

Article

Health Insurance Coverage before and after the Affordable Care Act in the USA [†]

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Abstract: The Affordable Care Act (ACA) is at the crossroads. It is important to evaluate the effectiveness of the ACA in order to make rational decisions about the ongoing healthcare reform, but existing research into its effect on health insurance status in the United States is insufficient and descriptive. Using data from the National Health Interview Surveys from 2009 to 2015, this study examines changes in health insurance status and its determinants before the ACA in 2009, during its partial implementation in 2010–2013, and after its full implementation in 2014 and 2015. The results of trend analysis indicate a significant increase in national health insurance rate from 82.2% in 2009 to 89.4% in 2015. Logistic regression analyses confirm the similar impact of age, gender, race, marital status, nativity, citizenship, education, and poverty on health insurance status before and after the ACA. Despite similar effects across years, controlling for other variables, youth aged 26 or below, the foreign-born, Asians, and other races had a greater probability of gaining health insurance after the ACA than before the ACA; however, the odds of obtaining health insurance for Hispanics and the impoverished rose slightly during the partial implementation of the ACA, but somewhat declined after the full implementation of the ACA starting in 2014. These findings should be taken into account by the U.S. Government in deciding the fate of the ACA.

Keywords: health insurance coverage; determinants; the Affordable Care Act; Obamacare; partial implementation; full implementation



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1. Introduction

The life of the Affordable Care Act (ACA), officially called the Patient Protection Affordable Care Act (PPACA) and popularly known as Obamacare [1], is in jeopardy, with Donald Trump's promises made during the presidential campaign to repeal it. However, after his meeting with President Obama on 10 November 2016, President-elect Trump indicated that he may consider keeping parts of the ACA, specifically the provisions on the coverage of preexisting conditions and the allowance of parents to keep their children on their insurance plan until the age of 26 [2]. With these new developments, research on the effectiveness of the ACA has become extremely important and critical, so that the new administration can make rational decisions regarding the ACA and the health insurance of the nation.

The impact of the ACA has been a subject of debates before and after the ACA was signed into law by President Obama on 23 March 2010. Both the proponents and opponents of the ACA hope to use this issue to defend or attack the ACA. Although some provisions went into effect immediately after the act's enactment, the ACA did not go into full effect until 1 January 2014. Reliable data are important for an objective assessment of the effect of the ACA on the health insurance status of the U.S. population. Some statistics about health insurance rates after 2014 began to be released [3], but the data are descriptive in

nature without controlling for other variables. In particular, we do not know how the determinants of health insurance have changed after the implementation of the ACA.

The purpose of this study is to examine changes in U.S. health insurance status and its determinants before the passage of the ACA and after its partial and full implementation. Health insurance for this study includes employer-sponsored health insurance, Medicare, Medicaid, private insurance, military health insurance, state-sponsored health plan, or other government programs. Specifically, this study seeks to answer two research questions. First, how has the health insurance coverage rate changed after the partial and full implementation of the ACA? Second, how have the determinants of health insurance coverage changed after the partial and full implementation of the ACA? The remainder of this paper reviews the existing literature; proposes hypotheses to be tested; describes the data, variables, and methods of analysis; presents the results of data analysis; and discusses the implications of the findings.

2. Literature Review

There is a large body of relevant literature on health insurance and its determinants prior to the passage and especially full implementation of the ACA. In addition, there is some research on the effect of partial implementation of the ACA, particularly with regard to how it has impacted young adults aged 19–26 and racial and ethnic minorities. Our brief review of the literature in subsections below focuses on research that is pertinent to our research questions.

2.1. Effect of the ACA on Health Insurance Rate

Research by Schoen et al. [4] found that health insurance coverage rate nationwide was actually in decline prior to the passage of the ACA with 72% of the population aged 19–64 having health insurance coverage in 2007, a decline from the previous survey year of 2003. In addition, 20% of the respondents who had insurance were actually underinsured [4]. Meanwhile, health insurance coverage was also becoming increasingly expensive. French et al.'s review of the literature indicated that the ACA did significantly lower the number of uninsured Americans [5]. Blumberg and Holahan [6] estimated that around 20.4 million more non-elderly people gained coverage by 2016 as a result of the ACA while around 28.2 million remained uninsured currently. According to Buchmueller et al. [7], the rate of uninsured adults declined slightly in 2010 to 2013, pointing to the possible success of the ACA in providing health insurance coverage.

2.2. Impact of Age

Young adults were among those who made some of the largest gains with insurance coverage [6,8–11], because the ACA's provision of the so-called "new-19"—the age group under the ACA that can receive insurance coverage provided by parents until the age of 26—took effect immediately after the ACA was signed into law. Several studies all showed a significant increase in health insurance coverage for individuals aged 19–26 [12–14]. O'Hara and Brault found that around 1 to 3 million young adults who were uninsured received health insurance, indicating that the immediate partial impact of the ACA was significant at least for the young adult category, and that the reform did in fact work as it was intended to get these individuals covered on their parents' plans for longer [15].

2.3. Impact of Race and Ethnicity

Existing studies have documented that racial and ethnic minorities are less likely to have health insurance coverage than whites [16,17]. In particular, blacks were twice as likely, and Hispanics were three times as likely, as whites to be uninsured [18]. Blumberg and Holahan found that non-Hispanic whites had the largest gains for coverage compared to other racial and ethnic groups and that Hispanics were the least likely to gain insurance coverage from the ACA [6]. According to research by Chen, Bustamante and Tom [19], Latinos were the least likely to have employer-based health insurance coverage due to

income and immigration status and were also less likely to benefit from expansions provided by the ACA. McMorroo et al. showed that between 2013 and 2014 the uninsured rate for blacks and Hispanics declined overall by 8% compared to 4% for white adults [20]. Furthermore, Buchmueller et al. reported that after the ACA the percentage of individuals without health insurance coverage dropped significantly for all racial groups but more for minority groups, with a 7.1% decrease for Hispanics, 5.1% decrease for blacks, and only 3% decrease for whites [7].

