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Factors associated with the pre-travel health preparation of the 2011 internationally traveling population of New Jersey

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A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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Abstract

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By Rhett Stoney

The number of travelers crossing international borders has increased steadily over the past fifty years, from 25 million international tourist arrivals in 1950, to 935 million in 2009.(1) International travelers may be susceptible to unique health risks based on several factors including their destination and their purpose of travel. Though more people are traveling internationally, few seek pre-travel health advice before departure. Data from 843 New Jersey adults who reported traveling internationally in the past 12 months were derived from a state-added travel medicine module on the 2011 Behavioral Risk Factor Surveillance System (BRFSS). Logistic regression was utilized to examine factors associated with attendance at a pre-travel health consultation. Overall, 14% of travelers attended a pre-travel health consultation. Those traveling to a high-risk destination were 4.3 times more likely to seek a pre-travel consultation than those traveling to a low risk country after adjusting for other factors. Although travelers going to a medium risk country made up the largest group of travelers, only 11% attended a pre-travel consultation. Despite risks involved in international travel, pre-travel health consultation attendance remains low.

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ABSTRACT

The number of travelers crossing international borders has increased steadily over the past 50 years, from 25 million international tourist arrivals in 1950, to 935 million in 2009 (1). International travelers may be susceptible to unique health risks based on several factors, including their destination and purpose of travel. Though more people are traveling internationally, few seek pre-travel health advice before departure. Data from 843 New Jersey adults who reported traveling internationally in the past 12 months were derived from a state-added travel medicine module on the 2011 Behavioral Risk Factor Surveillance System (BRFSS). Logistic regression was utilized to examine factors associated with attendance at a pre-travel health consultation. Overall, 14% of travelers attended a pre-travel health consultation. Those traveling to a high-risk destination were 4.3 times more likely to seek a pre-travel consultation than those traveling to a low-risk country after adjusting for other factors. Although travelers going to a medium-risk country made up the largest group of travelers, only 11% attended a pre-travel consultation. Despite risks involved in international travel, pre-travel health consultation attendance remains low.

BACKGROUND

Rates of international travel have continued to grow substantially in the past decade. In 2009, US residents made more than 61 million trips with at least one night outside the United States, an approximate 5% increase since 1999 (2). Not only are more people traveling, but more people are traveling to the developing world. Over 50 million travel to these regions, and up to 8%, or 4 million persons worldwide are ill enough to seek health care abroad or on returning home (3). The reasons people travel are varied and extensive including tourism, business, study abroad, research, visiting friends and relatives, or responding to an international disaster. The risk of becoming ill or injured during international travel depends on many factors such as region of the world visited, the length of the trip, a traveler's age and health status, and the diversity of planned activities (2). How this risk is measured, perceived and communicated is a constant challenge in travel epidemiology, and its correct interpretation is paramount in how we understand potential dangers overseas.

There are many problems associated with assessing risk in travel epidemiology. A reasonably exact estimate of the number of cases of a disease in all travelers over a time period at a specific location is difficult to determine. Epidemiologically speaking, the exact denominator reflecting the total number of travelers to a location is nearly impossible to obtain. Finding a reliable denominator is central to calculate a true incidence rate or risk. In addition, disease risks are not stable over time, and current or real-time data is rarely available. True incidence of risk, therefore, is not the common measure used to quantitate disease infection or most other travel-related outcomes. Other measures such as proportionate morbidity and prevalence odds ratios are more common

in the literature, and help us understand the possible risk we may face traveling to a specific destination without measuring the exact risk. The lack of precise real-time risk estimates combined with the utilization of various different proxy measures has contributed to a wide variety of current recommendations regarding pre-travel preparation.

People from varying backgrounds can view the same data and come to different conclusions as to the cost and benefit of preventing risk. For example the national-level recommendations may vary depending on a specific country's experience with a particular disease or other risk factor. The fundamental differences in risk perception make it likely that multiple, overlapping, and at times conflicting guidelines will continue to exist, though efforts to harmonize guidelines have been made in recent years. For example from 2008 through 2010, the World Health Organization (WHO) convened an international group of yellow fever and travel medicine experts to review available data on yellow fever virus transmission. The results of this meeting have culminated in a country-specific list of yellow fever vaccine recommendations based on the geographic distribution of risk and can be found in the latest version of *CDC Health Information for International Travel 2012*. Despite these efforts, there will always be some variance in actual risk from a population perspective. Focus in travel medicine, therefore, should be to skillfully manage risk and it starts at the individual level. Each individual may represent a unique set of risk factors, which should be carefully considered with the most current and accurate information available in order to best prepare oneself for safe travel abroad.

The pre-travel health consultation is an opportunity to discuss risks of travel and develop plans that minimize those risks (2). The wide variety of information and misconception regarding travel risk is vast. For example, some travelers canceled plans to Asia because of fear of H5N1 avian influenza even though actual risk to travelers was extremely low. Others planned to ascend Mt. Everest even though the risk of dying is 1 in 40 (2). A pre-travel consultation can help clarify misconceptions about danger abroad. The goal of the pre-travel consultation is to prepare the traveler through counseling, education, vaccinations and medications to help reduce and manage their risk of illness and injury during travel (2).

Certain travelers are at higher risk for travel due to pre-existing health conditions. The most serious of these include cardiovascular disease, chronic obstructive pulmonary disease, diabetes, and immunodeficiency (4). About 50% of US travelers who die abroad are men older than 60 who have heart attacks (4). A recent study found that among medical incidents occurring in-flight, cardiovascular events rank second only to gastrointestinal disorders (5). Travel advisors are urged to pay particular attention to these individuals. In addition, an accurate assessment of medical history is important in order to prevent any possible contraindications with vaccinations or other medications (6). Underlying health conditions should also be closely considered when assessing planned activities abroad.

Purpose of travel(3, 7), specific behaviors(8), as well as activities performed abroad(9) may impact the risk of disease or injury in international travelers. Those traveling abroad to visit friends and relatives (VFR) have been a population of particular concern in travel medicine. Research has shown that VFR travelers do not heed pre-

travel advice for vaccinations and antimalarial prophylaxis at the same rate as business or tourist travelers do (10, 11). In 2010, 35% of US air travelers indicated VFR as their purpose of travel (12). This population includes travelers who have typically migrated from less-developed countries to the United States, and are now returning to the region of their birth. VFRs are more likely to be exposed to a range of travel related illnesses compared to other types of travelers due to increased likelihood of travel to high risk destinations and less frequent use of adequate protective measures (13). Reasons for the lack of use of adequate protective measures are numerous. Some of these include cultural and language barriers with health care providers, lack of awareness of risk, and distrust in the medical system. The CDC recommends that clinics incorporate culturally sensitive educational materials, provide language translators, and provide handouts in multiple languages as potential ways to help improve risk communication in this vulnerable population.

