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Immigration, health status, and healthcare utilization among the Chinese

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Abstract

Objective—To examine health status and healthcare utilization for Chinese adults by immigrant status.

Method—Data from the 2001 Taiwan National Health Interview Survey (NHIS) and the 1998–2004 U.S. NHIS are used to examine whether there is a 'healthy immigrant effect' among the Chinese by immigrant status. Logistic regression was conducted to assess immigration status on health status, health insurance coverage, and healthcare utilization controlling for relevant covariates.

Results—For Chinese immigrants, the duration of time living in the U.S. was associated with better health status and fewer emergency room visits. Compared with recent immigrants, Chinese living in Taiwan were more likely to report poor health and having smoked.

Conclusions—We found Higher levels of poor health status for Chinese living in Taiwan compared to Chinese immigrants, suggests that those who migrate are healthier than those who do not migrate. Interestingly, Chinese immigrants were not significantly healthier than U.S.-born Chinese.

Keywords

Immigrant health; healthy immigrant effects; Asian; Chinese

BACKGROUND

Research has documented that immigrants in the U.S. are healthier than their U.S.-born counterparts, but that this health advantage diminishes over time. This phenomenon is called the 'healthy immigrant effect' [1]. A similar pattern is seen among recent immigrants who are less likely to use healthcare than longer-term immigrants or U.S. born adults [2]. Hypotheses have been put forth about why immigrants are healthier than host populations, the most common being selective migration (i.e. healthy individuals are more likely to migrate), underreporting of immigrants in surveys, and the poor health habits of the US

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population. However, most studies only examine foreign-born and U.S.-born populations both residing in the U.S., which leaves our understanding incomplete. Specifically, we know little about the health status and healthcare utilization among comparable non-immigrants who remain in the countries of origin.

As the U.S. immigrant population continues to grow, the health of immigrants has great potential to impact the overall health status of the U.S. population, as well as impact the US healthcare system. As of 2007, 37.9 million foreign-born persons resided in the U.S. and immigrants accounted for 12.5% of the U.S. population [3]. The Asian population increased faster than the total population between 1990 and 2000. According to the US Census, the range for increase in Asian population was 48 percent for Asian along to 72 percent for Asian alone or in combination population from 1990 to 2000, comparing to the total population increases by 13 percent, from 248.7 million in 1990 to 281.4 million in 2000 [4]. The Chinese are the largest Asian group in the U.S; and 2.7 million people reported Chinese based on 2000 Census. To ensure the health and well-being of all people, it is important to understand the health status and healthcare needs unique to each immigrant group. Given the relative size and rate of population growth of the Chinese in the U.S., it is critical to have a complete understanding of the relationship between immigration, health, and healthcare utilization among the Chinese.

The current state of knowledge on the effects of immigration on Chinese health status in the U.S. is limited [5,6,7,8,9]. Most studies on the ‘healthy immigrant effect’ emphasize Hispanic populations so that the application of the ‘healthy immigrant effect’ to mortality outcomes among Hispanics has been termed the ‘Hispanic Paradox’ [10,11]. Although Chinese immigrants are the second largest immigrant group in the U.S., health status among Asian subgroups has not drawn the same attention [12].

Studies of immigrant health typically compare foreign-born and U.S.-born using a single U.S. data source without comparable information from the non-migrating counterparts that remain in the country of origin. To address this gap, we used 1998–2004 national health population survey data from Taiwan and compare this to similar data in the U.S. with the NHIS, to describe health status and healthcare utilization among Chinese adults by immigrant status.

METHODS

Data Source and Sample

We used cross-sectional survey data for Chinese adults ages 18 and older to describe health status and healthcare utilization among the Chinese by immigrant status and to examine whether the “healthy immigrant effect” exists among the Chinese. Data for Chinese adults residing in Taiwan were retrieved from the 2001 Taiwan National Health Interview Survey (Taiwan-NHIS). Pooled data for Chinese immigrants and U.S.-born Chinese between 1998 and 2004 were retrieved from the Integrated Health Interview Series (IHIS), a cross-sectional time series of harmonized United States National Health Interview Survey (U.S.-NHIS) data (Johnson et al., in press). Both Taiwan-NHIS and US-NHIS are face-to-face interview survey and use a stratified multistage sampling design with the probability of

selection proportional to population size. For the Taiwan-NHIS, a nationally representative sample of 6,592 households (26,658 persons) was interviewed from Taiwan in 2001. For US-NIHS, Each year, 100,000 people in 40,000 households, on average, are interviewed. Of these, approximately 600 Chinese are included.

