  $\chi^2(4) = 231.495, p < .0005$ ; Cramer's  $V > 0.30$  ( $\phi_c = 0.357, p < .0005$ )

## Adult Responses to HBM Constructs and Same Household Child Influenza Vaccination Status

The third hypothesis of this study was: adult perceived susceptibility, severity, benefits, and barriers to influenza and influenza vaccinations are associated with the likelihood of a same household child receiving an influenza vaccine. The associations between adult responses to questions reflecting these HBM constructs are presented in Table 12. When examining the construct of perceived susceptibility, associations were illustrated between adults' belief of getting sick from H1N1 or seasonal influenza without vaccination and the vaccination status of same household children. Adults indicating a very low chance of getting sick from seasonal influenza had fewer vaccinated children than unvaccinated children. Similarly, adults specifying a very high or somewhat high risk of getting sick from seasonal influenza without vaccination had twice as many vaccinated children in the same household. A similar pattern of association was shown with adults' beliefs of becoming ill with H1N1 without vaccination and the vaccination status of the same household child. Adults who stated a high (10.5%) or somewhat high chance (5.7%) of getting H1N1 without vaccination had almost twice the number of vaccinated children versus unvaccinated children (31.9% and 17.4%, respectively), while those with very low beliefs of getting sick had almost twice as many unvaccinated children.

Adults who were somewhat concerned about H1N1 influenza were more likely to have vaccinated children, whereas those adults who stated they were not at all concerned about H1N1 influenza had almost twice the amount of unvaccinated same household children - the HBM construct of perceived severity.

Adults' opinions on the effectiveness of both H1N1 and seasonal influenza vaccines were assessed for the construct of perceived benefits. Adults who identified H1N1 vaccines as being very effective had almost twice the number of vaccinated children (37.4%) versus unvaccinated children (21.6%); those who thought it not effective had more than twice the number of children who were unvaccinated (3.6%) compared to children who were vaccinated (1.3%). A similar outcome was exhibited with adults' opinions concerning the effectiveness of the seasonal influenza vaccine. Adults who felt the seasonal influenza vaccine was very effective had a greater percentage of vaccinated children (40.3%) than unvaccinated children (25.5%); while those adults who considered the vaccine not at all effective had more than twice as many unvaccinated children (5.5%) compared to vaccinated children (2.3%). For both H1N1 and seasonal influenza effectiveness, adults who considered the H1N1 vaccine or seasonal influenza vaccine somewhat effective had a greater number of unvaccinated children (45.7% and 51.9%, respectively) than unvaccinated children (51.9% and 46.2%, respectively).

An examination of perceived barriers showed the association between adults' reasons for not receiving either the H1N1 or seasonal influenza vaccinations and the vaccination status of same household children. When analyzing adults' reasons for not obtaining an H1N1 vaccine, it was associated with the vaccination status of children in the same household when adults indicated that they did not need the vaccine, the vaccine was not available, and when there was concern about side effects. When adults indicated that they did not feel the vaccine was necessary, fewer children were vaccinated. A smaller number of children were vaccinated when adults said they were worried about vaccine side effects. When adults revealed that they did not receive the H1N1 vaccine

because it was not available, twice as many children were vaccinated. , Adults who indicated they had yet to receive a seasonal influenza vaccine due to time restraints, had more than twice the percentage of vaccinated versus unvaccinated children.

Table 12: Association of Adult Responses to HBM Constructs and Same Household Child Influenza Vaccination Status

| Adult Responses (n, %)   |                                 | Children's Vaccination Status  |                            |                             |
|--|---------------------------------|--------------------------------|----------------------------|-----------------------------|
|  |                                 | Non-Vaccinated Children (n, %) | Vaccinated Children (n, %) | $\chi^2$ , p-value          |
| <b>Perceived Susceptibility</b>  |                                 |                                |                            |                             |
| Chance of getting sick from seasonal flu without seasonal flu vaccine <sup>b</sup> |                                 |                                |                            |                             |
|  | Very High (91, 10.0%)           | 26 (6.8%)                      | 65 (12.4%)                 | 47.492, <.001               |
|  | Somewhat High (287, 31.6%)      | 85 (22.1%)                     | 202 (38.5%)                |                             |
|  | Somewhat Low (343, 37.7%)       | 169 (43.9%)                    | 174 (33.2%)                |                             |
|  | Very Low (171, 18.8%)           | 97 (25.2%)                     | 74 (14.1%)                 |                             |
|  | Don't Know (17, 1.9%)           | 8 (2.1%)                       | 9 (1.7%)                   |                             |
| Chance of getting sick from H1N1 flu without H1N1 flu vaccine <sup>b</sup>         |                                 |                                |                            |                             |
|  | High (77, 8.5%)                 | 22 (5.7%)                      | 55 (10.5%)                 | 43.983 <sup>a</sup> , <.001 |
|  | Somewhat high (234, 25.7%)      | 67 (17.4%)                     | 167 (31.9%)                |                             |
|  | Somewhat low (352, 38.7%)       | 160 (41.6%)                    | 192 (36.6%)                |                             |
|  | Very low (213, 23.4%)           | 120 (31.2%)                    | 93 (17.7%)                 |                             |
|  | Don't know (32, 3.5%)           | 16 (14.2%)                     | 16 (3.1%)                  |                             |
|  | Refused (1, 0.1%)               | 0 (0.0%)                       | 1 (0.2%)                   |                             |
| <b>Perceived Severity</b>  |                                 |                                |                            |                             |
| Concern about H1N1 influenza <sup>c</sup>  |                                 |                                |                            |                             |
|  | Very concerned (176, 19.4%)     | 68 (17.7%)                     | 108 (20.6%)                | 12.474 <sup>a</sup> , .014  |
|  | Somewhat concerned (413, 45.4%) | 160 (41.5%)                    | 253 (48.3%)                |                             |
|  | Not very concerned (253, 27.8%) | 119 (30.9%)                    | 134 (25.6%)                |                             |
|  | Not at all concerned (66, 7.3%) | 38 (9.9%)                      | 28 (5.3%)                  |                             |
|  | Unknown (1, 0.1%)               | 0 (0.0%)                       | 1 (0.2%)                   |                             |
| <b>Perceived Benefits</b>  |                                 |                                |                            |                             |
| Effectiveness of H1N1 vaccine <sup>b</sup>   |                                 |                                |                            |                             |
|  | Very effective (279, 30.7%)     | 83 (21.6%)                     | 196 (37.4%)                | 37.771 <sup>a</sup> , <.001 |
|  | Somewhat effective (399, 43.9%) | 176 (45.7%)                    | 223 (42.6%)                |                             |
|  | Not very effective (56, 6.2%)   | 35 (9.1%)                      | 21 (4.0%)                  |                             |
|  | Not at all effective (21, 2.3%) | 14 (3.6%)                      | 7 (1.3%)                   |                             |
|  | Don't know (153, 16.8%)         | 76 (19.7%)                     | 77 (14.7%)                 |                             |
|  | Refused (1, 0.1%)               | 1 (0.3%)                       | 0 (0.0%)                   |                             |

<sup>a</sup> Cell count less than 5

<sup>b</sup> Grouped variable on 2009 NHFS

<sup>c</sup> Individual variable on 2009 NHFS

Table 12: Association of Adult Responses to HBM Constructs and Same Household Child Influenza Vaccination Status (continued)

| Adult Responses (n, %)                                   |  | Children's Vaccination Status  |                            |                             |
|--|--|--------------------------------|----------------------------|-----------------------------|
|  |  | Non-Vaccinated Children (n, %) | Vaccinated Children (n, %) | $\chi^2$ , p-value          |
| <b>Perceived Benefits</b>                                |  |                                |                            |                             |
| Effectiveness of seasonal influenza vaccine <sup>b</sup> |  |                                |                            |                             |
|  | Very effective (309, 34.0%)                                    | 98 (25.5%)                     | 211 (40.3%)                | 28.232 <sup>a</sup> , <.001 |
|  | Somewhat effective (442, 48.6%)                                | 200 (51.9%)                    | 242 (46.2%)                |                             |
|  | Not very effective (85, 9.4%)                                  | 47 (12.2%)                     | 38 (7.3%)                  |                             |
|  | Not at all effective (33, 3.6%)                                | 21 (5.5%)                      | 12 (2.3%)                  |                             |
|  | Don't know (38, 4.2%)  | 18 (4.7%)                      | 20 (3.8%)                  |                             |
|  | Refused (2, 0.2%)  | 1 (0.3%)                       | 1 (0.2%)                   |                             |
| <b>Perceived Barriers</b>                                |  |                                |                            |                             |
| Reasons for not receiving H1N1 vaccine <sup>c</sup>      |  |                                |                            |                             |
|  | Already had H1N1 (26, 5.0%)                                    | 9 (3.7%)                       | 17 (6.1%)                  | 1.570, .210                 |
|  | Allergies (1, 0.2%)  | 1 (0.4%)                       | 0 (0.0%)                   | 1.150 <sup>a</sup> , .284   |
|  | Tried but Couldn't Get the Vaccine (8, 1.5%)                   | 2 (0.8%)                       | 6 (2.1%)                   | 1.518 <sup>a</sup> , .218   |
|  | Vaccine cost too much (4, 0.8%)                                | 1 (0.4%)                       | 3 (1.1%)                   | .753 <sup>a</sup> , .385    |
|  | Hasn't gotten to it yet/ No time (37, 7.1%)                    | 12 (4.9%)                      | 25 (8.9%)                  | 3.196, .074                 |
|  | Vaccine doesn't work (10, 1.9%)                                | 7 (2.9%)                       | 3 (1.1%)                   | 2.250 <sup>a</sup> , .134   |
|  | Unsure where to go/ Who to call (7, 1.3%)                      | 2 (0.8%)                       | 5 (1.8%)                   | .923 <sup>a</sup> , .337    |
|  | Doctor hasn't recommended (1, 0.2%)                            | 1 (0.4%)                       | 0 (0.0%)                   | 1.150 <sup>a</sup> , .284   |
|  | Never gets flu vaccines/ doesn't believe in them (4, 0.8%)     | 3 (1.2%)                       | 1 (0.4%)                   | 1.310 <sup>a</sup> , .252   |
|  | Not needed (104, 19.8%)  | 60 (24.6%)                     | 44 (15.7%)                 | 6.457, .011                 |
|  | Vaccine not available (75, 14.3%)                              | 20 (8.2%)                      | 55 (19.6%)                 | 13.928, <.001               |
|  | Would rather save dose for someone who needs it more (0, 0.0%) | 0 (0.0%)                       | 0 (0.0%)                   | n/a                         |
|  | Worry about side effects (78, 14.9%)                           | 47 (19.3%)                     | 31 (11.1%)                 | 6.904, .009                 |
|  | Another reason (165, 31.5%)                                    | 75 (30.7%)                     | 90 (32.1%)                 | .119, .730                  |
|  | Unknown (3, 0.6%)  | 3 (1.2%)                       | 0 (0.0%)                   | 3.462 <sup>a</sup> , .063   |
|  | Refused (1, 0.2%)  | 1 (0.4%)                       | 0 (0.0%)                   | 1.150 <sup>a</sup> , .284   |