2.4. *Impact of Nativity*

Nativity is another variable that affects health insurance coverage greatly because immigrants are less likely to be insured than the U.S.-born [21]. Fried et al. found that immigration status had great impact on health insurance under the ACA, since immigrants potentially account for over 15% of uninsured non-elderly adults [22]. Research has shown that the foreign-born, especially recent immigrants, are on average healthier than the U.S.-born [23]. These advantages diminish over time as they become more susceptible to illness than the native-born, and this susceptibility can be further exacerbated by poverty status [23]. Despite their overall health advantage, immigrants still have a harder time obtaining insurance as Pandey and Kagotha [4] found that two-thirds of immigrants who had strong labor force participation still remained uninsured. Overall, immigrants are generally less likely to be insured at any point than the native-born [24,25]. If immigrants do not have health insurance coverage to regularly see a doctor, the only other alternative is the emergency room (ER), which leads to increasing costs to the point where some hospitals have to close their ERs because the costs are too high [21]. In addition, Mohanty et al. [26] noted that while health care expenses were low for immigrant children, their expenses for ER visits were higher than those for U.S.-born children. These are some of the gaps that the ACA was created to specifically address.

2.5. *Impact of Poverty and Medicaid Expansion*

Poverty is another factor that affects Medicaid and therefore the eligibility for health insurance coverage [27]. Medicaid “plays a particularly important role for Hispanic, Black, and American Indian/Alaska Native children, covering more than half of all children in these groups” [16]. Additionally, a more recent decision by the Supreme Court left Medicaid at the discretion of the states, and some states refused to take the Medicaid expansion, thereby leaving the aforementioned minority groups with decreased opportunities to acquire health insurance coverage. By 2017, 31 states had expanded Medicaid [28]. By increasing Medicaid eligibility to individuals who are below 138% of the national poverty line, the ACA expanded health insurance coverage to Americans [17]. Because the Medicaid expansion was not accepted by all states, some people that needed the expansion the most were not fortunate enough to reside in states that took the expansion. A great number of these people are those who are below the poverty line and belong to racial or ethnic minority groups. Additionally, the states that are opting not to expand Medicaid have the highest number of the uninsured and the highest poverty rates in the United States [29]. Blumberg and Holahan [6] found that about 43.9% of the 20.4 million people who obtained insurance through the ACA did so by enrolling in Medicaid.

There is growing literature on the impact of what may happen if the ACA was repealed or if funding to Medicaid was cut. For example, a study by Seiber and Berman found that a majority of individuals who were primarily older low-income whites with a high school education or less in Ohio were on Medicaid and had no other alternatives to health care [30]. Their findings also revealed that only a small portion of that group would qualify for employer-based health insurance coverage if the ACA were repealed, and that ultimately the majority of people who qualified for Medicaid through the ACA would have no viable alternatives if it were repealed [30].

2.6. Gaps in the Literature

Thus far, the current literature has not adequately looked into the impact of the ACA after partial and full implementation. In particular, the available information is generally descriptive. There is little research on the determinants of health insurance after the partial and full implementation of the ACA, using multivariate techniques. No study has attempted a longitudinal analysis of changes in the status and determinants of health insurance before and after the ACA using the latest data from National Health Interview Surveys (NHIS) 2009–2015 across the seven-year span. The current study is the first to systematically assess the status and determinants of health insurance coverage before and after the partial and full implementation of the ACA with the latest data from the NHIS.

3. Hypotheses

We expect that the national average health insurance coverage rate would be higher in 2014 and 2015 than in 2009 and that it would gradually increase between 2010 and 2013 because of several reasons. First, the ACA mandated large employers to provide health insurance for their employees and to provide tax credits for small companies that offer health insurance for their workers. Second, the ACA mandated individuals to maintain minimum essential health insurance coverage with a tax penalty for violation. Third, health insurance exchanges (marketplaces) created by the ACA allowed low-to-middle income Americans (i.e., those who make less than 400% of the Federal poverty level) to obtain free or low-cost health insurance through comparison of rates and government subsidies. Fourth, insurance companies are prohibited from dropping clients because of pre-existing conditions. Finally, young adults can stay on parents' insurance plans until the age of 26 instead of 19. All of these helped increase the health insurance rate of Americans.

With regard to the determinants of health insurance, we expect that such determinants as age, gender, race, ethnicity, marital status, nativity, citizenship, education, family income, poverty, and region will remain significant before and after the implementation of the ACA because these factors have been documented as significant predictors of health insurance in the literature. The relationships between these predictors and having health insurance should remain the same between 2009 and 2015. Specifically, all else being equal, youngsters aged 26 or below are less likely to have health insurance than their older counterparts, aged 27 or older, because people who are younger typically have fewer health problems or needs and have fewer resources than their older counterparts. *Ceteris paribus*, men are more likely to have health insurance coverage than women because men have a greater likelihood of full-time employment in positions that offer health insurance benefits [31]. Racial minorities are less likely to have health insurance than whites because their disadvantaged status could limit their resources for obtaining health insurance coverage [16,17]. Hispanics are less likely to have health insurance coverage than non-Hispanics. Similar to racial minorities, many in the Hispanic community lack sufficient resources to acquire health insurance coverage and therefore have a lower rate of health insurance [17,18,32]. Respondents who are currently married are more likely to have health insurance than those who are not currently married because of possible combined incomes and the need to provide health care coverage for the family [33]. The foreign-born are less likely to have health insurance than the U.S.-born, partly because of a lack of resources and partly because of norms of health insurance in the home countries [22,24,25]. Non-U.S. citizens are less likely to have health insurance than U.S. citizens due to their lower degree of assimilation to U.S. culture and society [22]. People with more education are more likely to have health insurance than those with less education since education increases knowledge of the need for health insurance and resources [17]. Respondents with a higher level of family income are more likely to have health insurance coverage than those with a lower level of family income because people with more disposable income will have more resources to secure health insurance coverage than those with a lower income [34]. Individuals living below the poverty line are less likely to have health insurance than those above the poverty line because poverty decreases resources to obtain health insurance [27].