The sample for our study was Chinese adults ages 18 and over residing in the U.S. between 1998 and 2004 or in Taiwan in 2001. We excluded respondents, with missing covariate information from the U.S. sample (n = 79; 5.1%) and the Taiwan sample (n = 580; 3.6%). The final unweighted sample size of Chinese adults in the U.S. was 1,217 persons and in Taiwan was 15,549 persons.

Measures

We chose outcome variables available on both surveys and included self-reported health status, ever smoked, and past year emergency room visits (ER visits). Self-reported health status was consistently measured on a five-point scale which we dichotomized into “fair/poor” (fair, or poor) and “good/excellent”(excellent, very good, good). In terms of smoking, We categorized the smoking variable into 2 groups as “yes” (ever smoked at least 100 cigarettes in entire life) and “no”. We used emergency room visits to examine healthcare utilization. The number of emergency room visits was defined as “0” for no visits and “greater than 1 time.” The comparison of US-NHIS and Taiwan-NHIS descriptive data for the outcome variables and other covariates is shown in Appendix A.

Immigrant status was defined based on respondents’ number of years residing in the U.S. and U.S. born or not. We recoded immigrant status into five categories: (1) Chinese immigrants in the U.S. less than 5 years, (2) Chinese immigrants in the U.S. 5 years to less than 15 years, (3) Chinese immigrants in the U.S. 15 years more, (4) US-born Chinese (non-immigrants), and (5) Chinese living in Taiwan (non-immigrants).

Additional covariates associated with health status were defined as follows. Age was categorized into four groups: 18–34 years, 35–49 years, 50–64 years, and 65 years and over. Educational attainment was classified as a college degree or not. Marital status was defined as married or not. Insurance status was grouped as insured or not for the U.S. sample.

Analytic methods

Cross tabulations were used to test for differences in background characteristics, health status, and utilization among the Chinese by immigrant status. We used logistic regression adjusted for age, marital status, education, and insurance status to examine the healthy immigrant effect. We produced three models for each outcome. The first shows the effects of duration of residence in the U.S. for immigrants only. The second includes U.S.-born Chinese, which is a standard modeling approach used to compare U.S.-born and foreign-born in the U.S. The third includes Chinese living in Taiwan, which allows for additional comparisons of the non-immigrant population in the country of origin.

All analyses were conducted using Stata statistical software (SE version 9.2), which produces unbiased estimates from data collected through complex sampling designs [13,14]. Variance estimates were produced using Taylor series linearization.

RESULT

Sample characteristics

Table 1 presents characteristics of the study population by immigrant status. Among the Chinese immigrants, nearly half had been in the U.S. over 15 years (43.8%) and over one third have been in the U.S. between 5 to14 years. U.S.-born Chinese were younger between 18–34 years old (52.4%), male (55.1%), college educated (66.2%), not married (63.6%), and insured (94.9%). Chinese immigrants and Chinese living in Taiwan were mostly women (52.5% and 50.7%, respectively) and nearly two thirds of each group were married (63.2% and 64.4%, respectively).

Differences in unadjusted health and healthcare were apparent across Chinese immigrants and Chinese non-immigrants; 5.2% of the U.S.-born Chinese report fair/poor health compared to 7.2% of Chinese immigrants living in the US, and 39.5% of Chinese living in Taiwan. Chinese immigrants were less likely to report ever smoking (18.9%) compared to U.S. born Chinese (25.0%) and Chinese living in Taiwan (27.4%). There were no significant differences in having at least one ER visit in the past year across the three groups.

Self-reported health status

Table 2 shows the results of logistic regression models estimating the odds of reporting fair/poor health status among the Chinese. Model 1 indicates that compared with Chinese immigrants living in the U.S. for less than 5 years, those who had been in the U.S. between 5 and 14 years and greater than 15 years were significantly less likely to report fair/poor health status (OR=0.42; 95% CI = 0.2–1.0 and OR = 0.36; 95% CI = 0.2–0.8, respectively) after adjusting for age, sex, marital status, education, and insurance status. For U.S.-born Chinese (Model 2), there were no significant differences in reporting fair/poor health compared to new Chinese immigrants. However, Chinese living in Taiwan were significantly more likely to report fair/poor health status than Chinese immigrants who had been in the U.S. less than 5 years (OR = 7.1; 95% CI = 3.7–13.5).