<sup>a</sup> Cell count less than 5

<sup>b</sup> Grouped variable on 2009 NHFS

<sup>c</sup> Individual variable on 2009 NHFS

Table 12: Association of Adult Responses to HBM Constructs and Same Household Child Influenza Vaccination Status (continued)

| Adult Responses (n, %)  | Children's Vaccination Status  |                            |                           |
|---|--------------------------------|----------------------------|---------------------------|
|   | Non-Vaccinated Children (n, %) | Vaccinated Children (n, %) | $\chi^2$ , p-value        |
| <b>Perceived Barriers</b>   |                                |                            |                           |
| Reasons for not receiving seasonal vaccine <sup>c</sup>               |                                |                            |                           |
| Already had seasonal influenza (0, 0.0%)                              | 0 (0.0%)                       | 0 (0.0%)                   | n/a                       |
| Allergies (1, 0.2%)   | 1 (0.5%)                       | 0 (0.0%)                   | .946 <sup>a</sup> , .331  |
| Tried but Couldn't Get the Vaccine (2, 0.5%)                          | 0 (0.0%)                       | 2 (1.0%)                   | 2.129 <sup>a</sup> , .145 |
| Vaccine cost too much (4, 1.0%)                                       | 2 (0.9%)                       | 2 (1.0%)                   | .003 <sup>a</sup> , .954  |
| Hasn't gotten to it yet/ No time (43, 10.3%)                          | 14 (6.5%)                      | 29 (14.4%)                 | 6.847, .009               |
| Vaccine doesn't work (12, 2.9%)                                       | 5 (2.3%)                       | 7 (3.5%)                   | .473, .492                |
| Unsure where to go/ Who to call (4, 1.0%)                             | 1 (0.5%)                       | 3 (1.5%)                   | 1.131 <sup>a</sup> , .288 |
| Doctor hasn't recommended (2, 0.5%)                                   | 0 (0.0%)                       | 2 (1.0%)                   | 2.129 <sup>a</sup> , .145 |
| Never gets flu vaccines/ doesn't believe in them (8, 1.9%)            | 4 (1.9%)                       | 4 (2.0%)                   | .007 <sup>a</sup> , .934  |
| Not needed (113, 27.2%)   | 69 (32.2%)                     | 44 (21.8%)                 | 5.747, .017               |
| Vaccine not available (21, 5.0%)                                      | 9 (4.2%)                       | 12 (5.9%)                  | .653, .419                |
| Would rather save dose for someone who needs it more (0, 0.0%)        | 0 (0.0%)                       | 0 (0.0%)                   | n/a                       |
| Worry about side effects (49, 11.8%)                                  | 31 (14.5%)                     | 18 (8.9%)                  | 3.108, .078               |
| Another reason (154, 37.0%)   | 76 (35.5%)                     | 78 (36.6%)                 | .428, .513                |
| Unknown (2, 0.5%)   | 1 (0.5%)                       | 1 (0.5%)                   | .002 <sup>a</sup> , .967  |
| Refused (1, 0.2%)   | 1 (0.5%)                       | 0 (0.0%)                   | .946 <sup>a</sup> , .331  |
| Worry about getting sick from H1N1 vaccine <sup>b</sup>               |                                |                            |                           |
| Very worried (89, 9.8%)   | 35 (9.1%)                      | 54 (10.3%)                 | 3.185 <sup>a</sup> , .672 |
| Somewhat worried (218, 24.0%)   | 92 (23.9%)                     | 126 (24.0%)                |                           |
| Not very worried (332, 36.5%)   | 151 (39.2%)                    | 181 (34.5%)                |                           |
| Not at all worried (266, 29.3%)                                       | 106 (27.5%)                    | 160 (30.5%)                |                           |
| Don't Know (3, 0.3%)  | 1 (0.3%)                       | 2 (0.4%)                   |                           |
| Refused (1, 0.1%)   | 0 (0.0%)                       | 1 (0.2%)                   |                           |
| Worry about getting sick from seasonal influenza vaccine <sup>b</sup> |                                |                            |                           |
| Very worried (61, 6.7%)   | 23 (6.0%)                      | 38 (7.3%)                  | 5.639 <sup>a</sup> , .228 |
| Somewhat worried (179, 19.7%)   | 80 (20.8%)                     | 99 (18.9%)                 |                           |
| Not very worried (314, 34.5%)   | 146 (37.9%)                    | 168 (32.1%)                |                           |
| Not at all worried (353, 38.8%)                                       | 135 (35.1%)                    | 218 (41.6%)                |                           |
| Don't Know (2, 0.2%)  | 1 (0.3%)                       | 1 (0.2%)                   |                           |

<sup>a</sup> Cell count less than 5

<sup>b</sup> Grouped variable on 2009 NHFS

<sup>c</sup> Individual variable on 2009 NHFS

## Adults' Cues to Action and Influenza Vaccination Status of Same Household Children

When investigating the fourth hypothesis, adults who receive a physician recommendation for influenza vaccination are more likely to have same household children receive an influenza vaccine. Physician recommendations for H1N1 and seasonal influenza vaccines were associated with vaccinated children. Children who vaccinated tended to have more adults in the same household who received physician recommendations for both influenza vaccines (29.2%), while more unvaccinated children lived in households with adults who did not receive a physician recommendation for either vaccine (71.8%) (Table 13).

Table 13: Association of Physician Recommendation for Adult Influenza Vaccination and Same Household Child Influenza Vaccination Status

| Adult Responses (n, %)  | Children's Vaccination Status  |                            |                             |
|---|--------------------------------|----------------------------|-----------------------------|
|   | Non-Vaccinated Children (n, %) | Vaccinated Children (n, %) | $\chi^2$ , p-value          |
| <b>Cues to Action</b>   |                                |                            |                             |
| Physician recommendation for both influenza vaccines <sup>c</sup> |                                |                            |                             |
| H1N1 Vaccine (40, 4.7%)   | 15 (4.4%)                      | 25 (4.9%)                  | 27.839 <sup>a</sup> , <.001 |
| Seasonal Vaccine (68, 8.0%)                                       | 25 (7.3%)                      | 43 (8.5%)                  |                             |
| Both Vaccines (201, 23.7%)  | 53 (15.5%)                     | 148 (29.2%)                |                             |
| Neither Vaccine (525, 61.9%)                                      | 245 (71.8%)                    | 280 (55.2%)                |                             |
| Refused recommendation (1, 0.1%)                                  | 0 (0.0%)                       | 1 (0.2%)                   |                             |
| Unknown (13, 1.5%)  | 3 (0.9%)                       | 10 (2.0%)                  |                             |

<sup>a</sup> Cell count less than 5

<sup>b</sup> Grouped variable on 2009 NHFS

<sup>c</sup> Individual variable on 2009 NHFS

## Chapter 5: Discussion

### Summary of central findings

The influenza vaccination literature primarily focuses on the reasons underlying a *biological parent's* acceptance or refusal of vaccines for themselves and/or their children. This was the original research plan for this master's thesis: to examine the concordance of influenza vaccination behaviors between U.S. parents and their children. However, closer examination of the 2009 H1N1 Flu Survey's (NHFS) format and dataset warranted a more feasible analysis of a subset of NHFS adults and children residing within the same household in the District of Columbia, Maryland, and Virginia (DMV). Thus, this study reported attempted to advance our understanding of the influenza vaccination uptake behaviors of the DMV adults and their decision whether or not to vaccinate same household children against influenza.

While there is a sizable amount of literature that examines parental vaccine decision making for children, many studies investigate general vaccination decision making that is from the perspective of parents and not that of the same household adult. Of this literature, there is a smaller subset that specifically addresses influenza vaccination, much of which are not necessarily representative of the general population of the United States. The research of Flood et al. (2010) is one such study that investigated parental influenza vaccination decision making in a sample that is representative of the U.S. population. The demographics of the DMV paired households in this research mirror that of Flood et al. (2010) as the majority of the adults in both studies were female, non-Hispanic White, < 44 years of age, married, college educated, and employed. Though most of the children in both studies were non-Hispanic White

males, this research differed in that more than half of the children were between the ages of six months and nine years of age, whereas the majority of children in the Flood et al. (2010) study were between five and twelve years old. The study also differed in average household income which was > \$60,000 in the Flood et al study, but more than \$75,000 in this investigation.

Four hypotheses were assessed in this research study presented here. These included investigating whether socio-demographics, same-household adult influenza vaccination status, responses to HBM constructs and physician recommendation for influenza vaccination influenced the influenza vaccination status of same household children. All four hypotheses were supported by the results of this investigation and, in general, the findings were consistent with the literature surrounding vaccine decision making. This literature illustrates the associations between race (Bisha, Yardley, Nicoll, & Michie, 2011; Flood et al., 2010; Hilyard et al., 2014), insurance coverage (Flood et al., 2010), perceived susceptibility (Bisha et al., 2011; Wheelock, Thomson & Sevdalis, 2013), perceived severity (Flood et al., 2010; Wheelcock et al., 2013), perceived benefits (Bisha et al., 2011), perceived barriers of vaccine safety (Bisha et al., 2011; Flood et al., 2010; Mills et al., 2005; Wheelcock et al., 2013), and physician recommendation (Flood et al., 2010; Hilyard et al., 2014; Wheelcock et al., 2013).

For the first hypothesis that looked at the association of sociodemographics to influenza vaccination status, results indicated that DMV adults were more likely to be vaccinated against influenza when they were non-Hispanic white, forty-four years of age or younger, and college graduates with health insurance. These findings mirror those from research conducted by several investigators (see Daley et al., 2006; Galarce,

Minsky, & Viswanath, 2011; Grant, 2003; Malosh, 2014) that point out how socio-demographics are linked to the likelihood of obtaining influenza vaccinations. The association between adult age and race with children's vaccination status illustrated in this research were also seen in the work of Flood and colleagues (2010) and Hilyard and her colleagues (2014). Flood et al's research (2010), which is similar to this thesis research, also had adults who were insured and who had at least a college education positively influenced child influenza vaccination status. Hilyard and her colleagues (2014) found higher vaccination rates in children of parents (adults) with only a high school education and no difference in children's vaccination rates based on health insurance status. Still, this research differs from that of Nagata et al., (2013) and Schneider and colleagues (2001) who focused on adult men and women  $\geq 65$  years of age and persons with high risk conditions such as diabetes, chronic heart conditions, Chronic Obstructive Pulmonary Disorder (COPD), cancer, or asthma (Egede & Zhang, 2003).

Although literature could not be found that specifically examined the impact of adult influenza vaccination status on children from the same household, the objective of hypothesis two, the research reported here illustrated correlations between the vaccination of adults and same household children, which parallels the correlation seen between influenza vaccinated parents and the vaccination status of their children in the research conducted by Flood and colleagues (2010). Specifically, in this study, statistically significant associations were found between the vaccination status of adults and children from the same household for H1N1, seasonal influenza, and a combination of both vaccines. There were households where the adults did not receive an H1N1 or

seasonal influenza vaccination and neither did the majority of the children. Yet, there were households where both adults and children received H1N1 or seasonal influenza vaccines. When examining combined H1N1 and seasonal flu vaccination, in households where adults did not receive an influenza vaccine, most of the children did not, as well. This trend of children's vaccine concordance with that of adults' from the same household continued, even when the adults received one or both influenza vaccines.