People in the Northeast, Midwest, and West are more likely to have health insurance than those in the South [6]. An important reason is that many states located within the South refused to accept the Medicaid expansions though many of their residents actually needed health insurance coverage the most.

However, we hypothesize that people living under poverty, racial minority groups, Hispanics, and the foreign-born should be more likely to see increased odds of having health insurance than their respective counterpart after the full implementation of the ACA than before the ACA's full implementation since the ACA was designed to help out people in more disadvantaged positions. It is expected that individuals aged 26 or below should see an increased probability of having health insurance after 23 March 2010 when the ACA was first signed into the law because the new-19 provision immediately took effect and extended all parents' health insurance coverage to their children until the age of 26. The effects of other predictors on health insurance are anticipated to be similar before and after the implementation of the ACA.

4. Data and Methods

4.1. Data and Samples

The data for this study come from the National Health Interview Survey (NHIS). Initiated in 1957, the NHIS has been conducted by the National Center for Health Statistics (NCHS) annually since 1960. The U.S. Census Bureau is the data collection agent for the NCHS. The NHIS is a nationally representative sample that provides a wealth of information on the health of the U.S. population including health, illness, health insurance, healthcare, and many other demographic and socioeconomic variables.

In order to answer our research questions, we used data from the 2009–2015 Integrated Public Use Microdata Series-National Health Interview Surveys (IPUMS-NHIS) integrated by the Minnesota Population Center at the University of Minnesota [35]. We selected seven sample years, including NHIS 2009, which was right before the enactment of the ACA; NHIS 2010–2013, which saw partial implementation of the ACA; NHIS 2014, which was immediately after the full implementation of the ACA; and finally, NHIS 2015, which was the latest data available after the full implementation of the ACA. The data for these seven sample years will allow us to compare health insurance rates and determinants of health insurance before the ACA, during the partial implementation of the ACA, and after the full implementation of the ACA. We restricted the analysis to adult respondents aged 18 or older who provided a valid answer to the question on health insurance because of two considerations. First, children did not make decisions about whether to have health insurance; parents did for them. Second, such variables as marital status and income are not pertinent to minors for bivariate and logistic regression analyses. After the restrictions, the sample sizes remained substantial with 64,047 cases in 2009, 65,332 cases in 2010, 74,337 cases in 2011, 79,339 cases in 2012, 77,066 cases in 2013, 82,986 cases in 2014, and 77,182 cases in 2015. The data were weighted so that the findings can be generalized to the population.

The NHIS provides the best data for addressing the research questions for several reasons. First, the NHIS is representative of the U.S. population when weighted and can be used to make inferences to the population. Second, the huge sample sizes permit trustworthy statistical estimates. Third, the wording about whether the individual had health insurance coverage in the NHIS remained the same in all sample years so that a direct comparison before and after the ACA can be made.

4.2. Variables and Measurements

The dependent variable is health insurance coverage status, which asked respondents whether they were covered by any health insurance. This variable is dummy coded with 1 for "has insurance" and 0 for "does not have insurance."

The independent variables are age, gender, race, Hispanic ethnicity, marital status, nativity, U.S. citizenship status, region, education, family income, and poverty status. These predictors were selected because of the rationales and empirical evidence in the literature

specified in the Hypotheses section [6,16–18,22,24,25,27,31–34]. To test the effect of the new-19 provision, age was recoded as a dummy variable coded 1 for age 26 or younger and coded 0 for ages 27–99 as the reference category. Gender is a dummy variable coded 1 for male and coded 0 for female. Several dummy variables for race were created with white as the reference category: one for black coded 1 for black and 0 otherwise, one for Asian coded 1 for Asian and 0 otherwise, and one for other race coded 1 for other race and 0 otherwise. Hispanic ethnicity is a dummy variable with 1 identifying Hispanic and with 0 indicating non-Hispanic. Marital status is a dummy variable with 1 indicating currently married and 0 not currently married. Nativity is a dummy variable coded 1 for foreign-born and 0 for U.S.-born. Citizenship status is a dichotomous variable coded 1 for non-U.S. citizen and 0 for U.S. citizen. Education is measured at the ordinal level. Education was recoded twice. For the logistic regression analysis, education was coded as an ordinal variable with 18 categories with 0 indicating no schooling or kindergarten and 17 indicating the completion of a doctoral degree. For the bivariate analysis, education was collapsed into four categories with 1 indicating did not graduate high school, 2 indicating graduation from high school or equivalent, 3 indicating some college but no degree, and 4 indicating the acquisition of a college degree or more. Family income is measured at the ordinal level with eight categories. Poverty level is a dichotomous variable dummy coded with 1 denoting below poverty line and 0 indicating above poverty line. Several dummy variables for region were created with South as the reference category: Northeast, North Central/Midwest, and West.