Another high-risk population includes those going abroad to perform humanitarian service. Often these travelers have different risks of disease or injury than persons traveling for other purposes due to the nature of their work,(7, 14, 15) length of stay,(16) and travel destinations that are primarily in low resource countries (3, 15, 17). Correspondingly, there have been many reports of humanitarians returning home ill (18-21). These travelers also include those who respond to international disasters. These individuals are particularly different from most travelers because they may work in areas of depleted infrastructure and poor access to medical care. In addition they often expose themselves to unstable environments and engage local populations. It is important to consider purpose of travel as well as planned activities prior to international travel.

Though much attention is placed on the risk of acquiring an infectious disease abroad, tourists are 10 times more likely to die as the result of an injury than from an infectious disease (2). From 2007 through 2009 road traffic crashes accounted for 32% of tourist deaths due to injuries (22). Depending on the country visited, much can determine the severity and outcome of unintended injuries. Emergency care may not be available or acceptable by US standards. More than 50 million persons are injured each year worldwide from traffic injuries and more than 85% of casualties occur in low and middle-income countries (2). Recreational motor vehicle rentals in the Caribbean are particularly popular among tourists. A study from Bermuda reported that the rate of motorbike injuries is much higher in tourists than in the local population (23). Unfamiliar equipment and inexperience with motorized 2-wheelers contributed to crashes and injuries. Drowning is also a leading cause of injury death to US travelers visiting countries where water recreation is a major activity such as the Bahamas, Jamaica, and Costa Rica. The risk factors are not clearly defined but are most likely related to unfamiliarity with local water currents and water conditions as well as alcohol use (2).

While all world regions have experienced growth in international arrivals, travel to developing countries accounted for most of the growth (1). Globally mobile populations are at higher risk of acquiring geographically restricted infections such as yellow fever, dengue fever, and malaria, as well as infections that are more common in resource-poor areas of the world, such as typhoid fever, hepatitis A and diarrheal diseases (24). Many of these illnesses are preventable if proper advice is followed regarding recommended vaccinations, prophylaxis and particular avoidance behaviors. Current vaccine coverage levels for international travelers are low. For example, a cross-

sectional study of 404 U.S. travelers to hepatitis A-endemic areas showed that only 24% had been immunized, despite the belief stated by 76% that vaccines provided "essential" protection (25). In a recent report of malaria in Haiti, all cases of malaria among humanitarian aid workers occurred in persons who had not taken malaria prophylaxis, and no cases were identified among 52 aid workers who took 346 person-weeks of chloroquine prophylaxis (26). A risk assessment of German travelers to India found that those who had not followed the traditionally recommended dietary restrictions showed a two-fold increased risk of illness, and 80% of travelers to all destination countries did not follow the dietary recommendations at all. Overall, 43% of travelers reported some kind of illness (27). The pre-travel consultation is an opportunity for travelers to get necessary anti-malarial prophylaxis and vaccinations as well as learn proper disease avoidance behaviors to help prevent illness abroad.

Despite the benefits, many travelers do not seek a pre-travel consultation or access health resources of any kind prior to departure (28). A study of 1,254 international travelers departing a major US airport found that only 54% of survey respondents traveling to low or low-middle income (LLMI) countries reported pursuing health information of any kind prior to their trip (24). Of those who sought health advice prior to travel to a LLMI country, less than a third of travelers visited a travel medicine specialist, and among VFRs this number was only 3%. The most common reason reported for not pursuing health information prior to travel was a lack of concern about health issues. These numbers are similar to those from a Swedish airport survey study that found 60% of international travelers sought travel health advice, and 30% of those seeking advice consulted a travel medicine clinic. Not only does this lack of concern put

the travelers themselves at risk, it may also pose a risk of importing travel-related diseases to the local population in their home country. The Institute of Medicine Reports on Emerging Infections have consistently identified international travel as a major factor in the emergence and transmission of global disease (29). The outbreak of SARS in 2003 and the H1N1 influenza pandemic are examples of the impact that international travel has on spread of disease. Continued epidemiological surveillance as well as targeted outreach efforts toward the international traveler must continue to improve in order to protect the internationally traveling population as well as those they may come in contact with both in their home country and abroad.

Identifying, treating and monitoring many of these travel-related diseases can place significant demands on the already limited resources and personnel in state and local public health agencies. In 2009, the CDC proposed a travel medicine module to add to the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is the world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984. Currently, data are collected monthly in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam.

The BRFSS Emerging Core Module on Travel Medicine is designed to provide crucial data that will help federal, state, and local health authorities and providers to ensure that travelers leave the U.S. and return to the U.S. healthy. The data are meant to provide federal, state, and local public health professionals and policy makers with accurate state and national-level data on a variety of important topics, including: health and illness among immigrant populations, prevalence and purpose of international travel, protective behaviors such as seeking pre-travel health care, and travel for the purpose of

seeking medical treatment outside the U.S. This data will help federal, state, and local health authorities and providers to identify high-risk populations in this large and rapidly growing risk group, which will help to make science-based decisions to develop programs and outreach campaigns to reach this population.

AIMS

There are currently no accurate state-level prevalence data available to public health providers and policy makers to identify at-risk populations for travel-related illnesses. Similarly, there is no current national data source of factors associated with seeking pre-travel health care. Before the travel medicine module can be incorporated in the annual BRFSS survey as a core or even a rotating optional module, the CDC in conjunction with the New Jersey Department of Health and Human Services agreed to pilot the travel medicine module for the 2011 New Jersey BRFSS. This study aims to evaluate the travel medicine module in conjunction with other BRFSS modules such as health, demographics and health care access to predict the likelihood of attending a pre-travel health consultation using a binary logistic regression model. The results of this cross-sectional study would inform state-level public health planners, policymakers, and travel health specialists about the extent of different aspects related to attending a pre-travel consultation and provide guidance on how they can act to reduce or prevent travel-related health issues.