Concerning hypothesis three, the analysis of adult responses to the HBM constructs and their association to the same household child's influenza vaccination showed an association between adults' perceived susceptibility, severity, benefits, and the barriers (time constraint, concern about vaccine side effects, lack of available vaccine, and the vaccine being unnecessary) with influenza vaccination in same household children. This is comparable to the work of Flood et al (2010); where adult's perception of influenza severity and susceptibility influenced child influenza vaccination. While their work was similar in that it also illustrated a negative association between the barrier of vaccine side effects and child influenza vaccination, it differed because other barriers, such as vaccines containing thimerosal and causing the flu were linked to child vaccination, which was not demonstrated in this study. Similar to the work of Viswanath and colleagues (2013), this thesis research illustrated an association between increased parental knowledge and more positive attitudes and opinions with the likelihood of being vaccinated against H1N1 and seasonal influenza (Newcombe et al., 2014). It also illustrated that adults' behavior modification of buying a facemask was associated with influenza vaccination in same household children. Though it seems counterintuitive, the finding that children were twice as likely to be vaccinated when same-household adults

were not due to vaccine unavailability, this could be explained by the prioritization of children to receive H1N1 vaccines and the availability of school vaccination clinics for students during the flu season (SteelFisher, Blendon, Bekheit, & Lubell, 2010). Also, by December 2009, more adults had discussed influenza vaccination for their children with a healthcare provider than for themselves and that a greater percentage of physicians recommended vaccination for the children than adults could factor into the disparity in influenza vaccination rates between adults and children (SteelFisher et al., 2010).

This thesis, through evaluation of hypothesis four, depicted a relationship between physician recommendation for H1N1 or seasonal influenza vaccines for adults and the vaccine uptake in same household children. This is congruent with the work of both Newcombe et al. (2014) and Flood et al. (2010). Both of these research studies illustrate how physician recommendation for influenza vaccination is a main factor of influenza vaccination. This research study differed because it illustrated an association between physician recommendation for adult influenza vaccination and influenza vaccination of same household children.

#### Implication of findings

The findings from this research highlight a different perspective than what is currently discussed in the literature, that is, by examining the characteristics of same-household adults and how they influence the influenza vaccination rate of children who live within the same home. The conclusions drawn from this research illustrate how adult and child vaccination statuses from within the same household may vary depending on the type of vaccination received – either H1N1 or seasonal flu. These results, from a public health research perspective, could be used to not only better understand how other

factors that are not parental, such as those from same household adults, influence influenza vaccination rates in same household children. These findings could modify the public health approach to influenza vaccine messaging and help shape the messaging and interventions designed to increase vaccine adherence by adults and children. The importance of adult vaccination status, knowledge, attitudes, and beliefs can be included in future research studies to help increase influenza vaccine uptake in adults and children, and potentially increase the uptake of other vaccines such as pertussis.

#### Limitations

Several limitations were noted during the conduct of this research. The manner in which the NHFS data were recoded and the format of the electronic file required extensive manipulation that made it difficult to answer the study's original research question: *Are parents who received flu vaccinations in the past year more likely to have vaccinated their children against influenza in that same year?* Data on the parental relationship of the adult to the same household child could not be determined. When the NHFS was administered, both adults and children within the household were interviewed; however, there were limitations with this process. For example, while information about the relationship between the adult interviewee and the child was included in the survey, it was removed from the public-use data file for privacy issues and, more importantly, the adult interviewed was not necessarily the biological parent of the child nor the same adult surveyed for the household (CDC, NCIRD, & NCHS, 2012a). In order for these data to better fit this study's original research question, the adult interviewed for the household had to be the child's biological parent. Moreover, only one child in each household was randomly interviewed, despite the number of children who lived in the household. If data

were collected for all of the children in the home, potentially more associations could be tested, and it would allow for more robust results. Finally, only survey respondents with landlines were mailed letters, which could have influenced which participants ultimately ended up completing the survey.

In the NHFS, there was an open-ended “other” category that non-vaccinated adults could select when asked why they did not receive an influenza vaccine. Though they were asked the reason for non-receipt, the respondents’ rationale for influenza vaccine refusal was not included in the dataset. Since a large proportion of the unvaccinated respondents indicated “other” as the reason they did not receive a vaccine, it would have been helpful to qualitatively assess these responses and gain a deeper understanding for non-receipt of a vaccine. The data on the relationship of the adult to the child and the “other” reason for not obtaining a vaccine should be made available.

Strengths of this study include the novel nature of this research, since little has been published that specifically examined how adults’ influenza vaccination status influences that of same household children. Additionally, the large sample size of the 2009 National H1N1 Flu Survey respondents provides sufficient power allowing an effect size of a certain extent to be determined during analysis (Field, 2013).

#### Directions for future research and intervention

The parental relationship to the same household child could not be determined along with how the parent’s vaccination status influenced that of the child. Future research should take into consideration the relationship of the adult to the same household child and how this influences H1N1 and seasonal influenza vaccine uptake. Despite its ability to minimize morbidity and mortality from influenza each year, the

influenza vaccination rates for both adults and children are well below the Healthy People 2020 (HP 2020) objective of 80% (Office of Disease Prevention and Health Promotion, 2014) at less than 50% (Lu et al., 2013). Thus, the findings of concordance between adults and children in the same DMV household could be used as a means to change the target, focus, and messaging of influenza vaccination in adults and children to achieve the HP 2020 vaccination objective. Nevertheless, the NFHS is an extensive survey tool and in order to obtain data on the parental factors that influence child vaccination, the survey and its data collection methodology would need to be modified. For example, the association between the adult and same household child was removed from the public data use file in an effort to increase privacy and minimize identifying information. Having this information would be beneficial when determining the relationship (e.g., biological parent, immediate family, or guardian) of the adults to the children.

Future research could address the limitations noted above and provide more robust information about how parents' attitudes and vaccination behaviors influence those of their children. For instance, secondary data analyses of other national datasets, such as the annual CDC National Flu Survey ([http://www.cdc.gov/nchs/nis/h1n1\\_introduction.htm](http://www.cdc.gov/nchs/nis/h1n1_introduction.htm)) could be conducted to investigate research questions such as: Is there concordance between the vaccination of parent and a child within the same household? Is there concordance between the influenza vaccination statuses of related and non-related children from the same household? How does physician recommendation of influenza vaccination for parents affect influenza vaccination in their children? Questions such as these would expand our knowledge concerning other possible avenues

that may impact influenza vaccination uptake in children and emphasize methods needed to increase uptake in children.

The use of quantitative data from other national influenza surveys coupled with data collected using qualitative methods (e.g., in-depth interviews and focus groups), would provide rich data and a deeper understanding of parental factors' and vaccination habits' impact on the vaccination habits of children within the same household. Using these complementary types of data would lead to an enhanced, in-depth understanding of the impact of parental vaccination attitudes and behaviors on the vaccination status of their children. This information could be used to tailor vaccine messaging and develop interventions to increase influenza vaccine uptake.

There is literature (e.g., Benin et al., 2006, Leask et al., 2006; Nichol et al., 1992) that report individuals who receive a vaccination recommendation by a physician are more likely to get vaccinated against influenza. Nonetheless, there are large numbers of unvaccinated individuals who have never received a physician recommendation. Interventions are needed to increase the number of physician recommendations for influenza vaccination. This could involve adding prompts to both adult and pediatric patient charts - either paper or electronic - for influenza vaccination discussions to increase the number of physician recommendations.

## Conclusions

Vaccinations are one of the the most cost-effective public health advancements of the twentieth century, which have aided in minimizing morbidity and mortality from vaccine preventable diseases. Influenza vaccination decision making behaviors are often based on perceived risk of contracting the flu, anticipated regret, physician or nurse

recommendation, previous vaccination behaviors and vaccine side effects. This investigation illustrated how the influenza vaccination behaviors of adults can impact the influenza vaccination status of children from the same household in the District of Columbia, Maryland, and Virginia.

## **Chapter 6: Appendices**

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## **Appendix A: 2009 NHFS; Section B- H1N1 Knowledge, Attitudes, Practices**

**PANINTRO1.** You may have heard of a new type of the flu called 2009 H1N1 flu, which is different from the seasonal flu. This new H1N1 flu is sometimes called swine flu or pandemic flu. I'd like to ask you some questions about this new H1N1 flu.

[ADD TO FAQs: A pandemic is a widespread outbreak of an illness that can spread from person to person. The new H1N1 flu became a pandemic in June 2009.]

**PAN7.** How much, if anything, do you know about the 2009 H1N1 flu? Would you say that you know a lot, a little, or nothing about the 2009 H1N1 flu?

- (1) A lot
- (2) A little
- (3) Nothing
- (77) DON'T KNOW
- (99) REFUSED

**PAN8.** How concerned are you about the H1N1 flu? Would you say you are very concerned, somewhat concerned, not very concerned, or not at all concerned?

- (1) VERY CONCERNED
- (2) SOMEWHAT CONCERNED
- (3) NOT VERY CONCERNED
- (4) NOT AT ALL CONCERNED
- (77) DON'T KNOW
- (99) REFUSED

**PAN10.** Which of the following have you done as a result of the H1N1 flu?

**PAN10B.** Frequent hand washing or use of hand sanitizer.

READ IF NECESSARY: Have you done this as a result of this current pandemic?

- (1) YES
- (2) NO
- (77) DON'T KNOW
- (99) REFUSED

**PAN10C.** Avoided close contact with others who have flu-like symptoms.

READ IF NECESSARY: Have you done this as a result of this current pandemic?

- (1) YES
- (2) NO
- (77) DON'T KNOW
- (99) REFUSED 18

**PAN10D.** Avoided touching your eyes, nose, or mouth as much as possible.  
READ IF NECESSARY: Have you done this as a result of this current pandemic?  
(1) YES  
(2) NO  
(77) DON'T KNOW  
(99) REFUSED

**PAN10E.** Taken anti-viral medicine, like Tamiflu® or Relenza®.  
READ IF NECESSARY: Have you done this as a result of this current pandemic?  
(1) YES  
(2) NO  
(77) DON'T KNOW  
(99) REFUSED

**PAN10F.** Reduced contact with people outside your own household as much as possible.  
READ IF NECESSARY: Have you done this as a result of this current pandemic?  
(1) YES  
(2) NO  
(77) DON'T KNOW  
(99) REFUSED

**PAN10G.** Reduced the amount of time spent at places where there are large gatherings of people.  
READ IF NECESSARY: Have you done this as a result of this current pandemic?  
(1) YES  
(2) NO  
(77) DON'T KNOW  
(99) REFUSED

**PAN10H.** Bought a face mask.  
READ IF NECESSARY: Have you done this as a result of this current pandemic?  
(1) YES  
(2) NO  
(77) DON'T KNOW  
(99) REFUSED

## **Appendix B: 2009 NHFS; Section F- Influenza Vaccination, Adult**

Ask HQ2\_INTRO through HQ8A if H1N1 vaccine is released [H1N1 FLAG=1].