4.3. Limitations of Data

Despite the advantages of the NHIS, some limitations of the data should be acknowledged. The main limitation of the samples is that some important predictors are not available or not ideal. For example, preexisting condition is an important predictor that makes a big difference before and after the full implementation of the ACA because after 1 January 2014, insurance companies could no longer exclude clients based on their preexisting conditions, but the NHIS does not contain a summary measurement of it. Because of the significant loss of cases in the models when using preexisting conditions, these determinants are not included in the analysis. Employment status is not included because a suitable employment variable contains too many missing cases and other employment variables are not ideal measures of employment status. Legal status of the foreign-born is also important but unavailable in the NHIS. Despite these drawbacks, the NHIS is the best data available to answer our research questions.

4.4. Methods of Analysis

This study begins with a trend analysis of changes in the rate of health insurance from 2009 to 2015 and an analysis of descriptive statistics on the determinants of health insurance. It then proceeds to a bivariate analysis of the relationship between each of the predictor variables and health insurance by year. Logistic regression is the main method of analysis for this study because the dependent variable is dichotomous. The results of multiple logistic regression models are presented by year from 2009 to 2015.

5. Results

5.1. Descriptive Analysis

Table 1 shows the means and standard deviations of the variables used in the analysis for 2009 to 2015. The mean of a dummy variable can be interpreted as a percentage after multiplying it by 100. Data from Table 1 indicate that in 2009, 82.2% of the U.S. population had health insurance coverage, but by 2015 the health insurance rate had increased by 7.2% to a total of 89.4%. The overall trend was a steady growth in health insurance rate year by year, except for the year 2010, which registered a slight decline in health insurance rate (81.3%). Especially, the increases in the rates in 2014 and 2015—the beginning of the full

implementation of the ACA—were impressive. The evidence appeared to show the initial success of the ACA.

Overall, the descriptive statistics for the independent variables from the years 2009 to 2015 were similar with some differences. The gender composition was consistent across all years, with 48% male respondents and 52% female respondents. The average age of the respondents increased over the 7-year span from about 46 in 2009–2011 to about 47 in 2012–2015. Whites constituted around 80% of the respondents with steady slight declines over time to 79% in 2015. Meanwhile, the proportions of black respondents were stable across all years at roughly 12%. Asians experienced small but steady increases from 4.7% in 2009 to 6% in 2015, and other races stood at less than 2%. Hispanic respondents experienced small but steady increases from 13.7% in 2009 to 15.5% in 2015. The percentages of married respondents were mostly stable at around 55% across all years with some fluctuations. The percentage of the foreign-born showed a steady increase across all years, from 16.6% in 2009 to 18.5% by 2015. The composition of U.S. citizenship was very consistent with approximately 92% of respondents being a U.S. citizen and about 8% non-citizens in all years. Finally, regional composition was largely consistent across all years with only the slightest of percentage shifts between 2009 and 2015. In 2009, 18% of respondents resided in the Northeast, 23% in the North Central/Midwest, 36% in the South, and 23% in the West. In 2015, the percentage of respondents in the North and West regions remained the same, while the North Central/Midwest decreased from 23% to 22%. The South experienced a 1% increase from 36% to 37%.

Across all years, education level steadily increased but remained around an average of 13 years. The respondents whose family incomes were less than \$50,000 a year made up the highest proportions of the samples, from 47% in 2009 to about 42% in 2015. Those making \$50,000 to \$99,999 a year were quite stable at around 30% across the years. Those making \$100,000 or more a year varied, from 21.3% in 2010 to 23.6% in 2013 and then saw noticeable increases to 26% in 2014 and 28.2% in 2015. The percentages of the respondents living below the poverty line followed a parabolic pattern from 12.1% in 2009 to 13.8% in 2011–2012 and then to 11.7% in 2015.

5.2. Bivariate Analysis

Results of the bivariate relationships between the predictors and health insurance coverage can be found in Table 2. The chi square tests for all cross-tabulated analyses are highly significant at the 0.0001 level across all years. The bivariate analyses reveal increases in the rate of health insurance coverage across all determinants from 2009 to 2015, with some minor fluctuations in some years, although certain categories among determinants were still more or less likely than other categories to have health insurance coverage. This indicates that the ACA has a net positive effect across many determinants of health insurance coverage.

Table 1. Means and Standard Deviations (SD) of Variables Used in the Analysis, U.S. Adults, 2009–2015.