METHODS

We examined data from the 2011 BRFSS, a state-based random digit dial telephone survey of the adult population conducted by the Centers for Disease Control and Prevention in conjunction with the New Jersey Department of Health and Senior Services. The BRFSS collects data on health care utilization and risk behaviors from a representative sample of civilian non-institutionalized adults (≥ 18 years) in each of the 50 states. A detailed description of the survey design and random sampling procedures are available elsewhere (30). Specifics relevant to this analysis are found below.

Study Population

In 2011, 15,369 telephone interviews were conducted in the state of New Jersey as part of the national BRFSS survey. Five questions representing the travel medicine module were included in the survey and asked among the 843 respondents over 18 who indicated traveling internationally in the past 12 months. Questions considered in this analysis included whether or not the interviewee traveled outside of the United States in the past 12 months; their particular travel destination; if they visited a doctor or other health care provider to get shots, medicine, or health information prior to travel; their purpose of travel; and whether or not they received an influenza vaccine in the past 12 months.

Definitions and Variables

The outcome of interest in this study was whether or not the traveler participated in a pre-travel health consultation prior to a trip outside of the United States in the past 12 months. A pre-travel health consultation was defined as those respondents who answered

yes to the following question: “Before any trips outside the U.S. that you have taken in the past 12 months, did you visit a doctor or other health care provider to get shots, medicine or health information for your travel?” Various factors may be associated with whether or not an individual seeks a pre-travel health consultation but we were limited by the variables addressed in the BRFSS. The variables we examined were demographics, destination risk category, reason for travel, number of children in the household, a current physical, mental, or emotional disability and whether or not the traveler received an influenza vaccination in the past 12 months. Since there currently is no all-encompassing system in travel medicine measuring risk of disease or injury abroad, destination risk category was determined by the most recent destination traveled by each interviewee in the past 12 months and categorized based on the United Nations Development Index (HDI). In this analysis the HDI was used as a proxy for explaining differences in risk a traveler may face depending on their specific travel destination. The HDI measures country development by combining indicators of life expectancy, educational attainment and income into a composite human development index. This is the first known study to utilize the HDI for determining travel related risk using BRFSS data. The HDI categorizes countries according to Very High, High, Medium, and Low Human Development. For the purpose of this analysis those countries that had a Very High HDI were categorized as low-risk, those with a High HDI were categorized as medium-risk, and those with a Medium or Low HDI were categorized as high-risk. A complete listing of countries and their respective HDIs can be found at http://hdr.undp.org/en/statistics/ or in the 2011 Human Development Report, "*Sustainability and Equity: A Better Future for All*". Some countries were not included in the HDI. These countries were placed in a

risk category that was deemed most appropriate for the particular country based in part by geographic relationship to other countries in the UN HDI as well as by the World Bank classification for country income. More information regarding the World Bank Classification can be found elsewhere (31). A current disability was defined as anything physical, mental, or emotional that limited the person's activities in anyway.

Data Analysis

Univariate analyses were conducted on all variables followed by bivariate analysis using pre-travel visit (Yes or No) as the outcome variable. Destination risk category was treated as the exposure variable of interest, but other covariates were included in the bivariate analysis as well. Covariates such as reason for travel, education, number of children in household, and race were collapsed into larger categories after initial preliminary analysis to enhance the sample size for certain categories for comparison. The number of children in household variable was dichotomized to indicate that the interviewee lived or did not live with children in the household. The reason of travel variable was collapsed into travelers going abroad for vacation/leisure, VFR, business, or another purpose. Those who traveled for another purpose were placed in the "other" category. Those who answered that they traveled internationally within the past 12 months were included in the univariate analysis, however those who did not specify what country they traveled to or refused to answer the question regarding specific travel destination were excluded from bivariate analysis. All responses that were "Don't Know" or "Refused" were excluded for the particular covariate of interest in the bivariate analysis as well. To account for the complexity of the survey sample design, weights

were assigned to all variables and considered in statistical calculations including odds ratios, confidence intervals, and chi-square tests for significance at the 0.05 level.

A multivariable logistic regression model included all variables of interest that were found to be significant at the 0.05 level in the bivariate analysis, as well as others that were considered to be plausible predictors based on the literature. Exact numbers of responses for each question varied due to the length of the interview, but only interviews in which all variables of interest were accounted for in the questions answered were included in the multivariable logistic regression model. All analyses were conducted using SAS Enterprise Guide Version 5.1. This study was given exempt status by the Emory Institutional Review Board.

RESULTS

Of 15,369 interviews 843 (6%) respondents over 18 indicated they had traveled outside of the US in the past 12 months. Of these, 808 traveled to a specific destination. The top 15 destinations visited can be seen in Table 1. For a more detailed list please see Appendices Table A. Of the 808 respondents traveling to a specific destination, 121 (15%) traveled to a country not listed in the UN HDI. Of these, 110 (91%) traveled to a destination in the Caribbean. Table 2 shows travel, health, and demographic characteristics of the 843 travelers over 18 who went abroad in the past 12 months. A more detailed list of all observed variables can be found in the Appendices, Table B. Three hundred eighteen travelers (39%) went to a region of the world considered to be low-risk while 343 (42%) went to a medium-risk country and 148 (18%) traveled to a high-risk country.

Of the 841 travelers who indicated a reason for travel, 597 (71%) indicated traveling for vacation/leisure. One hundred forty-nine travelers (18%) went abroad to visit friends and relatives, while 69 (8%) went abroad for business. Twenty-six travelers (3%) traveled for another reason including health or medical treatment, research, volunteer/missionary, or some other purpose. Four hundred ninety-four (59%) travelers were female. Six hundred ten travelers (73%) identified themselves as white. Of the 836 travelers who answered the question regarding race, 88 Hispanics (11%) were represented as well as 61 Asians (7%), and 59 blacks (7%). Other races included 13 travelers (2%). Five hundred fifty-four travelers (67%) did not have children, while 148

(18%) travelers reported having a current physical, mental, or emotional disability. Five hundred nineteen (62%) travelers attended four or more years of college. Of 843 international travelers, 397 (47%) reported receiving an influenza vaccination in the past 12 months. The average age of travelers after adjusting the sample for weighting was 48 years.