HQ2\_INTRO. IF HFLUOVER or FLUOVER flag=1, then display: During the past flu season, there were two kinds of flu vaccines available, the seasonal flu vaccine, and the 2009-H1N1 flu vaccine. I will first ask you questions about the vaccine for H1N1 flu, which is sometimes called swine flu or pandemic flu, and then ask you questions about the seasonal flu.

Else display: There are currently two kinds of flu vaccines available, the seasonal flu vaccine, and the 2009-H1N1 flu vaccine. I will first ask you questions about the vaccine for H1N1 flu, which is sometimes called swine flu or pandemic flu, and then ask you questions about the seasonal flu.

HQ1. You may have gotten a shot card for the H1N1 and seasonal flu vaccinations. Have you received this shot card?

READ IF NECESSARY: A shot card is a piece of paper used to record vaccination dates and types. The shot card we are asking about is produced by the CDC and is sometimes handed out at places where people receive flu vaccinations.

YES

NO [SKIP TO HQ2]

(77) DON'T KNOW [SKIP TO HQ2]

(99) REFUSED [SKIP TO HQ2]

CARD. The next few questions will be about flu vaccinations. Since some of the vaccinations are difficult to remember it would be helpful if you could refer to your shot card.

READ IF NECESSARY: I'll be happy to wait while you go and get it.

R GETS SHOT CARD

R DOES NOT GET SHOT CARD/CAN'T LOCATE SHOT CARD

HQ2. Since September 2009, have you had an H1N1 flu vaccination? There are two types of H1N1 flu vaccinations. One is a shot and the other is a spray, mist or drop in the nose.

YES

NO [SKIP TO HQ7\_INT]

(77) DON'T KNOW [SKIP TO HQ7\_INT]

(99) REFUSED [SKIP TO HQ7\_INT]

HQ2\_A. How many H1N1 vaccination doses have you received?

1 VACCINATION OR DOSE  
2 OR MORE VACCINATION DOSES  
(77) DON'T KNOW [SKIP TO HQ5]  
(99) REFUSED [SKIP TO HQ5]

HQ2\_B1\_M. During what month did you receive [your/your first] H1N1 flu vaccine?

\_\_ [enter month] (77/7777) DON'T KNOW (99/9999) REFUSED

HQ2\_B1\_C. That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES  
NO [SKIP TO HQ2\_B1]

If HQ2\_B1\_M=CURRENT MONTH, then ask HQ2\_B1\_D, else skip to HQ2\_TYPE1.

HQ2\_B1\_D. On what day of the month did you receive [your/your first] H1N1 flu vaccine?

IF RESPONDENT SAYS DON'T KNOW SAY: I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_\_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]

(77) DON'T KNOW  
(99) REFUSED

HQ2\_TYPE1. Was this a shot or the spray in the nose?

FLU SHOT  
FLU NASAL SPRAY  
(77) DON'T KNOW

(99) REFUSED

If HQ2\_A = 2, then ask HQ2\_B2.

HQ2\_B2\_M. During what month did you receive your second H1N1 flu vaccine?

\_ [enter month] (77/7777) DON'T KNOW (99/9999) REFUSED

HQ2\_B2\_C. That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES

NO [SKIP TO HQ2\_B2]

If HQ2\_B2\_M=CURRENT MONTH, then ask HQ2\_B2\_D, else skip to HQ2\_TYPE2.

HQ2\_B2\_D. On what day of the month did you receive your second H1N1 flu vaccine?

IF RESPONDENT SAYS DON'T KNOW SAY: I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_ \_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]  
(77) DON'T KNOW  
(99) REFUSED

HQ2\_TYPE2. Was this a shot or the spray in the nose?

FLU SHOT

FLU NASAL SPRAY

(77) DON'T KNOW

(99) REFUSED

HQ5. At what kind of place did you get your most recent H1N1 flu vaccination?

[READ ONLY IF NECESSARY]

DOCTOR'S OFFICE [SKIP TO Q2\_INTRO]

HEALTH DEPARTMENT [SKIP TO Q2\_INTRO]

CLINIC OR HEALTH CENTER [SKIP TO Q2\_INTRO]

HOSPITAL [SKIP TO Q2\_INTRO]

OTHER MEDICALLY-RELATED PLACE [SKIP TO Q2\_INTRO]  
PHARMACY OR DRUG STORE [SKIP TO Q2\_INTRO]  
WORKPLACE [SKIP TO Q2\_INTRO]  
ELEMENTARY/MIDDLE/HIGH SCHOOL[SKIP TO Q2\_INTRO]  
OTHER NONMEDICALLY-RELATED PLACE [CONTINUE TO Q5\_OTH]  
(77) DON'T KNOW [SKIP TO Q2\_INTRO]  
(99) REFUSED [SKIP TO Q2\_INTRO]

HQ5\_OTH. [BACK CODE ALL VERBATIM ANSWERS]  
[SPECIFY]:\_\_ [SKIP TO Q2\_INTRO]

If HFLUOVER flag=1, skip HQ7\_INT and continue to HQ10

HQ7\_INT. How likely are you to get a H1N1 flu vaccination between now and the end of June?

Would you say you:  
will definitely get one  
will probably get one  
will probably not get one  
or, will definitely not get one  
(77) DON'T KNOW  
(99) REFUSED

HQ10. If HFLUOVER flag=0 display: There are many reasons why people don't get flu vaccinations. What is the main reason you [will not get/will probably not get/have not yet gotten] an H1N1 flu vaccination this flu season?

If HFLUOVER flag=1 display: There are many reasons why people don't get flu vaccinations. What is the main reason you did not get an H1N1 flu vaccination this past flu season?

[INTERVIEWER INSTRUCTION: IF MORE THAN ONE MENTION, PROBE 'WHAT IS THE MAIN REASON?']

[INTERVIEWER INSTRUCTION: IF 'I NEVER GET ONE', PROBE FOR MORE  
DETAIL]

CONCERNS ABOUT SIDE EFFECTS OR SICKNESS [SKIP TO Q2\_INTRO]  
THINK VACCINES DO NOT WORK [SKIP TO Q2\_INTRO]  
VACCINATION IS NOT NEEDED [SKIP TO Q2\_INTRO]  
ALLERGIC TO THE VACCINE [SKIP TO Q2\_INTRO]

COSTS TOO MUCH TO GET THE VACCINE [SKIP TO Q2\_INTRO]  
BECAUSE I ALREADY HAD H1N1 FLU [SKIP TO Q2\_INTRO]  
VACCINE NOT AVAILABLE [SKIP TO Q2\_INTRO]  
TRIED TO GET IT BUT COULDN'T [SKIP TO Q2\_INTRO]  
DON'T KNOW WHERE TO GO/WHO TO CALL [SKIP TO Q2\_INTRO]  
HAVEN'T GOTTEN TO IT YET/NO TIME [SKIP TO Q2\_INTRO]  
NOT IN A PRIORITY GROUP [SKIP TO Q2\_INTRO]  
SOME OTHER REASON [CONTINUE TO HQ10\_OTH]  
(77) DON'T KNOW [SKIP TO Q2\_INTRO]  
(99) REFUSED [SKIP TO Q2\_INTRO]  
HQ10\_OTH. [SPECIFY]:\_\_

Q2\_INTRO. Now I'm going to ask you about the seasonal flu vaccine. This is the vaccine that is available every year around September for the flu season.

Q2. Since August 2009, have you had a seasonal flu vaccination? There are two types of seasonal flu vaccinations. One is a shot and the other is a spray, mist or drop in the nose.

YES

NO [SKIP TO Q7\_INT]

(77) DON'T KNOW [SKIP TO Q7\_INT]

(99) REFUSED [SKIP TO Q7\_INT]

Q2\_B\_M. During what month did you receive your most recent seasonal flu vaccine?  
\_\_ [enter month] (77/7777) DON'T KNOW (99/9999) REFUSED

Q2\_B\_C. That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES

NO [SKIP TO Q2\_B]

If Q2\_B\_M=CURRENT MONTH, then ask Q2\_B\_D, else skip to Q3.

Q2\_B\_D. On what day of the month did you receive most recent seasonal flu vaccine?

IF RESPONDENT SAYS DON'T KNOW SAY: I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_\_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]  
(77) DON'T KNOW  
(99) REFUSED

Q3. Was your most recent seasonal flu vaccine a shot, or the spray in the nose? The seasonal flu vaccine can be given either as a shot or a nasal spray, also called "FluMist<sup>®</sup>".

SHOT  
SPRAY  
(77) DON'T KNOW  
(99) REFUSED

Q5. At what kind of place did you get your most recent seasonal flu [vaccination]?

[READ ONLY IF NECESSARY]

DOCTOR'S OFFICE [SKIP TO CARD\_2]  
HEALTH DEPARTMENT [SKIP TO CARD\_2]  
CLINIC OR HEALTH CENTER [SKIP TO CARD\_2]  
HOSPITAL [SKIP TO CARD\_2]  
OTHER MEDICALLY-RELATED PLACE [SKIP TO CARD\_2]  
PHARMACY OR DRUG STORE [SKIP TO CARD\_2]  
WORKPLACE [SKIP TO CARD\_2]  
ELEMENTARY/MIDDLE/HIGH SCHOOL [SKIP TO CARD\_2]  
OTHER NONMEDICALLY-RELATED PLACE [CONTINUE TO Q5\_OTH]  
(77) DON'T KNOW [SKIP TO CARD\_2]  
(99) REFUSED [SKIP TO CARD\_2]

Q5\_OTH. [BACK CODE ALL VERBATIM ANSWERS]  
[SPECIFY]:\_\_ [SKIP TO CARD\_2]

Ask CARD\_2 if HQ1=1 AND HQ2=1 AND Q2=1, else SKIP CARD\_2 and go to HQ8.

CARD\_2. Earlier you mentioned having a shot card for your flu vaccinations. Did you get this card after getting a seasonal flu vaccine, an H1N1 flu vaccine, or both?"

SEASONAL [SKIP TO Q9]  
H1N1 [SKIP TO Q9]  
BOTH [SKIP TO Q9]  
(77) DON'T KNOW [SKIP TO Q9]  
(99) REFUSED [SKIP TO Q9]

If FLUOVER flag=1, skip Q7\_INT and continue to Q10

Q7\_INT. How likely are you to get a seasonal flu vaccination between now and the end of June?

Would you say you:  
will definitely get one  
will probably get one  
will probably not get one  
or, will definitely not get one  
(77) DON'T KNOW  
(99) REFUSED

Q10. If FLUOVER flag=0 display: There are many reasons why people don't get flu vaccinations. What is the main reason you [will not get/will probably not get/have not yet gotten] a seasonal flu vaccination this flu season?

If FLUOVER flag=1 display: There are many reasons why people don't get flu vaccinations. What is the main reason you did not get a seasonal flu vaccination this past flu season?

[INTERVIEWER INSTRUCTION: IF MORE THAN ONE MENTION, PROBE 'WHAT IS THE MAIN REASON?']