Variable	2009		2010		2011		2012		2013		2014		2015	
	Mean	SD												
Has insurance	0.822	0.38	0.813	0.39	0.823	0.38	0.827	0.38	0.83	0.38	0.866	0.34	0.894	0.31
Male	0.48	0.50	0.48	0.50	0.48	0.50	0.48	0.50	0.48	0.50	0.48	0.50	0.48	0.50
Age	46.12	17.69	46.24	17.76	46.38	17.85	46.66	17.88	46.79	17.94	47.01	18.00	47.15	18.05
Race														
White	0.81	0.39	0.81	0.39	0.81	0.40	0.80	0.40	0.80	0.40	0.80	0.40	0.792	0.41
Black	0.12	0.33	0.12	0.33	0.12	0.33	0.12	0.32	0.12	0.33	0.12	0.33	0.12	0.33
Asian	0.05	0.21	0.05	0.22	0.05	0.22	0.05	0.23	0.06	0.23	0.06	0.23	0.06	0.24
Other	0.02	0.13	0.01	0.12	0.02	0.13	0.02	0.13	0.02	0.13	0.02	0.13	0.02	0.14
Hispanic	0.14	0.34	0.14	0.35	0.14	0.35	0.15	0.36	0.15	0.36	0.15	0.36	0.16	0.36
Currently married	0.56	0.50	0.55	0.50	0.55	0.50	0.55	0.50	0.54	0.50	0.54	0.50	0.55	0.50
Foreign-born	0.17	0.37	0.17	0.38	0.17	0.38	0.18	0.38	0.18	0.38	0.18	0.39	0.19	0.39
U.S. citizen	0.92	0.28	0.92	0.28	0.92	0.27	0.92	0.28	0.92	0.28	0.92	0.28	0.92	0.28
Region														
Northeast	0.18	0.38	0.18	0.38	0.18	0.38	0.18	0.39	0.18	0.38	0.18	0.38	0.18	0.38
Midwest	0.23	0.42	0.23	0.42	0.23	0.42	0.22	0.42	0.22	0.42	0.22	0.49	0.22	0.41
South	0.36	0.48	0.36	0.48	0.36	0.48	0.37	0.48	0.37	0.48	0.37	0.48	0.37	0.48
West	0.23	0.42	0.23	0.42	0.23	0.42	0.23	0.42	0.23	0.42	0.23	0.42	0.23	0.42
Education	12.29	2.43	12.87	2.44	12.91	2.45	12.95	2.40	12.98	2.42	13.01	2.42	13.08	2.40
Family income														
\$0–\$49,999	0.47	0.50	0.48	0.50	0.48	0.50	0.47	0.50	0.46	0.50	0.45	0.50	0.42	0.49
\$50,000–\$99,999	0.31	0.46	0.30	0.46	0.30	0.46	0.31	0.46	0.31	0.46	0.29	0.46	0.30	0.46
\$100,000 and over	0.22	0.42	0.21	0.41	0.22	0.41	0.23	0.42	0.24	0.43	0.26	0.43	0.28	0.45
Below poverty line	0.12	0.33	0.13	0.34	0.14	0.35	0.14	0.35	0.14	0.34	0.13	0.34	0.12	0.32
N	64,047		65,332		74,337		79,339		77,066		82,986		77,182	

Table 2. Cont.

Variable	2009		2010		2011		2012		2013		2014		2015	
	%	% Base												
Education														
No high school	67.0	11,258	66.0	11,498	68.6	12,568	67.7	12,880	68.1	12,223	73.7	12,566	76.9	11,238
High school/GED	78.7	17,772	77.5	17,991	77.7	20,130	78.5	21,631	79.3	20,793	82.6	22,397	86.3	20,355
Some college	82.7	12,284	81.2	12,280	82.5	14,125	83.3	15,386	83.0	14,654	87.1	15,690	90.3	14,653
College degree+	91.1	21,590	90.7	22,512	91.0	26,311	91.1	28,379	91.0	28,383	93.7	31,243	95.0	30,007
Family income														
\$0–\$49 k	71.8	28,338	70.4	30,084	71.7	34,340	71.7	35,869	72.2	34,211	77.3	33,540	82.4	29,341
\$50 k–\$99 k	87.4	17,468	87.3	17,306	88.2	19,819	88.1	21,616	88.1	20,926	91.0	20,884	91.3	19,883
\$100 k+	94.8	11,784	95.3	11,446	95.7	13,222	95.9	14,536	95.9	14,684	96.8	16,715	97.4	16,519
Poverty status														
Above poverty line	85.2	48,004	84.4	48,077	85.4	55,020	86.0	58,815	86.2	57,535	89.0	64,672	91.0	61,613
Below poverty line	62.3	7896	62.2	8886	64.3	10,355	63.9	11,133	65.0	10,501	70.7	11,189	77.3	9387

Source: The National Health Interview Surveys, 2009–2015. The χ^2 tests for all variables are statistically significant at the 0.0001 level, and all N's are unweighted.

5.3. Logistic Regression Analysis

Although bivariate analyses presented above are informative, they cannot fully establish causal relationships between the predictors and health insurance because other conditions that may influence the dependent variable are not controlled. To determine the independent effect of each predictor, multivariate logistic regression is needed. To that end and to assess how the determinants of health insurance had changed before and after the ACA, we tested a logistic regression model predicting health insurance coverage for each of the seven years from 2009 to 2015. Results of the logistic regression models are presented in Table 3. The model fit statistics reveal that all the logistic regression models fit the data pretty well. In particular, all the Model χ^2 's are highly significant, and all the pseudo R^2 's are around 20 or higher, indicating that the models explain at least 20% of the variance in the likelihood of health insurance coverage. All predictors across all years are highly significant at least at the 0.01 level or beyond, meaning that all predictors have a significant effect on health insurance. The results of many predictors are consistent with the stated hypotheses with the exception of a few. A major goal of this study is to determine the changes in the determinants of health insurance coverage after the partial and full implementation of the ACA.

From 2009 to 2015, men were consistently less likely than women to have health insurance coverage. For example, in 2015, men were 34.9% less likely ($0.651 - 1 = -0.349$) than women to have health insurance. The results across all years do not align with our hypothesis that men are more likely than women to have health insurance coverage. One possible reason is that women have many more health care needs than men such as infant care, cancer screenings, and reproductive health, many of which can be covered through health insurance. Additionally, men tend to take illness less seriously than women [36] and may take health insurance less seriously than women as well.

In confirmation of our hypothesis, individuals aged 26 or younger were less likely to have health insurance coverage than those aged 27 or older. However, young people aged 26 or under did see an increasing likelihood of having health insurance coverage since 2010 and especially since 2011. In 2009, they were 43.9% less likely ($0.561 - 1 = -0.439$) to have health insurance than those age 27 or older. By 2012, they were only 25.6% less likely ($0.774 - 1 = -0.256$) to do so. Their odds decreased slightly in 2015, being 26.9% less likely ($0.731 - 1 = -0.269$) than those aged 27 or older to have health insurance coverage. These findings indicate that the new-19 provision had a significant effect on the health insurance of the young people aged 26 or under.