Ever Smoked

Table 3 shows the results of logistic regression models estimating the odds of reporting having ever smoked among the Chinese by immigrant status. Models 4 and 5 indicate that after adjusting for age, sex, marital status, education, and insurance status, there were no significant differences in smoking behavior among immigrants by number of years in the U.S. or among U.S.-born Chinese compared to Chinese immigrants who had been in the U.S. less than 5 years. Conversely, Model 6 shows that Chinese living in Taiwan had 1.6 times higher odds of reporting ever smoked compared with Chinese immigrants who had been in the U.S. less than 5 years (95% CI = 1.1–2.5).

ER Visit

Table 4 shows the results of logistic regression models estimating the odds of reporting a past year ER visit among the Chinese by immigrant status. Chinese immigrants who had been in the U.S. greater than 15 years (Model 7) were significantly less likely to report past year ER visits than Chinese immigrants who had been in the U.S. less than 5 years (OR =

0.5; 95% CI = 0.3–0.9). Model 8 indicates that U.S.-born Chinese were significantly less likely to report past year ER visits than Chinese immigrants who had been in the U.S. less than 5 years (OR = 0.5; 95% CI = 0.3–0.9). Model 9 shows that there were no significant differences in past year ER use among Chinese living in Taiwan compared with Chinese immigrants who had been in the U.S. less than 5 years.

DISCUSSION

Our study describes selected health status and healthcare utilization differentials among the Chinese by immigrant status. By using a population-based national health survey from two countries to analyze Chinese health status and healthcare utilization by immigrant status from 1998 to 2004, our study provides several important findings.

First, our results suggest that U.S.-born Chinese, Chinese immigrants living in the US, and Chinese living in Taiwan were different in terms of demographic characteristics and indicators of health status. Not surprisingly, Chinese adults living in Taiwan were more similar to Chinese immigrants than to U.S.-born Chinese in terms of basic demographics (e.g. age, sex, marital status), but they were significantly different with respect to educational attainment suggesting that Chinese immigrants were more educated than their non-migrating counterparts in Taiwan. Moreover, Chinese in Taiwan had higher odds of self-reported fair/poor health and having ever smoked compared with Chinese immigrants or U.S. born Chinese, lending partial support to the “healthy migrant effect” hypothesis in-so-much as Chinese immigrants were healthier than the non-migrating Chinese living in Taiwan.

Second, our findings are not generally consistent with the conventional wisdom drawn from previous studies of immigrant health that suggest that immigrants are healthier than their U.S. born counterparts and that health status deteriorates as time living in the US increases. This may be due in part to the fact that many studies of immigrant health focus on immigrants as whole [15,16] or emphasize Hispanics [17,18,19,20]. In studies of Asian subgroups, the endency is to compare across subgroups [21,9], which results in different conclusions to seemingly similar but substantively different questions.

For example, Frisbie et al. (2001) [5] examined 1992–1995 NHIS data for Asian Pacific Island (API) subgroups and concluded that foreign-born API were healthier than their US-born counterparts, but the health advantage decreased with increasing duration of U.S. residence. However, these analyses used Japanese as the referent group in multivariate models, so the effect of immigration on the health of the Chinese is not clear. And, while being Asian and being foreign-born is typically associated with better health status, these same characteristics were found to be negatively associated with healthcare access and utilization among some API subgroups of children in the U.S. based on NHIS data from 1997–2000 [9]. However, all API subgroups were compared with non-Hispanic Whites. In contrast, our study focused solely on the Chinese, with all comparisons being between Chinese subgroups defined by immigration status.