[INTERVIEWER INSTRUCTION: IF 'I NEVER GET ONE', PROBE FOR MORE DETAIL]

CONCERNS ABOUT SIDE EFFECTS OR SICKNESS [SKIP TO Q9]  
THINK VACCINES DO NOT WORK [SKIP TO Q9]  
VACCINATION IS NOT NEEDED [SKIP TO Q9]  
ALLERGIC TO THE VACCINE [SKIP TO Q9]  
THE VACCINE COSTS TOO MUCH [SKIP TO Q9]  
VACCINE NOT AVAILABLE [SKIP TO Q9]  
TRIED TO GET IT BUT COULDN'T [SKIP TO Q9]  
HAVEN'T GOTTEN TO IT YET/NO TIME [SKIP TO Q9]  
DON'T KNOW WHERE TO GO/WHO TO CALL [SKIP TO Q9]  
SOME OTHER REASON [CONTINUE TO Q10\_OTH]  
(77) DON'T KNOW [SKIP TO Q9]  
(99) REFUSED [SKIP TO Q9]  
Q10\_OTH. [SPECIFY]:\_\_

Q9. Since this past August, 2009, have you seen a doctor or other health professional about your own health at a doctor's office, hospital, clinic, or some other place?

YES [CONTINUE TO Q9\_NUM]  
NO [SKIP TO HQ8]  
(77) DON'T KNOW [SKIP TO HQ8]  
(99) REFUSED [SKIP TO HQ8]

Q9\_NUM. How many times did you see a doctor or other health professional about your own health since August 2009?

[ENTER NUMBER]\_

IF H1N1 flag=1, then ask HQ8, else ask HQ8\_1.

HQ8. Since August 2009, did your doctor or other health professional personally recommend that you get an H1N1 flu vaccination or a seasonal flu vaccination?

[INTERVIEWER INSTRUCTION: POSTED SIGNS, NEWSLETTERS, PAMPHLETS, OR TELEVISION AND RADIO ADS SHOULD NOT BE CONSIDERED A RECOMMENDATION] [INTERVIEWER INSTRUCTION: IF R SAYS "YES" PROBE TO FIND OUT WHICH VACCINES WERE RECOMMENDED]

H1N1 flu vaccination  
Seasonal flu vaccination  
Both vaccinations  
Neither vaccination  
(77) DON'T KNOW  
(99) REFUSED

Ask HQ8\_1 if H1N1 vaccine is not released [H1N1 FLAG=0].

HQ8\_1. Since August 2009, did your doctor or other health professional personally recommend that you get a seasonal flu vaccination?

[INTERVIEWER INSTRUCTION: POSTED SIGNS, NEWSLETTERS, PAMPHLETS, OR TELEVISION AND RADIO ADS SHOULD NOT BE CONSIDERED A RECOMMENDATION]

YES  
NO  
(77) DON'T KNOW  
(99) REFUSED

NEXTFLU. Please think ahead to the upcoming flu season, that is, the flu season that will begin in the fall of 2010. How likely are you to get a flu vaccination during the upcoming flu season?

Would you say you:  
will definitely get one  
will probably get one  
will probably not get one  
or, will definitely not get one  
(77) DON'T KNOW  
(99) REFUSED

PNEU\_INTRO. The next few questions are about the pneumonia vaccination. A pneumonia shot is usually given only once or twice in an adult's life and protects against pneumonia. It is also called the pneumococcal vaccination. Have you ever had a pneumonia vaccination as an adult?

YES [CONTINUE TO PNEU1]  
NO [SKIP TO PAN12/HQ23]  
(77) DON'T KNOW [SKIP TO PAN12/HQ23]  
(99) REFUSED [SKIP TO PAN12/HQ23]

PNEU1. How many of these pneumonia vaccinations have you received?

1 vaccination or dose  
2 vaccination doses  
3 or more vaccination doses  
(77) DON'T KNOW  
(99) REFUSED

PNEU2. How old were you when you received your most recent pneumonia vaccination?

\_\_\_\_\_YEARS [CONTINUE TO PAN 12]

If H1N1 IS NOT RELEASED [FLAG=0], then ask:

PAN12. Now I'm going to ask you your opinion about the H1N1 flu vaccine. When the H1N1 flu vaccine is available this fall, how likely would you be to get this vaccination? Would you say that you are very likely, somewhat likely, somewhat unlikely, or very unlikely to get this vaccination?

VERY LIKELY [SKIP TO Q23]  
SOMEWHAT LIKELY [SKIP TO Q23]  
SOMEWHAT UNLIKELY [SKIP TO Q23]  
VERY UNLIKELY [SKIP TO Q23]  
(77) DON'T KNOW [SKIP TO Q23]  
(99) REFUSED [SKIP TO Q23]

If H1N1 is released [H1N1 FLAG=1], then ask HQ23, else skip to Q23.

HQ23. Now I'm going to ask you for your opinions about the H1N1 flu vaccine [IF HFLUOVER flag=1, then display: that was available this past flu season]. How effective do you think the H1N1 flu vaccination is in preventing the H1N1 flu? Would you say:

Very effective,  
Somewhat effective,  
Not too effective  
Or, not at all effective?  
(77) DON'T KNOW  
(99) REFUSED

HQ24. IF HFLUOVER=0: If you [had not gotten/do not get] an H1N1 flu vaccination this fall or winter, what [would have been/are] your chances of getting sick with the H1N1 flu? Would you say:

Very high,  
Somewhat high,  
Somewhat low,  
Or, very low?  
(77) DON'T KNOW  
(99) REFUSED

IF HFLUOVER=1 and HQ2=1: Before you got the H1N1 flu vaccination, did you think your chances of getting sick with the H1N1 flu were very high, somewhat high, somewhat low, or very low?

IF HFLUOVER=1 and HQ2=2, 77, 99: Earlier you told me that you did not get an H1N1 flu vaccination. Did you think your chances of getting sick with the H1N1 flu this past season were very high, somewhat high, somewhat low, or very low?

VERY HIGH  
SOMEWHAT HIGH  
SOMEWHAT LOW  
VERY LOW  
ALREADY HAD H1N1 FLU  
(77) DON'T KNOW  
(99) REFUSED

HQ24\_B. How worried [were/are] you about getting sick from the H1N1 flu vaccine? Would you say:

Very worried,  
Somewhat worried,  
Not too worried,  
Or, not at all worried about getting sick from the flu vaccination?  
(77) DON'T KNOW  
(99) REFUSED

Q23. How effective do you think the seasonal flu vaccination [was/is] in preventing the seasonal flu? Would you say:

Very effective,  
Somewhat effective,  
Not too effective  
Or, not at all effective?  
(77) DON'T KNOW  
(99) REFUSED

Q24. If FLUOVER=0: If you [had not gotten/do not get] a seasonal flu vaccination this fall or winter, what [would have been/are] your chances of getting sick with the seasonal flu? Would you say:

Very high,  
Somewhat high,  
Somewhat low,  
Or, very low?  
(77) DON'T KNOW  
(99) REFUSED

IF FLUOVER=1 and Q2=1: Before you got the seasonal flu vaccination, did you think your chances of getting sick with the seasonal flu were very high, somewhat high, somewhat low, or very low?

IF FLUOVER=1 and Q2=2, 77, 99: Earlier you told me that you did not get a seasonal flu vaccination. Did you think your chances of getting sick with the seasonal flu this past season were very high, somewhat high, somewhat low, or very low?

VERY HIGH  
SOMEWHAT HIGH  
SOMEWHAT LOW  
VERY LOW  
ALREADY HAD SEASONAL FLU  
(77) DON'T KNOW  
(99) REFUSED

Q24\_B. How worried [were/are] you about getting sick from the seasonal flu vaccine? Would you say:

Very worried,  
Somewhat worried,  
Not too worried,  
Or, not at all worried about getting sick from the flu vaccination?  
(77) DON'T KNOW  
(99) REFUSED

**Appendix C: 2009 NHFS; Section CF- Influenza Vaccination, Child**

**CR1\_X.** So I'll know how to refer to [S.C.] during the survey, could you tell me is your [S.C.] male or female?

MALE

FEMALE

(99) REFUSED

**CHQ2\_INTRO. ASK ONLY IF NEW RESPONDENT:** I will first ask you questions about H1N1 flu, which is sometimes called swine flu or pandemic flu, and then ask you questions about seasonal flu.

**CHQ1.** You may have gotten a shot card for [S.C.]'s H1N1 and seasonal flu vaccinations.

The shot card we are asking about is a wallet-sized card that is sometimes handed out at places where people receive flu vaccinations. Have you received one of these shot cards for [S.C.]?

READ IF NECESSARY: A shot card is a piece of paper used to record vaccination dates and types. The shot card we are asking about is produced by the CDC and is sometimes handed out at places where people receive flu vaccinations and is wallet-sized.

YES [CONTINUE TO CCARD]

NO [SKIP TO CHQ2]

(77) DON'T KNOW [SKIP TO CHQ2]

(99) REFUSED [SKIP TO CHQ2]

**CCARD.** The next few questions will be about flu vaccinations. Since some of the vaccinations are difficult to remember it would be helpful if you could refer to [S.C.]'s shot card.

READ IF NECESSARY: I'll be happy to wait while you go and get it.

R GETS SHOT CARD

R DOES NOT GET SHOT CARD/CAN'T LOCATE SHOT CARD

**CHQ2.** Since September 2009, has [S.C.] had an H1N1 flu vaccination? There are two types of H1N1 flu vaccinations. One is a shot and the other is a spray, mist or drop in the nose.

Yes

No [SKIP TO CHQ7\_INT]

(77) DON'T KNOW [SKIP TO CHQ7\_INT]

(99) REFUSED [SKIP TO CHQ7\_INT]

**CHQ2\_A.** How many H1N1 vaccination doses has [S.C.] received?

1 vaccination or dose

2 or more vaccination doses

(77) DON'T KNOW [SKIP TO CHQ5]

(99) REFUSED [SKIP TO CHQ5]

**CHQ2\_B1\_M.** During what month did [S.C.] receive [his/her] first H1N1 flu vaccine?

\_\_ [enter month] (77/7777) DON'T KNOW (99/9999) REFUSED

**CHQ2\_B1\_C.** That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES

NO [SKIP TO CHQ2\_B1]

*If CHQ2\_B1\_M=CURRENT MONTH, then ask CHQ2\_B1\_D, else skip to CHQ2\_TYPE1.*

**CHQ2\_B1\_D.** On what day of the month did [S.C.] receive [his/her] first H1N1 flu vaccine?

**IF RESPONDENT SAYS DON'T KNOW SAY:** I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_\_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]

(77) DON'T KNOW

(99) REFUSED

**CHQ2\_TYPE1.** Was this a shot or the spray in the nose?

FLU SHOT

FLU NASAL SPRAY

(77) DON'T KNOW  
(99) REFUSED

*If HQ2\_A = 02, then ask HQ2\_B2.*

**CHQ2\_B2.** During what month did [S.C.] receive [CR1\_X=1:his; 2:her; 99: his or her] second H1N1 flu vaccine?

\_\_ [enter month] (77/7777) DON'T KNOW (99/9999) REFUSED

**CHQ2\_B2\_C.** That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES

NO [SKIP TO CHQ2\_B2]