The data provide mixed evidence to support our hypothesis that racial minorities are less likely than whites to have health insurance coverage because blacks and other races were indeed less likely than whites to have health insurance across all years, but Asians were more likely than whites to have health insurance across all years. The likelihood for blacks to have health insurance compared to whites fluctuated from 2009 to 2015. In 2009, blacks were 14.3% less likely than whites to have health insurance; however, their likelihood of having insurance increased in 2012 and 2014 but decreased again in 2015 to 16% less likely than whites to have health insurance coverage. The increase in odds in 2014 may be a result of the health insurance marketplace going fully active to the general public. A possible explanation for the decrease in 2015 is that many insurance providers began withdrawing from the health insurance exchange, which resulted in limited options and increasing costs for the ACA. Other races saw increased odds of having health insurance since 2010 with fluctuations. Asians were more likely than whites to have health insurance coverage with increasing odds from 3.3% more likely in 2009 to 28.9% more likely in 2014 and 41.4% more likely in 2015 to have health insurance coverage than whites. The sizeable increases in 2014 and 2015 could also be attributed to the health insurance marketplace that went live in 2014.

Table 3. Odds Ratios of Logistic Regression Models Predicting Health Insurance Coverage, U.S. Adults, NHIS 2009–2015.

Predictor	2009	2010	2011	2012	2013	2014	2015
Male	0.656 *** (0.000)	0.637 *** (0.000)	0.681 *** (0.000)	0.660 *** (0.000)	0.699 *** (0.000)	0.669 *** (0.000)	0.651 *** (0.001)
Age 26 or below	0.561 *** (0.001)	0.5730 *** (0.001)	0.723 *** (0.001)	0.774 *** (0.001)	0.704 *** (0.001)	0.755 *** (0.001)	0.731 *** (0.001)
Race (ref. = White)							
Black	0.857 *** (0.001)	0.802 *** (0.001)	0.842 *** (0.001)	0.905 *** (0.001)	0.777 *** (0.001)	0.949 *** (0.001)	0.840 *** (0.001)
Asian	1.033 *** (0.001)	1.099 ** (0.001)	1.121 *** (0.001)	1.102 *** (0.001)	1.166 *** (0.001)	1.289 *** (0.001)	1.414 *** (0.001)
Other	0.704 *** (0.001)	0.773 ** (0.002)	0.743 *** (0.001)	0.903 *** (0.001)	0.879 *** (0.001)	0.980 *** (0.002)	0.847 *** (0.002)
Hispanic	0.533 *** (0.001)	0.562 *** (0.001)	0.539 *** (0.001)	0.546 *** (0.001)	0.502 *** (0.001)	0.524 *** (0.001)	0.510 *** (0.001)
Currently, married	1.582 *** (0.000)	1.592 *** (0.000)	1.583 *** (0.000)	1.538 *** (0.000)	1.467 *** (0.000)	1.545 *** (0.000)	1.538 *** (0.000)
Foreign Born	0.890 *** (0.001)	0.967 *** (0.001)	0.844 *** (0.001)	0.988 *** (0.001)	0.944 *** (0.001)	0.976 *** (0.001)	0.996 *** (0.001)
Not U.S. Citizen	0.320 *** (0.001)	0.293 *** (0.001)	0.362 *** (0.001)	0.288 *** (0.001)	0.305 *** (0.001)	0.261 *** (0.001)	0.245 *** (0.001)
Region (ref. = South)							
Northeast	1.965 *** (0.001)	1.871 *** (0.001)	1.848 *** (0.001)	1.873 *** (0.001)	1.887 *** (0.001)	1.973 *** (0.001)	2.081 *** (0.001)
Midwest	1.310 *** (0.001)	1.385 *** (0.001)	1.437 *** (0.001)	1.407 *** (0.001)	1.364 *** (0.001)	1.496 *** (0.001)	1.472 *** (0.001)
West	1.210 *** (0.001)	1.190 *** (0.001)	1.221 *** (0.001)	1.180 *** (0.001)	1.165 *** (0.001)	1.545 *** (0.001)	1.729 *** (0.001)
Education	1.056 *** (0.000)	1.057 *** (0.000)	1.055 *** (0.000)	1.058 *** (0.000)	1.047 *** (0.000)	1.064 *** (0.000)	1.076 *** (0.000)
Family Income	1.418 *** (0.000)	1.475 *** (0.000)	1.510 *** (0.000)	1.500 *** (0.000)	1.488 *** (0.000)	1.392 *** (0.000)	1.281 *** (0.000)

Table 3. Cont.

Predictor	2009	2010	2011	2012	2013	2014	2015
In Poverty	0.858 *** (0.001)	0.918 *** (0.001)	0.959 *** (0.001)	0.879 *** (0.001)	0.890*** (0.001)	0.824 *** (0.001)	0.850*** (0.001)
Constant	0.423 *** (0.001)	0.375 *** (0.001)	0.441 *** (0.001)	0.356 *** (0.001)	0.465 *** (0.001)	0.496 *** (0.002)	0.651 *** (0.002)
−2 log likelihood	146,190,974	150,231,556	149,013,535	147,812,723	147,348,508	129,054,233	113,606,141
Model χ^2	28,779,090	30,515,412	28,306,600	29,551,108	28,982,864	24,985,712	20,098,466
df	15	15	15	15	15	15	15
Pseudo R ²	0.233	0.241	0.227	0.235	0.231	0.219	0.196
N	64,047	65,332	74,337	79,339	77,066	82,986	77,182

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$. Standard errors are in parentheses.