Of 840 international travelers over 18 who answered the survey regarding pre-travel, 117 (14%) attended a pre-travel consultation. In the bivariate analysis observations that represented answers of "Don't Know" or "Refused" for the outcome variable pre-travel and for the variable of interest were excluded. Table 3 represents the bivariate analysis summary. A more detailed version of the weighted bivariate analysis as it applies to all variables analyzed can be found in the Appendices Table C. Of travelers going to a high-risk country, 43 (29%) attended a pre-travel consultation. Three times as many travelers traveling to a high-risk country attended a pre-travel consultation compared to travelers going to a low-risk country ($p=0.004$). Thirty-nine travelers to a medium-risk country (11%) sought a pre-travel consultation while only 9% of travelers to a low-risk country sought a pre-travel consultation. In the bivariate analysis, no association was found indicating that those traveling to a medium-risk country were more likely to attend a pre-travel health consultation compared to travelers to low-risk countries ($p=0.91$).

Fifty-six (10%) of vacation travelers attended a pre-travel health visit. Though vacation travelers made up the largest group of travelers, they had the lowest pre-travel health attendance among travelers indicating a specific purpose of travel. Travelers who indicated traveling for an "other" reason represented the highest pre-travel consultation

attendance (42%) followed by VFR travelers (20%) and business travelers (20%). Those who indicated traveling for an "other" purpose of travel were 5.7 times more likely to attend a pre-travel health visit than those traveling for vacation (p=0.003). International travelers who received influenza vaccine in the past 12 months were 4.1 times more likely to seek a pre-travel consultation than did international travelers who did not receive influenza vaccine (p<.0001). There was no significant association between attending four or more years of college and attending a pre-travel health visit.

A multivariate model included significant variables from the weighted bivariate analysis as well as those that were thought to be possible predictors based on the literature (Table 3). An unweighted multivariate model was also assessed and can be found in the Appendices (Table D). Seven hundred ninety-one individuals answered all of the questions concerning the variables of interest in the weighted model. Statistically significant variables from the bivariate analysis included in the model were destination risk category, purpose of travel, race, and whether or not the traveler received an influenza vaccination in the past 12 months. Non-significant, but possibly relevant predictor variables, age, sex, and current disability were also included in the model. Travelers who went to a high-risk country were 4.3 times more likely to attend a pre-travel consultation than travelers going to a low-risk country after adjusting for purpose of travel, age, sex, race, current disability, and receiving an influenza vaccination in the past 12 months. There was no significant association indicating that those traveling to a medium-risk country were more likely to attend a pre-travel health visit than those traveling to a low-risk country (p=0.39). Those who received an influenza vaccination in the past 12 months were 6.3 times more likely to attend a pre-travel consultation than

those who did not. Those who went abroad for a purpose other than vacation, business or VFR were 5.6 times more likely to attend a pre-travel consultation than those who did not.

DISCUSSION

International travel has increased dramatically in the last decade, and even more travelers are seeking out areas that have rarely been visited in the past (2). Despite this increase in international travel, many travelers do not access health resources prior to departure (28). Of those who do, fewer visit a doctor or other health care provider before going abroad (24). Of 840 international travelers over 18 in this study who answered the survey regarding pre-travel, 117 (14%) visited a doctor or other health care provider to get shots, medicine, or health information for their trip. Other studies have assessed the pre-travel health of international travelers through airport surveys and travel medicine clinics, but these studies have often focused on travel to only specific countries or regions of the world. For example, an airport survey of international travelers going to low or low- middle income (LLMI) countries found that 259/1,254 (54%) reported pursuing health information of any type prior to their trip. Of those seeking advice, 98 (38%) saw a primary care practitioner (24). Another study of American travelers leaving John F. Kennedy International Airport reported that 36% of travelers going to high-risk destinations reported seeking health advice (25). Even after incorporating a complex survey design accounting for sampling disparities within the state of New Jersey, there were significant disparities in those attending a pre-travel consultation.

Although the measure for destination risk was slightly different, the findings of this study suggest several consistencies with other research. Of the 147 travelers going to a high-risk country, only 43 (29%) sought a pre-travel health consultation. Despite

making up the largest proportion of international travelers, only 39 (11%) of travelers going to a medium-risk country sought a pre-travel consultation. This is of concern considering that 61% of international travel was to medium or high-risk countries, and that 9 of the top 15 travel destinations were to medium or high-risk countries.

A majority of travelers (70%) went abroad for vacation or leisure. Two hundred eighty-three (82%) of these vacationers went to a medium-risk country, many of which are in Central and South America. A GeoSentinel study found that ill-returned travelers residing in the United States had significantly higher proportional morbidity from acute diarrhea after visits to Mexico and Central America, compared with ill returned travelers from Canada and Western Europe (32). Many popular travel destinations in this study were to the Caribbean, where travelers are at risk year round for respiratory infections, the leading cause of seeking medical care in returning travelers (2). Depending on the country, travelers could also be at risk for dengue and malaria, two potentially deadly diseases. Though this study was limited by the variables of the BRFSS, other studies have demonstrated the consequences of inadequate malaria preparation. In a recent report of malaria in Haiti, all cases of malaria occurred in persons who had not taken malaria prophylaxis, and no cases were identified among 52 travelers who took 346 person-weeks of chloroquine prophylaxis (26). In a recent study among American travelers going to a malaria endemic country only 46% carried antimalarial medications with them (25).

Those traveling for another purpose besides business, VFR or vacation were 5.6 times more likely to seek a pre-travel consultation compared to vacation travelers ($p=0.003$). These 26 travelers went abroad for reasons such as to conduct research, study,

or volunteer. One possible explanation for this large likelihood could be that these people were going abroad on behalf of a formal organization or program. Organizations may have their own requirements regarding the necessity to seek a pre-travel health visit.

Those who received an influenza vaccination in the past 12 months were over 6 times more likely to attend a pre-travel consultation than those who did not get vaccinated. Though this may indicate that travelers who get their influenza vaccination could be more health conscious, and thus likely to attend a pre-travel health visit, it is possible that due to the design of the survey those who saw a doctor in the past 12 months prior to their trip may have used the opportunity to receive their influenza vaccination at that visit in addition to any required travel vaccinations.