*If CHQ2\_B2=CURRENT MONTH, then ask CHQ2\_B2\_D, else skip to CHQ2\_TYPE2.*

**CHQ2\_B2\_D.** On what day of the month did [S.C.] receive [his/her] second H1N1 flu vaccine?

**IF RESPONDENT SAYS DON'T KNOW SAY:** I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_\_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]

(77) DON'T KNOW

(99) REFUSED

**CHQ2\_TYPE2.** Was this a shot or the spray in the nose?

FLU SHOT

FLU NASAL SPRAY

(77) DON'T KNOW

(99) REFUSED

**CHQ5.** At what kind of place did [S.C.] get [CR1\_X=1:his; 2:her; 99: his or her] most recent H1N1 flu vaccination?

[READ ONLY IF NECESSARY]

DOCTOR'S OFFICE [SKIP TO CQ2\_INTRO]

HEALTH DEPARTMENT [SKIP TO CQ2\_INTRO]

CLINIC OR HEALTH CENTER [SKIP TO CQ2\_INTRO]

HOSPITAL [SKIP TO CQ2\_INTRO]

OTHER MEDICALLY-RELATED PLACE [SKIP TO CQ2\_INTRO]  
PHARMACY OR DRUG STORE [SKIP TO CQ2\_INTRO]  
WORKPLACE [SKIP TO CQ2\_INTRO]  
ELEMENTARY/MIDDLE/HIGH SCHOOL [SKIP TO CQ2\_INTRO]  
OTHER NONMEDICALLY-RELATED PLACE [SKIP TO Q5\_OTH]  
(77) DON'T KNOW [SKIP TO CQ2\_INTRO]  
(99) REFUSED [SKIP TO CQ2\_INTRO]

**CHQ5\_OTH.** [BACK CODE ALL VERBATIM ANSWERS]

[SPECIFY]:\_\_ [SKIP TO CQ2\_INTRO]

*If HFLUOVER flag=1, skip CHQ7\_INT and continue to CHQ10.*

**CHQ7\_INT.** How likely is [S.C.] to get an H1N1 flu vaccination between now and the end of June?

Would you say [he/she/he or she]:  
will definitely get one  
will probably get one  
will probably not get one  
or, will definitely not get one  
(77) DON'T KNOW  
(99) REFUSED

**CHQ10.** **If HFLUOVER flag=0 display:** There are many reasons why people don't get flu vaccinations. What is the main reason [S.C.] [will not get/will probably not get/has not yet gotten] a H1N1 flu vaccination this flu season?

If HFLUOVER flag=1 display: There are many reasons why people don't get flu vaccinations. What is the main reason [S.C.] did not get an H1N1 flu vaccination this past flu season?

[INTERVIEWER INSTRUCTION: IF MORE THAN ONE MENTION, PROBE 'WHAT IS THE MAIN REASON?']

[INTERVIEWER INSTRUCTION: IF 'I NEVER GET ONE', PROBE FOR MORE DETAIL]

CONCERNS ABOUT SIDE EFFECTS OR SICKNESS [SKIP TO CQ2\_INTRO]  
THINK VACCINES DO NOT WORK [SKIP TO CQ2\_INTRO]  
VACCINATION IS NOT NEEDED [SKIP TO CQ2\_INTRO]

ALLERGIC TO THE VACCINE [SKIP TO CQ2\_INTRO]  
COSTS TOO MUCH TO GET THE VACCINE [SKIP TO CQ2\_INTRO]  
BECAUSE CHILD ALREADY HAD H1N1 FLU [SKIP TO CQ2\_INTRO]  
VACCINE NOT AVAILABLE [SKIP TO CQ2\_INTRO]  
TRIED TO GET IT BUT COULDN'T [SKIP TO CQ2\_INTRO]  
DON'T KNOW WHERE TO GO/WHO TO CALL [SKIP TO CQ2\_INTRO]  
HAVEN'T GOTTEN TO IT YET/NO TIME [SKIP TO CQ2\_INTRO]  
SOME OTHER REASON [CONTINUE TO CHQ10\_OTH]  
(77) DON'T KNOW [SKIP TO CQ2\_INTRO]  
(99) REFUSED [SKIP TO CQ2\_INTRO]

**CHQ10\_OTH.** [SPECIFY]:\_\_

**CQ2\_INTRO.** Now I will ask you questions about seasonal flu.

**CQ2.** Since August 2009, has [S.C.] had a seasonal flu vaccination? There are two types of seasonal flu vaccinations. One is a shot and the other is a spray in the nose.

YES

NO [SKIP TO CQ7\_INT]

(77) DON'T KNOW [SKIP TO CQ7\_INT]

(99) REFUSED [SKIP TO CQ7\_INT]

*If S.C. is greater than 8 years old, then ask CQ2\_B; else skip to CQ2\_B\_1.*

**CQ2\_B.** During what month did [S.C.] receive [CR1\_X=1:his; 2:her; 99: his or her] most recent seasonal flu vaccine?

\_\_ [enter month] (77/7777) DON'T KNOW (99/9999) REFUSED

**CQ2\_B\_C.** That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES

NO [SKIP TO CQ2\_B]

*If CQ2\_B=CURRENT MONTH, then ask CQ2\_B\_D, else skip to HQ2\_BTTYPE.*

**CQ2\_B\_D.** On what day of the month did [S.C.] receive [his/her] most recent seasonal flu vaccine?

**IF RESPONDENT SAYS DON'T KNOW SAY:** I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_\_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]  
(77) DON'T KNOW  
(99) REFUSED

**HQ2\_BTYPE.** Was this a shot or spray in the nose?

FLU SHOT  
FLU NASAL SPRAY  
(77) DON'T KNOW  
(99) REFUSED

*If S.C. is less than 9 years old, then ask CQ2\_B\_1; else skip to CQ3.*

**CQ2\_B\_1.** How many of these seasonal flu vaccinations has [S.C.] received since August 2009?

1 vaccination or dose  
2 or more vaccination doses  
(77) DON'T KNOW [SKIP TO CQ5]  
(99) REFUSED [SKIP TO CQ5]

**CQ2\_B\_2\_M.** During what month did [S.C.] receive [CR1\_X=1:his; 2:her; 99: his or her] first dose of seasonal flu vaccine since August 2009?

\_\_/\_\_/\_\_\_\_ [enter date] (77/7777) DON'T KNOW (99/9999) REFUSED

**CQ2\_B\_2\_C.** That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES  
NO [SKIP TO CQ2\_B\_2]

*If CQ2\_B\_2\_M=CURRENT MONTH, then ask CQ2\_B\_2\_D, else skip to CQ2\_TYPE1.*

**CQ2\_B\_2\_D.** On what day of the month did [S.C.] receive [his/her] first dose of seasonal flu vaccine since August 2009?

**IF RESPONDENT SAYS DON'T KNOW SAY:** I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_\_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]  
(77) DON'T KNOW  
(99) REFUSED

**CQ2\_TYPE1.** Was this a shot or the spray in the nose?

FLU SHOT  
FLU NASAL SPRAY  
(77) DON'T KNOW  
(99) REFUSED

**CQ2\_B\_3\_M.** During what month did [S.C.] receive [CR1\_X=1:his; 2:her; 99: his or her ] second dose of seasonal flu vaccine since August 2009?

\_\_/\_\_/\_\_ [enter date] (77/7777) DON'T KNOW (99/9999) REFUSED

**CQ2\_B\_3\_C.** That was [FILL IN MONTH] of [FILL IN YEAR], correct?

YES  
NO [SKIP TO CQ2\_B\_3]

*If CQ2\_B\_3\_M=CURRENT MONTH, then ask CQ2\_B\_3\_D, else skip to CQ2\_TYPE2.*

**CQ2\_B\_3\_D.** On what day of the month did [S.C.] receive [his/her] second dose of seasonal flu vaccine since August 2009?

**IF RESPONDENT SAYS DON'T KNOW SAY:** I understand you might not know the exact date, but I'm required to enter a number. Can you give me a best guess?

\_\_ [enter day] [RESTRICTED TO BETWEEN 1 AND CURRENT DAY]  
(77) DON'T KNOW  
(99) REFUSED

**CQ2\_TYPE2.** Was this a shot or the spray in the nose?

FLU SHOT  
FLU NASAL SPRAY  
(77) DON'T KNOW

(99) REFUSED

**CQ5.** At what kind of place did [S.C.] get [CR1\_X=1:his; 2:her; 99: his or her] most recent seasonal flu vaccination?

[READ ONLY IF NECESSARY]

DOCTOR'S OFFICE [SKIP TO CCARD\_2]  
HEALTH DEPARTMENT [SKIP TO CCARD\_2]  
CLINIC OR HEALTH CENTER [SKIP TO CCARD\_2]  
HOSPITAL [SKIP TO CCARD\_2]  
OTHER MEDICALLY-RELATED PLACE [SKIP TO CCARD\_2]  
PHARMACY OR DRUG STORE [SKIP TO CCARD\_2]  
WORKPLACE [SKIP TO CCARD\_2]  
ELEMENTARY/MIDDLE/HIGH SCHOOL [SKIP TO CCARD\_2]  
OTHER NONMEDICALLY-RELATED PLACE [SKIP TO Q5\_OTH]  
(77) DON'T KNOW [SKIP TO CCARD\_2]  
(99) REFUSED [SKIP TO CCARD\_2]  
**CQ5\_OTH.** [BACK CODE ALL VERBATIM ANSWERS]  
[SPECIFY]:\_\_ [SKIP TO CCARD\_2]

*Ask CCARD\_2 if CHQ1=1 AND CHQ2=1 AND CQ2=1, else SKIP CCARD\_2 and go to CQ9.*

**CCARD\_2.** Earlier you mentioned having a shot card for [S.C.]'s flu vaccinations. Did [S.C.] get this card after getting a seasonal flu vaccine, an H1N1 flu vaccine, or both?

SEASONAL [SKIP TO CQ9]  
H1N1 [SKIP TO CQ9]  
BOTH [SKIP TO CQ9]  
(77) DON'T KNOW [SKIP TO CQ9]  
(99) REFUSED [SKIP TO CQ9]

*If FLUOVER flag=1, skip CQ7\_INT and continue to CQ10.*

**CQ7\_INT.** How likely is [S.C.] to get a seasonal flu vaccination between now and the end of June?

Would you say [he/she/he or she]:  
will definitely get one  
will probably get one  
will probably not get one  
or, will definitely not get one  
(77) DON'T KNOW  
(99) REFUSED

**CQ10. If FLUOVER flag=0 display:** There are many reasons why people don't get flu vaccinations. What is the main reason [S.C.] [will not get/will probably not get/has not yet gotten] a seasonal flu vaccination this flu season?

If FLUOVER flag=1 display: There are many reasons why people don't get flu vaccinations. What is the main reason [S.C.] did not get a seasonal flu vaccination this past flu season?

[**INTERVIEWER INSTRUCTION:** IF MORE THAN ONE MENTION, PROBE 'WHAT IS THE MAIN REASON?']

