Published in final edited form as:
Res Social Adm Pharm. 2014 ; 10(1): . doi:10.1016/j.sapharm.2013.04.011.

Racial and ethnic disparities in influenza vaccinations among community pharmacy patients and non-community pharmacy respondents

Junling Wang, Ph.D., M.S.[*], **Kiraat D. Munshi, B.Pharm., M.S.**, and **Song Hee Hong, Ph.D.**
Health Outcomes and Policy Research, Department of Clinical Pharmacy, University of Tennessee College of Pharmacy, 881 Madison Avenue, Memphis, TN 38163, USA

Abstract

Background—Since 2009, pharmacists in all 50 states in the U.S. have been authorized to administer vaccinations.

Objectives—This study examined racial and ethnic disparities in the reported receipt of influenza vaccinations within the past year among noninstitutionalized community pharmacy patients and non-community pharmacy respondents.

Methods—The 2009 Medical Expenditure Panel Survey was analyzed. The sample consisted of respondents aged 50 years or older, as per the 2009 recommendations by the Advisory Committee on Immunization Practices. Bivariate and multivariate logistic regression analyses were conducted to examine the influenza vaccination rates and disparities in receiving influenza vaccinations within past year between non-Hispanic Whites (Whites), non-Hispanic Blacks (Blacks) and Hispanics. The influenza vaccination rates between community pharmacy patients and non-community pharmacy respondents were also examined.

Results—Bivariate analyses found that among the community pharmacy patients, a greater proportion of Whites reported receiving influenza vaccinations compared to Blacks (60.9% vs. 49.1%; $P < 0.0001$) and Hispanics (60.9% vs. 51.7%; $P < 0.0001$). Among non-community pharmacy respondents, differences also were observed in reported influenza vaccination rates among Whites compared to Blacks (41.0% vs. 24.3%; $P < 0.0001$) and Hispanics (41.0% vs. 26.0%; $P < 0.0001$). Adjusted logistic regression analyses found significant racial disparities between Blacks and Whites in receiving influenza vaccinations within the past year among both community pharmacy patients (odds ratio [OR]: 0.81; 95% CI: 0.69–0.95) and non-community pharmacy respondents (OR: 0.66; 95% CI: 0.46–0.94). Sociodemographic characteristics and health status accounted for the disparities between Hispanics and Whites. Overall, community pharmacy patients reported higher influenza vaccination rates compared to non-community pharmacy respondents (59.0% vs. 37.2%; $P < 0.0001$).

Conclusion—Although influenza vaccination rates were higher among community pharmacy patients, there were racial disparities in receiving influenza vaccinations among both community pharmacy patients and non-community pharmacy respondents. Increased emphasis on educational campaigns among pharmacists and their patients, especially minorities, may be needed.

[*]Corresponding author. Tel.: +1 901 448 3601; fax: +1 901 448 1221. jwang26@uthsc.edu (J. Wang).

Conflict of interest The authors declare no conflicts of interest.

Keywords

Racial ethnic disparities; Influenza vaccinations; Immunization; Community pharmacy; Pharmacists

Introduction

Seasonal epidemics of influenza typically occur annually during the fall or winter periods in the United States.[1] Influenza related complications include hospitalizations and death, and may occur as a result of the direct effects from the influenza virus infection, or due to certain risk factors such as age of infection, pregnancy, or comorbid conditions.[2] Estimates from prior seasonal influenza epidemics reported that on average, the number of influenza-related hospitalizations ranged from approximately 55,000 to 431,000 per annual influenza epidemic, with a mean of approximately 226,000.[3] During the period from 1990 to 1999, an average of 36,000 influenza-related deaths per influenza season were estimated to have occured.[4] Influenza combined with pneumonia was the eighth leading cause of death in the United States in 2009, responsible for approximately 53,692 deaths in that year.[5]