SUMMARY, PUBLIC HEALTH IMPLICATIONS, POSSIBLE FUTURE DIRECTIONS

This study is the first to incorporate CDC's 2011 Travel Medicine module as part of the BRFSS, and the only known study to predict the likelihood of a pre-travel consultation among the 2011 internationally traveling population of New Jersey. Although those traveling to a high-risk country were over four times more likely to attend a pre-travel visit after adjusting for all other factors, it is important to realize that only a small portion of travelers attended a pre-travel health visit in the first place. Many of these travelers went on vacation, and it has been shown in other studies that vacation travelers tend to stay for shorter periods of time than those traveling for other purposes(16), but 9 of the top 15 destinations were considered high or medium-risk. Knowledge, attitudes, and practices (KAP) of international travelers have been assessed in multiple countries (33), and a lack of concern or understanding regarding preventable

diseases and injury has consistently been found. As statistically significant as the associations may be in this study, the non-significant associations may be even more important. VFR attendance at pre-travel health consultations was low, as was found in other studies (10, 13). A group that accounts for 35% of the internationally traveling American population in 2010 ideally would be better prepared since many of these travelers go to high risk countries (12, 13). Mobile populations, diseases, and natural and civil disasters are constantly in flux, and the traveler needs the most up-to-date travel-specific information in order to make informed choices concerning their health. In order to better characterize health risks, specific priorities for future research have been identified in the field of travel medicine. Obtaining travel-related data for many existing and potentially vaccine-preventable diseases is essential since current data are sparse, and incidence in local populations does not mirror the incidence that would occur in visiting travelers. More attention needs to be paid to international travelers with pre-existing medical conditions as well as immunocompromising medications on travel outcomes. Exploring in more detail different behavior patterns between those traveling abroad for different purposes will have a substantial impact on characterizing risk. Finally, improved knowledge regarding exposure-related factors such as luxury vs. rough travel, organized package vs. self-directed travel are new important areas of research in travel health (2). Constant surveillance and continued epidemiological study is necessary to quantify and interpret changes in the global patterns of morbidity and mortality in order to best illustrate and communicate the correct perceptions of risk abroad to the public.

National and non-governmental organizations can conduct population based studies, and will continue to do so, but what cannot be overemphasized is that positive

changes in travel health start at the individual level. Each visit outside of the country needs to be given an individual risk assessment. The responsibility falls on both the traveler and the clinician. Clinicians of all disciplines, but especially those in primary care, need to know basic travel health information to determine the extent of health advice their patients should access before traveling (2). Individual travelers should be responsible for proactively doing research on their destination of travel and follow clinician advice in order to keep themselves and those they come in contact with safe. Through continued epidemiology and improved communication between providers and travelers, internationally traveling populations will be better prepared for the risks they face abroad.

Strengths and Weaknesses

This study offers a population-based approach based on a complex sample survey design. Other studies of the pre-travel consultation attendance of international travelers have been limited by their sample selection methods. For example, many studies on the KAP of international travelers have been derived from international travelers that were surveyed at a particular airport. Other studies have looked at the pre-travel health preparation of travelers who attended a pre-travel health consultation, but were limited by only reaching those international travelers who attended the particular clinic where the data was collected. This study offers an approach that attempts to be representative of the entire internationally population of a particular state, for an entire year.

Though this study offers a population-based approach, the sample size was relatively small compared to other studies, and made interpretation of potential

interactions difficult. In addition, the smaller sample size limited the statistical power of the study, and may have inflated some estimates such as the odds of those traveling for an "other" purpose to seek a pre-travel consultation. One possible way to increase the sample size and thus statistical power could be to pool the data from this survey into that of identical pre-travel surveys conducted over several years. This would allow a clearer interpretation of possible predictors of the pre-travel visit as well as allow for new potential studies of trends in international travelers seeking a pre-travel consultation over time.

A Discussion on Methodology

The results of the unweighted and the weighted logistic regression models differ statistically, but the message from each method is largely the same. There has been much debate over whether or not weighting variables for complex survey design makes a real difference in terms of identifying significant predictors of binary outcomes. There are many who oppose it, but that argument is beyond the scope of this paper. Perhaps further studies could analyze in more depth the utility of weighting data in order to show a range in circumstances where weighting would be necessary. In this particular study, however, a comparison of the unweighted and weighted model contributed to a greater understanding of the data as a whole.

The unweighted analysis allowed for a preliminary screening of all variables of interest in this dataset. A complete list of all weighted bivariate analyses (Table C) is included in the Appendices. For the overall exposure of interest, destination risk category, there was not much difference in the bivariate analyses and models between the unweighted and weighted odds ratios. Both the unweighted and the weighted model

predicted that travelers to a high-risk country are at least 4 times more likely to seek a pre-travel consultation compared to those traveling to a low-risk country, and both p-values were significant. The unweighted model incorporated covariates that were statistically significant in the unweighted bivariate analysis but were not found to be significant after adjusting for all other variables in the unweighted model. These covariates included having children in the household, and race. Race was also found to be significant in the weighted bivariate analysis, but not after controlling for all other variables. Having a current disability was found to be significant in both the unweighted and weighted bivariate analyses, and would have been a significant predictor if the study was conducted at the 0.10 significance level. If this were the case in the weighted model, those who had a current disability would be almost 2 times more likely to seek a pre-travel consultation compared to those without a disability. Sex was not found to be significant in any of the bivariate analyses, but it was included because it was thought to be a potential confounder, and dropping the variable did not add substantial precision to the overall model. Lastly, receiving an influenza vaccination in the last 12 months was significantly associated with a pre-travel health visit in both the bivariate analyses and multivariate models.

Potential interaction was considered for the three level exposure variable destination risk category and the four level purpose of travel variable. The association between VFR travelers and travel to high-risk countries was one of the main reasons for a desire to analyze this potential interaction as a possible effect modifier. A collinearity diagnostic was performed on this interaction but its meaning could not be interpreted.

This does not mean that there is no interaction. If the sample size were larger it may have been possible to meaningfully interpret the potential interaction.

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TABLES

Table 1. Top 15 travel destinations for all international travelers, New Jersey BRFSS, 2011†

Rank	Destination n (%*)	
1	Mexico	86 (11)
2	Canada	72 (9)
3	Dominican Republic	47 (6)
4	Bahamas	45 (6)
5	Italy	44 (5)
6	United Kingdom	38 (5)
7	India	33 (4)
8	Jamaica	29 (4)
9	France	25 (3)
10	Bermuda	25 (3)
11	Aruba	24 (3)
12	Puerto Rico	23 (3)
13	China	20 (3)
14	Germany	20 (3)
15	Ireland	20 (3)

†Frequencies shown represent actual survey responses and therefore are not weighted

*Percentages do not add to 100% because only top 15 travel destinations represented here.