[**INTERVIEWER INSTRUCTION:** IF 'I NEVER GET ONE', PROBE FOR MORE DETAIL]

CONCERNS ABOUT SIDE EFFECTS OR SICKNESS [SKIP TO CQ9]

THINK VACCINES DO NOT WORK [SKIP TO CQ9]

VACCINATION IS NOT NEEDED [SKIP TO CQ9]

ALLERGIC TO THE VACCINE [SKIP TO CQ9]

THE VACCINE COSTS TOO MUCH [SKIP TO CQ9]

VACCINE NOT AVAILABLE [SKIP TO CQ9]

TRIED TO GET IT BUT COULDN'T [SKIP TO CQ9]

HAVEN'T GOTTEN TO IT YET/NO TIME [SKIP TO CQ9]

DON'T KNOW WHERE TO GO/WHO TO CALL [SKIP TO CQ9]

SOME OTHER REASON [CONTINUE TO CQ10\_OTH]

(77) DON'T KNOW [SKIP TO CQ9]

(99) REFUSED [SKIP TO CQ9]

**CQ10\_OTH.** [SPECIFY]:\_\_

**CQ9.** Since this past August, 2009, has [S.C.] seen a doctor or other health professional about [his/her/his or her] health at a doctor's office, hospital, clinic, or some other place?

YES [CONTINUE TO CQ9\_NUM]

NO [SKIP TO CHQ8]

(77) DON'T KNOW [SKIP TO CHQ8]

(99) REFUSED [SKIP TO CHQ8]

**CQ9\_NUM.** How many times did [S.C.] see a doctor or other health professional about [his/her/his or her] health since August 2009?

[ENTER NUMBER]\_\_

[**INTERVIEWER INSTRUCTION:** IF R DOES NOT KNOW EXACT NUMBER OF VISITS SAY

“What is your best estimate?”]

*If H1N1 flag=1, ask CHQ8; else ask CHQ8\_1.*

**CHQ8.** Since August 2009, did [S.C.'s] doctor or other health professional personally recommend that [CR1\_X=1:he; 2:she; 99: he or she] get an H1N1 flu vaccination or a seasonal flu vaccination?

[**INTERVIEWER INSTRUCTION: POSTED SIGNS, NEWSLETTERS, PAMPHLETS, OR TELEVISION AND RADIO ADS SHOULD NOT BE CONSIDERED A RECOMMENDATION**] [**INTERVIEWER INSTRUCTION: IF R SAYS "YES" PROBE TO FIND OUT WHICH VACCINES WERE RECOMMENDED**]

H1N1 flu vaccination  
seasonal flu vaccination  
both vaccinations  
neither vaccination

(77) DON'T KNOW

(99) REFUSED

*Ask CHQ8\_1 if H1N1 flag=0.*

**CHQ8\_1.** Since August 2009, did [S.C.'s] doctor or other health professional personally recommend that [CR1\_X=1:he; 2:she; 99: he or she] get a seasonal flu vaccination? [**INTERVIEWER INSTRUCTION: POSTED SIGNS, NEWSLETTERS, PAMPHLETS, OR TELEVISION AND RADIO ADS SHOULD NOT BE CONSIDERED A RECOMMENDATION**]

YES

NO

(77) DON'T KNOW

(99) REFUSED

**CNEXTFLU.** Please think ahead to the upcoming flu season, that is, the flu season that will begin in the fall of 2010. How likely is [S.C] to get a flu vaccination during the upcoming flu season? Would you say [he/she/he or she]:

will definitely get one  
will probably get one  
will probably not get one  
or, will definitely not get one

(77) DON'T KNOW

(99) REFUSED

**Appendix D: 2009 NHFS; Section D- Demographics**

Q87. What is the highest grade or year of school you have completed?

[READ IF NECESSARY]

8<sup>TH</sup> GRADE OR LESS

9<sup>TH</sup>-12<sup>TH</sup> GRADE NO DIPLOMA

HIGH SCHOOL GRADUATE OR GED COMPLETED

COMPLETED VOCATIONAL, TRADE, OR BUSINESS SCHOOL PROGRAM

SOME COLLEGE CREDIT BUT NO DEGREE

ASSOCIATE DEGREE (AA, AS)

BACHELOR'S DEGREE (BA, BS, AB)

MASTER'S DEGREE (MA, MS, MSW, MBA)

DOCTORATE (PhD, EdD) OR PROFESSIONAL DEGREE (MD, DDS, DVM, JD)

(77) DON'T KNOW

(99) REFUSED

Q88. Are you now married, widowed, divorced, separated, or have you never been married?

MARRIED

WIDOWED

DIVORCED

SEPARATED

NEVER MARRIED

(77) DON'T KNOW

(99) REFUSED

*Ask CELL\_AGE and CELL\_AGE2 if Cell sample of if RDD SAMPLE AND SC\_1=1.*

CELL\_AGE. Could you tell me how old you are?

\_\_\_\_\_years [SKIP TO INSURE]

(777) DON'T KNOW [CONTINUE TO CELL\_AGE2]

(999) REFUSED [CONTINUE TO CELL\_AGE2]

CELL\_AGE2. I understand that you may be uncomfortable giving me your age. Could you tell me if you are:

(1) 18-24

(2) 25-49

(3) 50-64

(4) or, 65 or older

(77) DON'T KNOW  
(99) REFUSED

INSURE. Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?

YES  
NO  
(77) DON'T KNOW  
(99) REFUSED

Q89. Are you of Hispanic or Latino origin?

[INTERVIEWER INSTRUCTION: INCLUDE MEXICAN, MEXICAN-AMERICAN, CENTRAL AMERICAN, SOUTH AMERICAN OR PUERTO RICAN, CUBAN, OR OTHER SPANISH- CARIBBEAN]

YES  
NO [SKIP TO Q90]  
(77) DON'T KNOW [SKIP TO Q90]  
(99) REFUSED [SKIP TO Q90]

Q89\_1. Are you Mexican, Mexican-American, Central American, South American, Puerto Rican, Cuban, or other Spanish-Caribbean? (CHOOSE ALL THAT APPLY)

MEXICAN/MEXICANO [SKIP TO Q90]  
MEXICAN-AMERICAN [SKIP TO Q90]  
CENTRAL AMERICAN [SKIP TO Q90]  
SOUTH AMERICAN [SKIP TO Q90]  
PUERTO RICAN [SKIP TO Q90]  
CUBAN/CUBAN AMERICAN [SKIP TO Q90]  
SPANISH-CARIBBEAN [SKIP TO Q90]  
OTHER SPANISH/HISPANIC (SPECIFY)  
(77) DON'T KNOW [SKIP TO Q90]  
(99) REFUSED [SKIP TO Q90]  
Q89\_1\_OTHER. [SPECIFY]: \_\_\_\_\_

Q90. Now I'm going to read a list of categories. Which of the following categories describes your race? [In addition to being Hispanic or Latino,] Are you White, Black or African American, American Indian, Alaska Native, Asian, Native Hawaiian or other Pacific Islander?

WHITE [SKIP TO Q95 ]  
BLACK OR AFRICAN AMERICAN [SKIP TO Q95 ]  
AMERICAN INDIAN [SKIP TO Q95 ]

ALASKA NATIVE [SKIP TO Q95 ]  
ASIAN [SKIP TO Q95 ]  
NATIVE HAWAIIAN [SKIP TO Q95 ]  
PACIFIC ISLANDER [SKIP TO Q95 ]  
OTHER  
(77) DON'T KNOW [SKIP TO Q95 ]  
REFUSED [SKIP TO Q95 ]

Q90\_OTH. Could you tell me what that would be?  
[SPECIFY]: \_\_

Q95. Are you currently...? [READ ANSWER CHOICES]

Employed for wages  
Self-employed  
Out of work for more than 1 year  
Out of work for less than 1 year  
A Homemaker  
A Student  
Retired  
Or, unable to work  
(77) DON'T KNOW  
(99) REFUSED

*If Q95= 1 or 2, then ask the following questions; else skip to Q91.*

Q95\_A. What kind of business or industry is this? For example: education, public transportation, construction, restaurant/entertainment, grocery store, health care.  
[SPECIFY]: \_\_

Q95\_B. What kind of work do you do?

[READ IF NECESSARY: What is your job title? For example: teacher, nurse, farmer, mail clerk, cashier, computer specialist, waitress, bus driver.]  
[SPECIFY]: \_\_\_\_\_

*If Q95=1 or 2, ask PSL1, else skip to Q91.*

PSL1. Workers sometimes receive benefits in addition to their wages. Whether you receive them or not, please tell me whether you are ELIGIBLE to receive sick leave with full pay. IF R RECEIVES PAID TIME OFF (PTO) THT CAN BE USED FOR SICK TIME OFF, VACATION, OR ANOTHER PURPOSE, CODE AS "YES".

Yes [CONTINUE TO PSL2]  
No [SKIP TO Q91]  
(77) DON'T KNOW [SKIP TO Q91]  
(99) REFUSED [SKIP TO Q91]

PSL2. In addition to using the sick days for your own illness, can you use your paid sick days for a sick child or family member?

Yes  
No  
(77) DON'T KNOW  
(99) REFUSED

Q91. Please think about your total combined family income during 2008 for all members of the family. Include money for jobs, social security, retirement income, unemployment payments, public assistance, and so forth. Also include income from interest, dividends, net income from business, farm, rent, or any other money income received. Can you tell me that amount before taxes?

[IF RESPONDENT GIVES INCOME RANGE READ: WHAT AMOUNT WOULD YOU LIKE ME TO ENTER?]

\$\_\_\_\_\_ [SKIP TO Q92]  
(77) DON'T KNOW [SKIP TO Q91A]  
(99) REFUSED [SKIP TO Q91B]

Q91A. You may not be able to give us an exact figure for your total combined family income, but was your total family income during 2008 more or less than \$20,000?

(1) MORE THAN \$20,000 [SKIP TO Q91H]  
(2) \$20,000 [SKIP TO Q93]  
(3) LESS THAN \$20,000 [SKIP TO Q91C]  
(77) DON'T KNOW [SKIP TO Q93]  
(99) REFUSED [SKIP TO Q93]

Q91B. Income is important in analyzing the immunization information we collect. For example, this information helps us to learn whether persons in one group use these medical services more or less than those in another group. Now you may not be able to

give us an exact figure for your total combined family income, but was your total family income during 2008 more or less than \$20,000?

- (1) MORE THAN \$20,000 [SKIP TO Q91H]
- (2) \$20,000 [SKIP TO Q93]
- (3) LESS THAN \$20,000 [SKIP TO Q91C]
- (77) DON'T KNOW [SKIP TO Q93]
- (99) REFUSED [SKIP TO Q93]

Q91C. Was the total combined FAMILY income more or less than \$10,000?

- (1) MORE THAN \$10,000 [SKIP TO Q91E]
- (2) \$10,000 [SKIP TO Q93]
- (3) LESS THAN \$10,000 [SKIP TO Q91D]
- (77) DON'T KNOW [SKIP TO Q93]
- (99) REFUSED [SKIP TO Q93]

Q91D. Was it more than \$7,500?