Vaccination against influenza represents a highly efficacious and cost-effective strategy for reducing the morbidity and mortality associated with influenza among the U.S. population.[6–8] Nonetheless, despite widespread efforts to increase influenza vaccination coverage, the vaccination rates continue to remain low and fail to meet national goals. The Healthy People 2010 goal for influenza immunization was to achieve a vaccination coverage rate of 90% among adults aged 18 years and older. As of 2008, however, only 25% of noninstitutionalized adults aged 18–64 years, and 67% of elderly aged 65 and above were vaccinated against seasonal influenza.[9]

The role of pharmacists in the delivery of immunizations has gained prominence in recent years. The first organized immunization training for a group of 50 pharmacists was held in Seattle, Washington in late 1994.[10] The American Pharmacists Association (then known as the American Pharmaceutical Association) began its first formal nationally recognized program to train pharmacists in vaccine administration on November 1, 1996.[10] As of 2009, all 50 U.S. States, the District of Columbia, and Puerto Rico have legislation in place to allow pharmacists to administer vaccinations.[11] Previous studies have determined the benefits of influenza vaccinations by community pharmacists. States that had authorized their pharmacists to administer influenza vaccinations showed significantly greater influenza vaccination rates among all age groups, in comparison to states that did not provide such authority to pharmacists.[12,13] In addition, pharmacist-administered vaccinations within a pharmacy have been found to more cost-effective compared to “traditional settings”.[14]

The Institute of Medicine (IOM) in its report entitled *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare* observed that “Racial and ethnic disparities in health care exist, and are consistent and extensive across a range of medical conditions and health care services, are associated with worse health outcomes, and occur independently of insurance status, income, and education.”[15] Empirical evidence demonstrates significant differences in influenza vaccinations when comparing non-Hispanic Blacks (Blacks) and Hispanics to non-Hispanic Whites (Whites), among the adult, the near-elderly, and particularly the Medicare population groups.[16–28] Researchers have found several factors that play a role in these racial and ethnic disparities, including differences in consumer attitude toward vaccination and preventive care, and differences in quality of care received by populations of different races and ethnicities.[22,29] Although some studies have attempted to determine the influenza vaccination status of community pharmacy users,[13,30–32] none of

the earlier studies have examined racial and ethnic disparities in influenza vaccinations among individuals who utilize community pharmacies to fill their prescriptions and those who have not used community pharmacies, nor have they compared the influenza vaccination rates between these two subpopulations. The objectives of the present study were: (1) to examine racial and ethnic disparities in influenza vaccinations among community pharmacy patients (respondents who utilized community pharmacies to fill a minimum of one prescription medication in 2009), (2) to examine racial and ethnic disparities in influenza vaccinations among non-community pharmacy respondents (respondents who did not utilize community pharmacies in 2009), and (3) to compare the influenza vaccination rates between community pharmacy patients and non-community pharmacy respondents. The results from this study can provide insights into disparities in receiving influenza vaccinations among these subpopulations in addition to highlighting the relationship between influenza vaccinations and community pharmacies. Additionally, these findings can provide pharmacists and policy-makers indications of further opportunities for pharmacist intervention.

Methods

Data source

The present study is a retrospective cross-sectional secondary data analysis using the Medical Expenditure Panel Survey (MEPS) data from 2009.[33] MEPS is sponsored by the Agency for Healthcare Research and Quality, based on a sampling frame of the National Health Interview Survey. It collects data on health services utilization and health expenditures for noninstitutionalized civilians. The survey consists of five interviews conducted over a 2-year period, during which patients are asked about all health care utilization and associated expenditures for a specific period of time, and these periods cumulatively cover a 2-year period. MEPS is able to provide national estimates of all the health care use and expenditure data.[33]

MEPS currently have two major components: the Household Component and the Insurance Component. The Household Component provides data from individual households and their members, which is supplemented by data from their medical providers. The Insurance Component is a separate survey of employers that provides data on employer-based health insurance.[33] MEPS has several data files for each year, beginning 1996, which contain information on sociodemographic characteristics, health status, use of health services and medications, and the associated expenditures with the use of these services and medications. MEPS also includes a set of questions asked about the receipt of preventive or screening examination as part of the health status variables. For this study, the Full-Year Consolidated Data File, the Prescribed Medicines File, and the Medical Conditions File in MEPS were used.