In terms of ER visits, our results suggest that Chinese immigrants were more likely to have used the ER in the past year than non-immigrants. This finding is also not consistent with previous U.S. studies showing that non-citizens have significantly reduced access to the ER compared with citizens [22]. We also found that length of residence in the U.S. is associated with ER visits, such that longer-term immigrants (>15 years) are less likely to have ER visits than recent immigrants (< 5 years). One possible reason is that recent Chinese immigrants may not be familiar with the U.S. health care system. Therefore, they continue their health behavior from their own countries. For example, people in Taiwan do not typically see family doctors for their primary care. In addition, under Taiwan national health insurance, patients are allowed to visit either primary care physicians or other specialists for care without limitations [23]. The Department of Health in Taiwan has encouraged people to see family doctors before visiting specialist since 2003; however, patients still choose their own specialists without referral [24]. Therefore, patients with non-urgent medical problems would go to ER for the care. Huang et al. (2003) [25]examined patients with frequent emergency room visits in Taiwan and found that patients with non-urgent medical problems go to the ER often. As is common in their home country, Chinese immigrants may go to the ER directly instead of seeking out a primary care physician in order to get health care. Another reason Chinese immigrants may have more ER visit is due to access barriers to primary care, since U.S. federal policy allows non-citizen immigrants to receive emergency medical services [23]. These and other inconsistencies between our results and previous studies may also be due in part to the possibility that the healthy immigrant effect differs by race/ethnicity groups.

Finally, previous studies focus on comparing health status or healthcare utilization among foreign-born and native-born by using data from one country. No studies have examined health status and healthcare utilization among Chinese immigrants, U.S.-born Chinese, and their non-migrating counterparts in the country of origin by using cross-national datasets. Including data from the country of origin may help researchers and policymakers better elucidate the context of health and healthcare among immigrants.

Our preliminary results need to be considered in light of several limitations. First, the unavailability of the NHIS survey instrument in Mandarin languages may be a limitation. Chinese immigrants who do not speak English are likely underrepresented in the NHIS sample because the NHIS is only administered in English or Spanish. Tang et al. (2005) [26] found that among Asians surveyed in the California Health Interview Survey, 59% of Chinese had low levels of English proficiency and self-reports of smoking differed greatly by gender and English proficiency. Yu et al. (2002) [27] found that 57% of Chinese men interviewed with a Chinese language questionnaire had low English proficiency and that smoking was disproportionately represented among them. Since previous studies suggest that limited English proficiency is associated with higher levels of smoking and decreased access to appropriate healthcare, the systematic exclusion of non-English speaking Chinese from the NHIS sample may have resulted in the underestimation of our adverse outcomes of interest in the U.S. sample.

Second, the Taiwan NHIS may not adequately represent the non-migrating Chinese population. Moreover, the single grouping “Chinese” in the U.S. sample is made up of

Chinese immigrants from China, Taiwan, Hong Kong and other areas; and these groups may not be the same on important characteristics. One study of Chinese Americans and tobacco use reported that 81% of the foreign born were from mainland China, while 7% were from Taiwan, 6% from Hong Kong, and 6% from other countries [28]. The U.S. NHIS data do not allow us to distinguish country of origin. Third, for this preliminary study we excluded those with missing covariate data, which may introduce some bias into our results. The overall number excluded from the Taiwan sample was small relative to the sample size (3.6%), while the proportion excluded from the Chinese immigrant sample was 6.4 percent and the U.S.-born Chinese sample was 2.4 percent. The larger proportional losses for the Chinese immigrant sample may be problematic. Methods for missing data imputation will be explored for use in future studies.

CONCLUSION

The healthy immigrant effect among the Chinese may be due in part to selective migration. Specifically, there are higher levels of adverse health among the non-immigrant adult population in Taiwan than among Chinese immigrants, suggesting that those that migrate are indeed healthier than those that do not migrate. As the immigrant population continues to grow, the health of immigrants has great potential to impact the overall health status of the American population, as well as impact the U.S. healthcare system. Using similar health survey data available in different countries can play an important role in understanding the health status and healthcare needs of immigrants in order to appropriately address and improve the health status and healthcare utilization practices of immigrants once they arrive in the U.S.