Table 2. Demographic and health characteristics of the internationally traveling population of New Jersey, 2011 (n=843).*

Characteristic	
Median Age (std)	48 (15.2)
Participated in a pre-travel health visit	N (%)
Yes	117 (14)

No	723 (86)
Visit Destination Risk Category	
High-Risk	146 (18)
Medium-Risk	342 (43)
Low-Risk	317 (39)
Purpose of Travel	
Vacation	594 (71)
Visiting Friends or Relatives	149 (18)
Business	69 (8)
Other	26 (3)
Gender	
Female	494 (59)
Male	349 (41)
Race	
White	648 (78)
Black	67 (8)
Asian	61 (7)
Other	57 (7)
Children	
None	554 (67)
>1	150 (18)
1	124 (15)
Current Disability	
Yes	148 (18)
No	694 (82)
Education	
4+ years of College	519 (62)
<4 years of College	322 (38)
Flu Vaccine in last 12 months	
Yes	397 (47)
No	446 (53)

*Denominators fluctuate slightly as not all travelers answered every question.

Table 3. Proportion of international travelers seeking a pre-travel health consultation by weighted demographic, travel, and health characteristics, New Jersey BRFSS, 2011*

	Pre-travel n, %			Bivariate			Weighted Model**		
	Yes	**No**	**Total**	**OR[c]**	**95% CI**	**P-value**	**OR[a]**	**95% CI**	**P-value**
Visit Destination Risk Category†									
High-Risk	43 (29)	104 (71)	147	3.00	(1.42, 6.32)	0.004	4.35	(2.00, 9.45)	0.0002
Medium-Risk	39 (11)	303 (89)	342	1.04	(0.50, 2.19)	0.91	1.35	(0.68, 2.67)	0.39
Low-Risk	28 (9)	289 (91)	317	1.00			1.00		
Purpose of Travel									
Visiting Friends or Relatives	30 (20)	116 (80)	146	1.75	(0.93, 3.31)	0.082	1.12	(0.43, 2.89)	0.82
Business	14 (20)	55 (80)	69	1.23	(0.52, 2.87)	0.64	1.52	(0.57, 4.03)	0.40
Other	11 (42)	15 (58)	26	5.74	(1.60, 20.60)	0.003	5.62	(1.77, 17.87)	0.003
Vacation	56 (10)	508 (90)	564	1.00			1.00		
Sex									
Female	63 (13)	416 (87)	479	1.65	(0.95, 2.87)	0.07	1.46	(0.79, 2.68)	0.23
Male	50 (15)	292 (85)	342	1.00			1.00		
Race									
Not White	38 (22)	138 (78)	176	1.83	(1.02, 3.26)	0.04	1.60	(0.75, 3.42)	0.22
White	73 (11)	562 (89)	635	1.00			1.00		
Current Disability									

Yes	28 (19)	118 (81)	146	1.83	(0.92, 3.68)	0.08	1.96	(0.96, 4.03)	0.07
No	88 (13)	603 (87)	674	1.00			1.00		
Influenza Vaccine last 12 months									
Yes	71 (18)	315 (82)	386	4.11	(2.34, 7.22)	<0.0001	6.30	(3.19, 12.47)	<0.0001
No	42 (10)	393 (90)	435	1.00			1.00		

*Frequencies displayed represent actual, unweighted survey data. All statistics calculated using weighted survey data

**All listed variables included in weighted model

†Based on 2011 United Nations Human Development Index

APPENDICES

Appendix Table A:
Destinations of travel for the internationally traveling population of New Jersey, BRFSS, 2011

Destination of Travel	Frequency
Mexico	86
Canada	72
Dominican Republic	47
Bahamas	45
Italy	44
United Kingdom	38
India	33
Jamaica	29
France	25
Bermuda	25
Aruba	24
Puerto Rico	23
China	20
Germany	20
Ireland	20
Don't Know	15
Non-specific countries	15
Spain	13
Costa Rica	12
Portugal	9
St. Martin	9
Greece	8
Israel	8
Australia	6
Philippines	6

Switzerland	6
Cayman Islands	6
Antigua and Barbuda	5
Austria	5
Brazil	5
Colombia	5
Panama	5
Poland	5
South Africa	5
Sweden	5
Trinidad and Tobago	5
Turks and Cairos Islands	5
US Virgin Islands	5
Refused	5
Argentina	4
Barbados	4
Guatemala	4
Peru	4
St. Lucia	4
Curacao	4
Czech Republic	3
Haiti	3
Japan	3
Norway	3
Romania	3
Thailand	3
Vietnam	3
Europa Island	3
Hong Kong	3
St. John	3
St. Thomas	3
Afghanistan	2
Burma	2

Cambodia	2
Chile	2
Denmark	2
Dominica	2
Ecuador	2
El Salvador	2
Honduras	2
Netherlands	2
New Zealand	2
Nicaragua	2
Nigeria	2
St. Kitts and Nevis	2
Singapore	2
Turkey	2
Howland Island	2
Albania	1
Belgium	1
Bhutan	1
Bosnia and Herzegovina	1
Bulgaria	1
Cameroon	1
Egypt	1
Ethiopia	1
Guyana	1
Hungary	1
Iraq	1
Korea	1
Federated States of Micronesia	1
Pakistan	1
Russia	1
St. Vincent and the Grenadines	1
Syria	1
Tunisia	1

United Arab Emirates	1
Uruguay	1
Serbia	1
Taiwan	1
British Indian Ocean Territory	1
Cocos	1
French Polynesia	1
St. Helena	1
British Virgin Islands	1
Tortora	1

Total 843

*Answer to "Yes" for international travel, but "Don't Know" for destination visited were initially included in the univariate analysis but were dropped in the bivariate analysis

Appendix Table B.
Description of demographic, health, and travel characteristics of the internationally traveling population of New Jersey, BRFSS, 2011

Travel Medicine Questions	**Yes**	row %	**No**	row %	**Total**	**Missing***
Traveled Internationally in Last 12 months	843	21%	3178	79%	4021	10917
Participated in a Pre-Travel Health Visit	117	14%	723	86%	840	
Became Sick Abroad or Within 7 days of Return	48	6%	791	94%	839	0

*Missing values due to question not answered

Reason for Travel	**n**	**Col %**
Vacation/Leisure	597	71%
Business	69	8%
VFR	149	18%

Health/Medical Treatment	3	0%
Research Study	7	1%
Volunteer/Missionary	4	0%
Other	10	1%
Total	841	100%