Study sample

The sample was divided into two groups: (1) the community pharmacy patients, which included respondents aged 50 years or older who had filled at least one prescription medication at a community pharmacy in 2009, and (2) the non-community pharmacy respondents, which included respondents aged 50 years or older who either did not fill their medications at a community pharmacy, or those who did not fill any medications at all in 2009. A community pharmacy was defined as all pharmacies other than “mail-order” and “on-line” pharmacies. These included “HMO/clinic/hospital”, “drug store”, and “another store”. The inclusion of individuals aged 50 years or older was based on the recommendations by the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention. The ACIP is an expert panel entrusted with

providing and updating annual recommendations related to reducing vaccine-preventable deaths.[34] Up until 2009, the ACIP recommended an annual influenza vaccination for all adults aged 50 years or over and for all persons residing in long-term care facilities, since these groups were deemed to be among the high-risk groups.[1]

Outcome variable

As part of the preventive care variables, MEPS respondents aged 18 or older, were asked about their influenza vaccination status ("How long since last flu vaccination?"). The responses were coded as: (1) within past year, (2) within past 2 years, (3) within past 3 years, (4) within past 5 years, (5) more than 5 years, and (6) never. In order to determine whether the elderly were receiving influenza vaccinations as per the recommended guidelines, a binary outcome variable was created which was coded as: (0) did not receive an influenza vaccine within the past year (individuals who chose an option from 2 to 6), and (1) received an influenza vaccine within the past year (individuals whose response to the question was 1).

Theoretical framework

The Andersen's Behavioral Model of Health Services Utilization was used as the theoretical framework for this study.[35] This model postulates that an individual's use of health services is influenced by a combination of the predisposing, enabling and need factors. Predisposing factors are characteristics that influence the individual's predisposition to the use of health services, such as influenza vaccination in this case. Enabling factors are those, which influence an individual's ability to access and utilize health services. Need factors represent a subjective acknowledgment of the need for health services on the part of the individual or the provider.

The predisposing characteristics used in this study were age, gender, race and ethnicity, and marital status (married or not). Race and ethnicity, which consisted of Whites, Blacks, and Hispanics, were the main independent variables of interest. The sample sizes of other racial and ethnic groups were too small to produce reliable estimates of meaningful differences between them and other groups; hence, they were excluded from further analysis. Enabling characteristics in this study included education, insurance status, income, and two location variables: geographic region and metropolitan statistical area (MSA). Education comprised of the variable "highest degree when first entered MEPS" listing five different levels of education. Insurance status consisted of three binary variables to determine whether respondents had any form of private health insurance, Medicare, or Medicaid in 2009. Income consisted of poverty categories, which included negative income or poor (<100% of poverty line), near poor (less than 125% of poverty line), low income (125% to less than 200% of poverty line), middle income (200% to less than 400% of poverty line), and high income (≥400% of poverty line). The poverty line varied based on the number of individuals in the family; e.g., the poverty line was $21,954 for a family of four in 2009. Geographic region was divided into Northeast, Midwest, South and West regions. The need characteristics in this study consisted of the respondent's self-perceived health status and number of chronic conditions. Self-perceived health status was divided into five categories: excellent, very good, good, fair and poor. The number of chronic conditions was based on a raw count among a list of 25 chronic conditions, and categorized into three levels: ≤1, 2–4, and ≥5 chronic conditions. This list of chronic conditions was developed by Daniel and Malone and consisted of those chronic conditions that are applicable to Medicare beneficiaries.[36] The list of medical conditions was based on clinical classification codes developed in MEPS by aggregating ICD-9 codes.[33] Each of the clinical classification codes represents a clinical classification category; for example, code "005" is HIV infection and "202" is for rheumatoid arthritis and related diseases. Since the present study population

included near-elderly respondents aged 50–64 years, in addition to the Medicare population 65 years and over, the same list was used in this study. The independent variables were selected based on the Andersen's model, as well as the previous literature on influenza vaccinations and on racial and ethnic disparities in health services utilization.[16,17,23,37]