- |                 |               |               |
|-----------------|---------------|---------------|
| YES             | [SKIP TO Q93] | [SKIP TO      |
| NO              | Q93]          | [SKIP TO Q93] |
| (77) DON'T KNOW | [SKIP TO Q93] | [SKIP         |
| (99) REFUSED    | TO Q93]       |               |

Q91E. Was it more than \$15,000?

- |                 |                |               |
|-----------------|----------------|---------------|
| YES             | [SKIP TO Q91F] | [SKIP TO      |
| NO              | Q91G]          | [SKIP TO Q93] |
| (77) DON'T KNOW | [SKIP TO Q93]  |               |
| (99) REFUSED    |                |               |

Q91F. Was it more than \$17,500?

- |                 |               |               |
|-----------------|---------------|---------------|
| YES             | [SKIP TO Q93] | [SKIP TO      |
| NO              | Q93]          | [SKIP TO Q93] |
| (77) DON'T KNOW | [SKIP TO Q93] |               |
| (99) REFUSED    |               |               |

Q91G. Was it more than \$12,500?

YES  
NO  
(77) DON'T KNOW  
(99) REFUSED

[SKIP TO Q93] [SKIP TO  
Q93] [SKIP TO Q93]  
[SKIP TO Q93]

Q91H. Was the total combined FAMILY income more or less than \$40,000?

(1) MORE THAN \$40,000 [SKIP TO Q91I]  
(2) \$40,000 [SKIP TO Q93]  
(3) LESS THAN \$40,000 [SKIP TO Q91I]  
(77) DON'T KNOW [SKIP TO Q93]  
(99) REFUSED [SKIP TO Q93]

Q91I. Was the total combined FAMILY income more or less than \$60,000?

(1) MORE THAN \$60,000 [SKIP TO Q91O]  
(2) \$60,000 [SKIP TO Q93]  
(3) LESS THAN \$60,000 [SKIP TO Q91J]  
(77) DON'T KNOW [SKIP TO Q93]  
(99) REFUSED [SKIP TO Q93]

Q91J. Was the total combined FAMILY income more or less than \$50,000?

(1) MORE THAN \$50,000 [SKIP TO Q93]  
(2) \$50,000 [SKIP TO Q93]  
(3) LESS THAN \$50,000 [SKIP TO Q91K]  
(77) DON'T KNOW [SKIP TO Q93]  
(99) REFUSED [SKIP TO Q93]

Q91K. Was the total combined FAMILY income more or less than \$45,000?

(1) MORE THAN \$45,000 [SKIP TO Q93]  
(2) \$45,000 [SKIP TO Q93]  
(3) LESS THAN \$45,000 [SKIP TO Q93]  
(77) DON'T KNOW [SKIP TO Q93]  
(99) REFUSED [SKIP TO Q93]

Q91L. Was the total combined FAMILY income more or less than \$30,000?

- (1) MORE THAN \$30,000 [SKIP TO Q91M]
- (2) \$30,000 [SKIP TO Q93]
- (3) LESS THAN \$30,000 [SKIP TO Q91N]
- (77) DON'T KNOW [SKIP TO Q93]
- (99) REFUSED [SKIP TO Q93]

Q91M. Was the total combined FAMILY income more or less than \$35,000?

- (1) MORE THAN \$35,000 [SKIP TO Q93]
- (2) \$35,000 [SKIP TO Q93]
- (3) LESS THAN \$35,000 [SKIP TO Q93]
- (77) DON'T KNOW [SKIP TO Q93]
- (99) REFUSED [SKIP TO Q93]

Q91N. Was the total combined FAMILY income more or less than \$25,000?

- (1) MORE THAN \$25,000 [SKIP TO Q93]
- (2) \$25,000 [SKIP TO Q93]
- (3) LESS THAN \$25,000 [SKIP TO Q93]
- (77) DON'T KNOW [SKIP TO Q93]
- (99) REFUSED [SKIP TO Q93]

Q91O. Was the total combined FAMILY income more or less than \$75,000?

- (1) MORE THAN \$75,000 [SKIP TO Q91P]
- (2) \$75,000 [SKIP TO Q93]
- (3) LESS THAN \$75,000 [SKIP TO Q93]
- (77) DON'T KNOW [SKIP TO Q93]
- (99) REFUSED [SKIP TO Q93]

Q91P. Was the total combined FAMILY income more or less than \$100,000?

- (1) MORE THAN \$100,000 [SKIP TO Q93]
- (2) \$100,000 [SKIP TO Q93]
- (3) LESS THAN \$100,000 [SKIP TO Q93]
- (77) DON'T KNOW [SKIP TO Q93]
- (99) REFUSED [SKIP TO Q93]

Q92. Just to confirm that I entered the number correctly, the total combined family income was [Q91]?

YES

NO [SKIP TO Q91]

(77) DON'T KNOW [SKIP TO Q91]

(99) REFUSED [SKIP TO Q91]

Q93. What is your zip code?

\_\_\_\_\_ ENTER ZIP CODE

(7777) DON'T KNOW [SKIP TO Q94]

(9999) REFUSED [SKIP TO Q94]

Q93\_CONF. To confirm, you live in [CITY], [COUNTY] county, [STATE]. Is that correct?

YES [SKIP TO RENT\_OWN]

NO

Q94. In what city, county and state do you live?

ENTER  
STATE\_\_\_\_\_

CITY \_\_\_ ENTER COUNTY\_\_ ENTER

RENT\_OWN. Which of the following best describes your house or apartment? Is it: owned or being bought, rented, or occupied by some other arrangement by you (IF MORE THAN ONE ADULT IN HOUSEHOLD, READ: "or someone in your household")?

Owned or being bought

Rented

Occupied by some other arrangement

(77) DON'T KNOW

REFUSED

SC6\_X. Now I have some general questions. I am required to ask this. Just to confirm, are you male or female?

MALE [SKIP TO Q87]

FEMALE  
(99) REFUSED

*If R did not previously state that she is pregnant in Q34, then ask Q2\_PRGNT. SKIP Q2\_PRGNT and Q\_PRGNT if R is over 65 or older.*

Q2\_PRGNT. Were you pregnant at any time between October 2009 through January 2010?

[READ IF NECESSARY: "PREGNANT WOMEN ARE KNOWN TO BE AT HIGHER RISK FOR H1N1 FLU."]

YES  
NO  
(77) DON'T KNOW  
(99) REFUSED

Q\_PRGNT. To your knowledge, are you currently pregnant?

[INTERVIEWER INSTRUCTION: READ IF NECESSARY, "PREGNANT WOMEN ARE KNOWN TO BE AT HIGHER RISK FOR H1N1 FLU."]

YES  
NO  
(77) DON'T KNOW  
(99) REFUSED

*If Sample is RDD, then ask Q96; if sample is Cell, skip to C21\_06Q3\_CELL.*

Q96. Do you have more than one telephone number in your household? Do not include cell phones or numbers that are only used by a computer or fax machine.

[READ IF NECESSARY: I'D LIKE TO KNOW ABOUT THE TELEPHONE NUMBERS, NOT TELEPHONE EXTENSIONS THAT RING TO THIS HOUSEHOLD.]

[INTERVIEWER INSTRUCTION: COUNT BUSINESS TELEPHONE NUMBERS THAT RING TO THE HOUSEHOLD IF THEY ARE USED OCCASIONALLY FOR HOME USE.]

YES  
NO [SKIP TO Q98]  
(77) DON'T KNOW [SKIP TO Q98]  
(99) REFUSED [SKIP TO Q98]

Q97. How many telephone numbers are residential numbers?

[INTERVIEWER INSTRUCTION: THIS QUESTION IS ASKING FOR THE TOTAL NUMBER OF HOME TELEPHONE NUMBERS (INCLUDING THE NUMBER WE CALLED)].

ONE

TWO

THREE OR MORE

(77) DON'T KNOW

(99) REFUSED

Q98. Not including cellular telephones, has your family been without telephone service for 1 week or more during the past 12 months? Do not include interruptions of phone service due to weather or natural disasters.

YES [SKIP TO Q98\_D]

NO [SKIP TO Q98\_D]

(77) DON'T KNOW [SKIP TO Q98\_D]

(99) REFUSED [SKIP TO Q98\_D]

*For Cell sample, ask C21\_06Q3\_CELL, else go to Q98\_D.*

C21\_06Q3\_CELL

Next I have some questions about cell phones in your household. In total, how many working cell phones do you and other adult household members have available for personal use? Please count only cell phones used by household members aged 18 and over, and do not count cell phones that are used exclusively for business purposes.

ONE

TWO

THREE OR MORE

(77) DON'T KNOW

(99) REFUSED

Q98\_D. Of all the telephone calls that you or your family receive, are:

All or almost all calls received on cell phones

Some received on cell phones and some on regular phones

Very few or none on cell phones

(77) DON'T KNOW

(99) REFUSED

Q99. Those are all the questions I have. You may be re-contacted in the future to participate in related studies. Your participation in future studies is voluntary. I'd like to thank you again on behalf of the Centers for Disease Control and Prevention for the time and effort you've spent answering these questions.

Would you like to get the address of a website or a phone number where you get more information about pandemic flu?

Yes

No [SKIP TO Q100]

Q99\_INFO. You can get additional information about pandemic flu at <http://www.cdc.gov/h1n1flu> or by calling 1-800-CDC-INFO (800-232-4636).

Q100. If you would like more information about this study, please call the study's toll-free number, 1-800-993-0495. If you have questions about your rights as a study participant, you may call 1-800-223-8118, toll-free, and leave a message asking to speak to the Chairperson of the Ethics Review Board. [DISPLAY IF CC\_1=2: As a reminder, I still need to talk to the parent or guardian of [S.C.]. When would be a good time to reach [S.C.]'s parent or guardian? READ IF NECESSARY: Is there another phone number I should call to reach [S.C.]'s parent or guardian?]

(1) TERMINATE INTERVIEW

INTERVIEWERS ONLY:

LANG1. WAS THIS INTERVIEW COMPLETED USING ENGLISH ONLY?

YES [TERMINATE CASE]

NO

LANG2. WHICH LANGUAGES WERE NEEDED TO COMPLETE THIS INTERVIEW?

INTERVIEWER INSTRUCTION: CODE ALL THAT APPLY

ENGLISH

SPANISH

ARABIC [TERMINATE CASE]

CANTONESE [TERMINATE CASE]

FRENCH/CREOLE/HAITIAN [TERMINATE CASE]

ITALIAN [TERMINATE CASE]

JAPANESE [TERMINATE CASE]

KOREAN [TERMINATE CASE]

MANDARIN [TERMINATE CASE]

POLISH [TERMINATE CASE]

PORTUGUESE [TERMINATE CASE]

TAGALOG/FILIPINO [TERMINATE CASE]

VIETNAMESE [TERMINATE CASE]

ANOTHER LANGUAGE [TERMINATE CASE]

LANG3. WAS THIS INTERVIEW COMPLETED "MOSTLY IN ENGLISH" OR "MOSTLY IN SPANISH"?

MOSTLY IN ENGLISH [TERMINATE CASE]  
MOSTLY IN SPANISH [TERMINATE CASE]  
ABOUT HALF AND HALF [TERMINATE CASE]

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