As hypothesized, Hispanics were less likely than non-Hispanics to have health insurance coverage in all the seven years. In 2009 they were 46.7% less likely than non-Hispanics to have health insurance coverage. Their odds of having health insurance slightly increased from 2010 to 2012 and decreased since 2013. The full implementation of the ACA did not help them much. In 2015, Hispanics were 49% less likely than non-Hispanics to have health insurance coverage.

Coinciding with our hypothesis, respondents who were currently married were more likely than those who were not currently married to have health insurance coverage from 2009 to 2015. However, the odds of having health insurance for the currently married slightly decreased from 1.582 times as likely as the odds for people who were not married in 2009 to 1.538 times in 2015 with fluctuations over time.

The results for the foreign-born are interesting. As expected, the foreign-born were less likely than the native-born to have health insurance coverage in all the seven years. However, the effect of the ACA on the health insurance of the foreign-born appeared to be significant. In 2009, the foreign-born were 11% less likely than the native-born to have health insurance coverage. However, by 2015 the foreign-born had been only 0.4% less likely than the native-born to have health insurance coverage, or they almost had had the same chance as the native-born to have insurance. The similar trend can be observed between 2010 and 2014, except for 2011.

As expected, non-U.S. citizens were less likely to have health insurance coverage than U.S. citizen across all years. The effect of the ACA on the health insurance of non-citizens seemed to be trivial or even negative. Before the ACA in 2009, non-citizens were 68% less likely to have health insurance coverage than U.S. citizens. However, in 2015, they were 75.5% less likely than U.S. citizens to have health insurance. Only in 2011, non-citizens had slightly greater odds of having health insurance than they were in 2009.

As hypothesized, all other regions were more likely than the South to have health insurance coverage. All regions experienced increases in their likelihood to have health insurance coverage over the seven-year span, and some regions like the West experienced notable increases. The West had a large increase from 21% in 2009 up to 72.9% more likely than the South by 2015. Most notably in 2015 the Northeast grew to being 1.081 times more likely than the South to have health insurance coverage. The North Central/Midwest grew from being 31% more likely than the South to have coverage in 2009 to 47.2% more likely by 2015.

As hypothesized, as education increased so did the odds of having health insurance coverage from 2009 to 2015 with some fluctuations over time. From 2009 to 2013, for each level increase in education, the odds of having health insurance coverage increased by around 5%. After the ACA took full effect, the odds increased to 6.4% in 2014 and 7.6% in 2015.

As anticipated, family income showed a positive relationship with the odds of having health insurance coverage for all seven years. The effect of family income on the likelihood of having health insurance coverage increased in 2010 and 2011 but steadily decreased after 2011. The reason for this declining effect of family income on health insurance coverage is unclear.

Consistent with our hypothesis, those living below the poverty line were less likely to have health insurance coverage than those above the poverty line across the years of 2009 to 2015. However, the effect of poverty on health insurance was mixed with gains and losses over time. In 2009, people below the poverty line were 14.2% less likely than people above the poverty line to have health insurance coverage. This figure decreased in 2010 to 8.2% less likely and again in 2011 to 4.1% less likely than people above the poverty line to have health insurance coverage. By 2014, this figure had increased again to 17.6% less likely and in 2015 to 15% less likely than people above the poverty line to have health insurance coverage.

6. Discussion and Conclusions

While opinions on Obamacare have been divided, it is important to objectively assess its impact on health insurance status in the United States. So far, inadequate research has examined the effect of the ACA on health insurance status in America after its implementation, as pertinent data were released only recently. This study analyzes changes in health insurance status and its determinants after the ACA, using data from the NHIS 2009–2015. The analysis of descriptive statistics shows that the national health insurance coverage rate increased from 82.2% in 2009 to 89.4% by 2015, which was a 7.2% increase.

The results of the bivariate analyses indicate that the health insurance rates for all categories of age, gender, race, Hispanic ethnicity, marital status, nativity, U.S. citizenship status, region, education, family income, and poverty status registered noticeable increases in 2014 and 2015 after the ACA took full effect. In particular, the new-19 category (i.e., those under 27) saw a 14.7% increase in health insurance rate from 2009 to 2015. Blacks, Asians, and especially other races made gains of 9.3%, 9.5%, and 13.2% in health insurance rate, respectively. Hispanics made gains of 14.4% across seven years. The foreign-born experienced a noticeable increase of 12.9% in health insurance rate from 2009 to 2015. The health insurance rate of non-U.S. citizens increased by 17.7% in the same period. The health insurance rate of people living below the poverty line increased by 15% during the seven-year period. These outcomes evince that the full implementation of the ACA along with the launch of the healthcare marketplace had a positive effect on health insurance coverage.

The results of the logistic regression analysis reveal that, congruous with our expectation, age, gender, race, ethnicity, marital status, nativity, citizenship status, education, family income, region, and poverty level are indeed significant predictors of health insurance before and after the implementation of the ACA. Consistent with our hypothesis, the youngsters in the new-19 group indeed witnessed significantly greater odds of gaining health insurance after the partial implementation and especially full implementation of the ACA than they did before the ACA. Our hypothesis that the foreign-born, racial minority groups, Hispanics, and people living under poverty should see increased odds of having health insurance after the full implementation of the ACA than before its full implementation is only partly borne out. The foreign-born were generally much more likely to obtain health insurance after the ACA than they were before the ACA. In fact, in 2015, they were almost parallel with the native-born in the odds of having health insurance. Asians and other races had greater chances of gaining health insurance after the ACA than they did before the ACA, but the odds for blacks to gain health insurance coverage in comparison to whites went up and down from 2009 to 2015. For Hispanics, the odds of getting health insurance in comparison to non-Hispanics increased slightly from 2010 to 2012 compared to 2009, but decreased after that. Similarly, for people living under poverty, the likelihood of gaining health insurance rose modestly from 2010 to 2013 compared to 2009 but slightly declined in 2014 and 2015.