Own/Rent Home	**n**	**Col %**
Own	677	81%
Rent	151	18%
Other arrangement	8	1%
Total	836	100%

Demographics	**Yes**	row %	No	row %	**Total**	**Missing**
Pregnant	7	7%	92	93%	99	528
Were you born in the US?	621	74%	222	26%	843	0

*Missing values due to question not answered

Sex	**n**	**Col%**
Male	349	41%
Female	494	59%
Total	843	100%

Race/Ethnicity	**n**	**Col %**
White	610	73%
Hispanic	88	11%
Black	59	7%
Asian	61	7%
Native Hawaiian/Pacific Islander	2	0%
American Indian/Alaska Native	2	0%
Other	8	1%
Mixed	1	0%
Total	831	100%

Marital Status	n	Col%
Married	546	65%
Divorced	76	9%
Widowed	72	9%
Separated	12	1%
Never Married	104	12%
Member of Unmarried Couple	29	3%
Total	839	100%

Children	n	Col%
1	124	15%
2	106	13%
3	38	5%
4	4	0%
5	2	0%
None	554	67%
Total	828	100%

Employment status	n	Col%
Employed for Wages	466	55%
Self-employed	80	10%
Out of Work for more than 1 year	22	3%
Out of work for less than 1 year	21	2%
Homemaker	38	5%
Student	15	2%
Retired	182	22%
Unable to Work	18	2%
Total	842	100%

Annual Income from All Sources	n	Col %
<10,000	10	1%
10,000-<15,000	12	2%
15,000-<20,000	17	2%

20,000-<25000	32	4%
25000-<35,000	36	5%
35000-<50,000	89	12%
50,000-<75,000	101	14%
75,000 or more	441	60%
Total	738	100%

Education-Highest Grade Completed	**n**	**Col%**
Never Attended School or Only Kindergarten	0	0%
Grades 1-8 (Elementary)	12	1%
Grades 9-11 (Some High School)	20	2%
Grade 12 or GED (High School Graduate)	134	16%
College 1year to 3 years (Some College)	156	19%
College 4 years +	519	62%
Total	841	100%

Health Status Variables

Self-Reported General Health	**n**	**Col%**
Excellent	241	29%
Very Good	313	37%
Good	204	24%
Fair	73	9%
Poor	11	1%
Total	842	100%

Health Care Access Variables

	Yes	row %	**No**	**row %**	**Total**
Do you have a current health plan?	803	95%	38	5%	841
Has there been a cost barrier to health care in last 12 months?	74	9%	766	91%	840

Number of Doctors or Personal HC Providers	n	Col %
Yes, only one	624	74%
More than one	139	17%
No	77	9%
Total	840	100%

When was your last check-up?	n	Col %
Within past year	682	82%
Within past 2 years	103	12%
Within past 5 years	29	3%
5 or more years ago	17	2%
Never	4	0%
Total	835	100%

Chronic Health Conditions Variables

Told you have High Blood Pressure	n	col%
Yes	277	33%
Yes, but female told only during pregnancy	6	1%
No	548	65%
Told borderline high or pre-hypertensive	11	1%
Total	842	100%

	Yes	row %	No	row %	Total	Missing
Are you taking medications for HBP?	232	84%	45	16%	277	
Ever have myocardial infarction?	23	3%	818	97%	841	
Ever have angina or coronary heart disease?	32	4%	807	96%	839	0

Ever have a stroke?	18	2%	821	98%	839	0
Any other types of cancer?	79	9%	760	91%	839	0
COPD/Emphysema/Chronic Bronchitis	38	5%	802	95%	840	0
Depressive disorder	78	9%	762	91%	840	0
Kidney disease	16	2%	826	98%	842	0
Ever told have asthma	52	63%	31	37%	83	568
Current Mental/Physical/Emotional Disability	148	18%	694	82%	842	0
Have you performed any physical activities in last 30 days	690	82%	152	18%	842	0
Have you gotten the influenza vaccine in last 12 months	397	47%	446	53%	843	0

*Missing values due to question not answered

Diabetes	**n**	**Col %**
Yes	62	7%
Yes, but female told only during pregnancy	13	2%
No	750	89%
No, pre-diabetes or borderline diabetes	18	2%
Total	843	100%

Smoking	**n**	**Col %**
Everyday	42	5%
Some days	33	4%
Not at all	267	32%
Missing	501	59%
Total	843	100%

How often use seatbelt?	**n**	**Col %**
Always	788	94%
Nearly Always	34	4%
Sometimes	10	1%
Seldom	4	0%
Never	4	0%
Never drive/ride in a car	2	0%
Total	842	100%

Language Preference	**n**	**Col %**
English	807	96%
Spanish	36	4%
Total	843	100%

Appendix Table C.
Weighted bivariate analysis for all variables of potential interest, New Jersey BRFSS, 2011

Pre-travel								
Purpose of Travel	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.23	(0.52, 2.87)	**0.64**
Business Travelers	14	20%	55	80%	69			
Ref-Vacation Travelers	56	10%	508	90%	564			
Total	70	11%	563	89%	633			

Pre-travel								
Purpose of Travel	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.75	(0.93, 3.31)	**0.0818**
VFR Travelers	29	20%	116	80%	145			
Ref-Vacation Travelers	56	10%	508	90%	564			
Total	85	12%	624	88%	709			

Pre-travel						
Purpose of Travel	Yes	No	Total	Odds Ratio	95% CI	p value

	n	%	n	%		5.74	(1.60, 20.66)	**0.0026**
Other Travelers	11	42%	15	58%	26			
Ref-Vacation Travelers	56	10%	508	90%	564			
Total	67	11%	523	89%	590			

Pre-travel								
Risk Category	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%				
High Risk	43	29%	104	71%	147	3.00	(1.42, 6.32)	**0.0041**
Medium Risk	39	11%	303	89%	342	1.04	(0.50, 2.19)	0.91
Low Risk	28	9%	289	91%	317	1	n/a	n/a

	Pre-travel							
	Yes		No		Total	Odds Ratio	95% CI	p value
Sex	**n**	**%**	**n**	**%**		0.61	(0.35, 1.05)	**0.0687**
Male	49	15%	287	85%	336			
Female	61	13%	409	87%	470			
Total	110	14%	696	86%	806			