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Table 1

Characteristics of Chinese by Immigration Status (United States, 1998–2004; Taiwan, 2001)

		US-born Chinese		Chinese Immigrant		Chinese living in Taiwan		
		n=253		n=964		n=15,549		
		Rate %	Obs	Rate %	Obs	Rate %	Obs	P value
Demographic								
	Immigrant Status							< 0.001
	Immigrant in US < 5 years			20.7	205			
	Immigrant in US 5–14 years			35.5	332			
	Immigrant in US > 15 years			43.8	427			
	US-born Chinese	100.0	253					
	Chinese living in Taiwan					100.0	15,549	
	Age							< 0.001
	18–34 years old	52.4	128	35.5	328	37.3	5,806	
	35–49 years old	26.6	68	36.4	358	32.7	5,090	
	50–64 years old	12.3	33	16.5	162	18.4	2,858	
	65+ years old	8.8	24	11.6	116	11.5	1,795	
	Gender							0.06
	Female	44.9	116	52.5	519	50.7	7,881	
	Male	55.1	137	47.5	445	49.3	7,667	
	Education							< 0.001
	Not College	33.8	89	44.0	428	73.1	11,374	
	College	66.2	164	56.0	536	26.9	4,175	
	Marital Status							< 0.001
	Not Married	63.6	157	36.8	350	35.6	5,532	
	Married	36.4	96	63.2	614	64.4	10,017	
	Insurance Status							< 0.001
	No	5.1	13	14.8	143			
	Yes	94.9	240	85.2	821	100.0	15,549	
Health								

	US-born Chinese		Chinese Immigrant		Chinese living in Taiwan		
	n=253		n=964		n=15,549		
	Rate %	Obs	Rate %	Obs	Rate %	Obs	P value
Health Status							< 0.001
Excellent/Good Health	94.8	241	92.8	896	60.5	9,401	
Fair/Poor Health	5.2	12	7.2	68	39.5	6,148	
Ever Smoking							< 0.001
No	75.0	191	81.1	779	72.6	11,285	
Yes	25.0	62	18.9	185	27.4	4,264	
Utilization							
ER visit							0.47
0 time	92.0	229	89.8	867	89.9	13,972	
>1 time	8.0	24	10.2	97	10.1	1,577	

Table 2

Odds of Reporting Fair/Poor Health Status among Chinese by Immigration Status (United States, 1998–2004; Taiwan, 2001)

	Model 1	Model 2	Model 3
	Chinese Immigrant in US	All Chinese in US	All Chinese
	OR (95 CI)	OR (95 CI)	OR (95 CI)
Immigrant Status			
Immigrant in US < 5 years	1.00	1.00	1.00
Immigrant in US 5–14 Years	0.42 (0.18 – 0.97) *	0.49 (0.21 – 1.13)	0.71 (0.33 – 1.53)
Immigrant in US >15 Years	0.36 (0.17 – 0.78) **	0.43 (0.19 – 0.94) *	0.8 (0.40 – 1.61)
US-born Chinese		0.46 (0.16 – 1.38)	0.69 (0.26 – 1.80)
Chinese living in Taiwan			7.07 (3.70 – 13.53) ***
Age			
18–34 Years old	1.00	1.00	1.00
35–49 years old	7.17 (2.18 – 23.66) **	4.62 (1.63 – 13.08) **	1.41 (1.28 – 1.55) ***
60–64 years old	18.28 (4.56 – 73.36) ***	13.17 (4.82 – 35.95) ***	2.81 (2.50 – 3.16) ***
65+ years old	59.08 (17.25 – 202.34) ***	31.98 (12.73 – 80.32) ***	4.96 (4.35 – 5.66) ***
Gender			
Female	1.00	1.00	1.00
male	0.87 (0.49 – 1.55)	1.07 (0.62 – 1.85)	0.70 (0.65 – 0.75) ***
Education			
Not College	1.00	1.00	1.00
College	0.46 (0.20 – 1.05)	0.36 (0.17 – 0.75)	0.63 (0.57 – 0.69) ***
Marital Status			
Not Married	1.00	1.00	1.00
Married	0.74 (0.39 – 1.40)	0.64 (0.37 – 1.09)	0.89 (0.81 – 0.98) *
Insurance Status			
Non-Insured	1.00	1.00	1.00
Insured	1.08 (0.42 – 2.77)	0.86 (0.36 – 2.05)	0.89 (0.40 – 1.98)

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	Model 1	Model 2	Model 3
	Chinese Immigrant in US	All Chinese in US	All Chinese
	OR (95 CI)	OR (95 CI)	OR (95 CI)
Observations	964	1217	16765

95% confidence intervals in parentheses

* significant at < 0.05;

*** significant at < 0.01

Table 3

Odds of Reporting Ever Smoking among Chinese by Immigration Status (United States, 1998–2004; Taiwan, 2001)