Our findings suggest that the ACA, overall, had a positive effect on the national health insurance rate and across many groups. The 7.2% increase in national average health insurance rate translated into roughly 22.5 million more people who acquired health insurance coverage from 2009 to 2015. The gradual increases in health insurance rates from 2011 to 2013 and significant increases in the insurance rates since 2014 show that the ACA did effectively increase the health insurance rate of the nation. Our results are by and large congruent with the findings of some recent studies [37,38]. However, roughly 10.6% of the country still remains uninsured, and Hispanics, blacks, non-citizens, and the impoverished would be recommended targets for further increasing the insurance rates.

The results of this study suggest that the new-19 provision significantly increased the health insurance of individuals aged 26 or younger. It was evident from the bivariate analysis that the percentage of individuals aged 18 to 26 saw an overall increase from 69.5% in 2009 to 84.2% by 2015, an increase of 14.7% across a seven-year span. The findings of the logistic regression reveal significant increases in the odds of gaining health insurance after the ACA. These results are consistent with the findings of VanGarde et al.'s recent

study using data from the Behavioral Risk Factor Surveillance System [39] and indicate the effectiveness of the new-19 provision. Hence, any plan to refine or replace the ACA should consider the retention of this provision.

The finding that the South of the country was less likely to have health insurance coverage than all other regions suggests that the Medicaid expansion was pivotal in providing health insurance coverage to many people residing in those regions. According to the Kaiser Family Foundation [28], in the Northeast, all nine states adopted the Medicaid expansion; in the Midwest, only five of the twelve states or 41% adopted the expansion; in the South, only six out of seventeen or 35% of the states accepted the expansion; in the West, ten out of thirteen or 77% of states accepted the expansion. What is most remarkable from the bivariate analysis results is that up until 2013 the West and the South were relatively similar in percentage of people who had health insurance coverage; by 2014 and 2015, however, the West had surpassed not only the South but also the national average rate slightly and the Midwest. The evidence suggests a possible important role of Medicaid expansion in the increase in the health insurance rate. A recent study by the Kaiser Family Foundation further confirms the crucial role of Medicaid expansion in insurance coverage, access, and economic impact [40]. The implication is that for the South to catch up to the rest of the country, the Medicaid expansion should be considered in addition to other options in order to increase access to health insurance coverage, especially for disadvantaged communities.

Many findings in this study are consistent with what is found in the existing literature. For example, individuals with a higher level of education, a higher level of family income, being above the poverty line, and being married are more likely to have health insurance coverage than their respective counterparts [17,33,41] This is obviously a good thing, but the disadvantaged groups by and large still remain below the national average for health insurance coverage overall.

The findings for black people, people of other races, Hispanic people, non-U.S. citizens, and people below the poverty line show signs that improvement and amendments to the ACA are necessary. After the initial gains, all five groups experienced a decreased likelihood to have health insurance coverage at certain points (black people in 2015, other races in 2015, Hispanic people after 2010, non-U.S. citizens after 2011, and people in poverty after 2011). These results indicate issues within the ACA that must be addressed in order to better serve these disadvantaged groups. What will significantly hurt their chances further is if the ACA is completely repealed without a suitable replacement, and if Medicare experiences any cuts.

The ACA was an attempt to address these issues in order to facilitate the needs of these disadvantaged groups that need health insurance coverage. However, as observed in this study, more work is needed to better address this area in particular. Key among these would be addressing the Medicaid expansion issue because, as previous literature has already shown, this is needed for many minority groups to even qualify for coverage under the ACA. This also means that cutting funding to Medicaid, which the current administration is considering at the moment, would affect many more people than it is trying to help due to the costs it would incur. Considering the fact that many of the states in the South that opted not to take the Medicaid expansion in the first place have some of the highest impoverished populations in the country [29], this would only serve to decrease any gains these states made, while also affecting states in all other regions that actually took the expansion and experienced better results because of it.

What this means is that all future considerations for healthcare in the United States must be done in such a way to further help these disadvantaged groups, rather than to make it harder for these groups to acquire the coverage needed or to take away their coverage. The ACA was a first step and, in most cases, succeeded, but further improvements are still needed to better address the needs of minority and impoverished groups. Finally, if Congress attempts to repeal the ACA without any type of replacement and keep these proposed cuts on Medicaid, such a plan would undoubtedly result in a net loss in

comparison to what the ACA has accomplished over the course of seven years. It must be pointed out that health insurance coverage is not simply a medical issue but, more importantly, is a political issue. Ideological differences surrounding the issue of healthcare coverage in the United States must be taken into account.

Future research should include employment status, both full-time and part-time, to determine how likely each group is to have health insurance coverage. Preexisting conditions need further research because this was a significant provision in the ACA. Gender difference in health insurance coverage needs further confirmation. Racial and ethnic groups will need continuous study to track their rates of change as the ACA continues on into further years, or if it is hopefully replaced with an improved version that helps these groups further. Finally, further analysis of the ACA should be conducted as new NHIS data after 2015 become available. This will allow for the most up-to-date policy analysis and provide information to lawmakers on what will work best for the country.

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