	Pre-travel							
Race	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.83	(1.02, 3.26)	**0.0419**
Not White	43	21%	165	79%	208			
White	65	11%	521	89%	586			
Total	108	14%	686	86%	794			

	Pre-travel							
# of Children in household	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.39	(0.85, 2.26)	**0.19**
Children	45	17%	217	83%	262			
No Children	65	12%	465	88%	530			
Total	110	14%	682	86%	792			

	Pre-travel				

Education	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.41	(0.78, 2.53)	**0.25**
4+ years of College	76	15%	429	85%	505			
Less than 4 years College	34	11%	267	89%	301			
Total	110	14%	696	86%	806			

	Pre-travel							
Employment	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.20	(0.58, 2.45)	**0.62**
Retired	22	13%	147	87%	169			
Fully Working (ref)	69	13%	454	87%	523			
Total	91	13%	601	87%	692			

	Pre-travel							
Employment	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.47	(0.82, 3.20)	**0.48**
Out of Work	12	20%	48	80%	60			
Fully Working (ref)	69	13%	454	87%	523			
Total	81	14%	502	86%	583			

	Pre-travel							
Income	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		0.7297	(0.40, 1.32)	**0.30**
Make Less Than 75K/year	35	12%	246	88%	281			
Make 75K+ or Greater/year	65	15%	363	85%	428			
Total	100	14%	609	86%	709			

	Pre-travel							
General Health Status	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.22	(0.66, 2.28)	**0.52**
Very Good/Good	65	13%	428	87%	493			
Excellent (ref)	31	13%	201	87%	232			

Total	96	13%	629	87%	725

	Pre-travel							
General Health Status	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.25	(0.44, 3.59)	**0.67**
Fair/Poor	14	17%	68	83%	82			
Excellent (ref)	34	14%	205	86%	239			
Total	48	15%	273	85%	321			

	Pre-travel							
Current Health Plan	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		0.41	(0.12, 1.42)	**0.14**
No Current Plan	5	14%	31	86%	36			
Current Plan	105	14%	663	86%	768			
Total	110	14%	694	86%	804			

	Pre-travel							
Cost Barrier	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		2.02	(0.88, 4.66)	**0.09**
Yes	14	20%	56	80%	70			
No	96	13%	637	87%	733			
Total	110	14%	693	86%	803			

	Pre-travel							
Visit to Doctor	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		0.3553	(0.16, 0.81)	**0.01**
Not Within Past Year	12	8%	136	92%	148			
Within Past Year	96	15%	555	85%	651			
Total	108	14%	691	86%	799			

	Pre-travel							
Current Disability	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		1.83	(0.92, 3.68)	**0.08**
Yes	28	20%	114	80%	142			
No	82	12%	581	88%	663			
Total	110	14%	695	86%	805			

	Pre-travel							
Influenza Vaccine last 12 months	Yes		No		Total	Odds Ratio	95% CI	p value
	n	%	n	%		4.11	(2.34, 7.22)	**<.0001**
Yes	70	18%	309	82%	379			
No	40	9%	387	91%	427			
Total	110	14%	696	86%	806			

Appendix Table D.
Proportion of international travelers seeking a pre-travel health consultation by unweighted demographic, travel, and health characteristics, New Jersey BRFSS, 2011*

	Pre-travel n, %			Bivariate			Unweighted Model		
	Yes	**No**	**Total**	**OR[c]**	**95% CI**	**P-value**	**OR[a]**	**95% CI**	**P-Value**
Destination Visited Risk Category†									
High-Risk	43(29)	104(71)	147	4.31	(2.54, 7.29)	<.0001	4.03	(2.19, 7.43)	<.0001
Medium-Risk	39(11)	303(89)	342	1.33	(1.04, 2.90)	0.28	1.46	(0.84, 2.54)	0.18
Low-Risk	28(9)	289(91)	317	1.00			1.00		
Purpose of Travel									
Visiting Friends or	30(21)	116(79)	146	2.27	(1.39, 3.71)	0.0009	1.71	(0.95, 3.08)	0.07

Relatives									
Business	14(20)	55(80)	69	2.31	(1.21, 4.42)	0.01	2.40	(1.16, 4.99)	0.01
Other	11(42)	15(58)	26	6.65	(2.91, 15.19)	<0.0001	6.22	(2.49, 15.54)	<.0001
Vacation	56(10)	508(90)	564	1.00			1.00		
Sex									
Female	63(13)	416(87)	479	0.88	(0.59, 1.32)	0.55	1.00	(0.64, 1.56)	0.99
Male	50(15)	292(85)	342	1.00			1.00		
Race									
Not White	38(22)	138(78)	176	2.12	(1.37, 3.27)	0.0006	1.39	(0.81, 2.40)	0.23
White	73(11)	562(89)	635	1.00			1.00		
Children in household									
Children	47(18)	221(82)	268	1.52	(1.01, 2.28)	0.04	1.44	(0.90, 2.30)	0.13
No Children	66(12)	473(88)	539	1.00			1.00		
Current Disability									
Yes	28(19)	118(81)	146	1.64	(1.03, 2.63)	0.04	1.74	(1.02, 2.97)	0.04
No	88(13)	603(87)	674	1.00			1.00		
Influenza Vaccine last 12 months									
Yes	71(18)	315(82)	386	2.11	(1.40, 3.18)	0.0003	3.07	(1.90, 4.98)	<.0001
No	42(10)	393(90)	435	1.00			1.00		

*All variables in table included in the unweighted model except for children in household
†Based on 2011 United Nations Human Development Index

Institutional Review Board Exemption Letter

Emory University
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An equal opportunity, affirmative action university

March 20, 2012

RE: Determination: No IRB Review Required
Title: Factors associated with the pre-travel health preparation of the 2011 internationally traveling population of New Jersey
PI: Rhett Stoney

Dear Mr. Stoney:

Thank you for requesting a determination from our office about the above-referenced project. Based on our review of the materials you provided, we have determined that it does not require IRB review because it does not meet the definition(s) of “research” involving “human subjects” or the definition of “clinical investigation” as set forth in Emory policies and procedures and federal rules, if applicable. Specifically, in this project, you will be conducting a secondary data analysis of de identified data sets. This determination could be affected by substantive changes in the study design, subject populations, or identifiability of data. If the project changes in any substantive way, please contact our office for clarification.

Thank you for consulting the IRB.

Sincerely,

Andrea Goosen, MPH, CIP
Research Protocol Analyst
This letter has been digitally signed