	Model 4	Model 5	Model 6
	Chinese Immigrant	All Chinese in US	All Chinese
	OR CI (95)	OR CI (95)	OR CI (95)
Immigrant Status			
Immigrant in US < 5 years	1.00	1.00	1.00
Immigrant in US 5–14 Years	1.24 (0.73 – 2.09)	1.23 (0.74 – 2.03)	1.22 (0.71 – 2.12)
Immigrant in US >15 Years	1.13 (0.69 – 1.84)	1.08 (0.68 – 1.72)	1.24 (0.75 – 2.03)
US-born Chinese		1.63 (0.99 – 2.67)	1.67 (0.97 – 2.87)
Chinese living in Taiwan			1.61 (1.05 – 2.47) *
Age			
18–34 Years old	1.00	1.00	1.00
35–49 years old	1.07 (0.64 – 1.81)	1.42 (0.92 – 2.18)	1.30 (1.14 – 1.49) ***
60–64 years old	1.48 (0.76 – 2.86)	1.77 (1.02 – 3.06) *	1.04 (0.88 – 1.22)
65+ years old	1.66 (0.81 – 3.42)	2.28 (1.28 – 4.05) **	1.11 (0.93 – 1.32)
Gender			
Female	1.00	1.00	1.00
male	7.86 (5.06 – 12.19) ***	5.92 (4.18 – 8.39) ***	19.25 (16.89 – 21.94) ***
Education			
Not College	1.00	1.00	1.00
College	0.58 (0.39 – 0.86) **	0.66 (0.49 – 0.90) **	0.37 (0.34 – 0.42) ***
Marital Status			
Not Married	1.00	1.00	1.00
Married	0.95 (0.62 – 1.47)	0.87 (0.60 – 1.27)	0.94 (0.83 – 1.06)
Insurance Status			
Non-Insured	1.00	1.00	1.00
Insured	0.9 (0.53 – 1.53)	0.78 (0.47 – 1.32)	1.03 (0.58 – 1.85)
Observations	964	1217	16765

95% confidence intervals in parentheses

** significant at < 0.05;

*** significant at < 0.01

Table 4

Odds of ER Visit among Chinese by Immigration Status (United States, 1998–2004; Taiwan, 2001)

	Model 7	Model 8	Model 9
	Chinese Immigrant	All Chinese in US	All Chinese
	OR CI (95)	OR CI (95)	OR CI (95)
Immigrant Status			
Immigrant in US < 5 years	1.00	1.00	1.00
Immigrant in US 5–14 Years	0.69 (0.37 – 1.29)	0.71 (0.38 – 1.30)	0.76 (0.42 – 1.37)
Immigrant in US >15 Years	0.51 (0.29 – 0.91) *	0.52 (0.30 – 0.93) *	0.65 (0.37 – 1.14)
US-born Chinese		0.49 (0.26 – 0.93) *	0.53 (0.28 – 0.99) *
Chinese living in Taiwan			0.65 (0.40 – 1.03)
Age			
18–34 Years old	1.00	1.00	1.00
35–49 years old	1.43 (0.79 – 2.59)	1.24 (0.75 – 2.06)	0.92 (0.79 – 1.08)
60–64 years old	2.54 (1.31 – 4.93) **	2.42 (1.44 – 4.07) ***	1.24 (1.05 – 1.47) **
65+ years old	3.16 (1.75 – 5.70) ***	2.81 (1.80 – 4.37) ***	1.75 (1.49 – 2.04) ***
Gender			
Female	1.00	1.00	1.00
male	0.83 (0.53 – 1.31)	0.82 (0.54 – 1.25)	0.99 (0.88 – 1.11)
Education			
Not College	1.00	1.00	1.00
College	1.02 (0.64 – 1.62)	0.95 (0.60 – 1.50)	0.91 (0.78 – 1.06)
Marital Status			
Not Married	1.00	1.00	1.00
Married	0.73 (0.48 – 1.12)	0.73 (0.51 – 1.05)	0.83 (0.73 – 0.94) **
Insurance Status			
Non-Insured	1.00	1.00	1.00
Insured	2.75 (1.08 – 6.99)	3.04 (1.21 – 7.65) *	3.08 (1.28 – 7.39) *
Observations	964	1217	16765

95% confidence intervals in parentheses

* significant at $p < 0.05$;

** significant at $p < 0.01$;

*** significant at $p < 0.001$