Statistical analysis

In order to achieve the first objective, racial and ethnic disparities in influenza vaccinations among community pharmacy patients were examined using bivariate and multivariate analyses. In the bivariate analyses, survey-weighted chi-square tests were conducted to determine the statistical differences in the influenza vaccination rates within the past year by racial and ethnic groups. For the multivariate analyses, survey-weighted logistic regression analyses were conducted to control for the predisposing, enabling and need factors. Similar analyses were conducted for the second objective of examining racial and ethnic disparities in influenza vaccinations among the non-community pharmacy respondents. For the third objective, a survey-weighted chi-square test was conducted to compare the influenza vaccination rates between community pharmacy patients and non-community pharmacy respondents. The complex sampling design of MEPS survey, including primary sampling units, strata, and personal weights, were accounted for in all analyses. The data analyses of this study were conducted using SAS 9.2 (SAS Institute Inc, Cary, North Carolina). The statistical significance level was set *a priori* at 0.05.

Results

Population characteristics

The sociodemographic characteristics of the community pharmacy patients were analyzed across the three racial and ethnic groups (Table 1). Of the 6845 individuals (weighted n = 71,135,249), the majority were Whites (81.8%), followed by Blacks (10.0%) and Hispanics (8.2%). The differences between Whites and minorities were significant for all the patient characteristics except gender, which was not significantly different between Whites and Hispanics. A greater proportion of Blacks were female. In comparison to Whites, Blacks and Hispanics were more likely to belong to younger age groups and more likely to be unmarried. Compared to Whites, minorities were less likely to have earned higher educational degrees, less likely to have private health insurance, less likely to have Medicare coverage, more likely to have Medicaid coverage, and more likely to belong to lower income categories. Whites and minorities had different geographic distributions across the four census regions, and minorities were more likely to live in the MSAs compared to Whites. Minorities were more likely to perceive their health status to be in lower health categories though less likely to report greater numbers of chronic conditions.

The non-community pharmacy respondents consisted of 2077 individuals (weighted n = 20,565,253) (Table 2). The majority of the sample comprised of Whites (77.3%) followed by Blacks (11.4%) and Hispanics (11.3%). The patterns in differences between Whites and minorities among the non-community pharmacy respondents were similar to the community pharmacy patients for the following independent variables: highest degree received, private health insurance, Medicare, Medicaid, poverty categories, region, MSA, self-perceived health status and the number of chronic conditions. The difference in age between Whites and Blacks was not significant. Compared to Whites, Hispanics were more likely to belong to younger age groups. The differences in gender and marital status were not significant between Whites and Hispanics. Compared to Whites, Blacks were more likely to be females and more likely to be unmarried.

Disparities in influenza vaccination

The proportion of individuals across the three racial and ethnic groups who received influenza vaccinations within the past year in 2009 were compared (Table 3). Among both population groups in this study, community pharmacy patients and non-community pharmacy respondents, there was a significant difference in the receipt of influenza vaccinations between Whites and Blacks ($P < 0.0001$), and Whites and Hispanics ($P < 0.0001$). Among the community pharmacy patients, over half of the Blacks did not receive influenza vaccinations within the past year in 2009. Among the non-community pharmacy respondents, over half of the individuals in all three racial and ethnic groups did not receive influenza vaccinations within the past year in 2009.

Adjusted multivariate logistic regression analyses for community pharmacy patients and the non-community pharmacy respondents were conducted separately. Among the community pharmacy patients (Table 4), Blacks had a 19% lower likelihood of receiving the influenza vaccination within the past year compared to their White counterparts (OR: 0.81; 95% CI: 0.69–0.95). The difference between Hispanics and Whites in this population was not found to be statistically significant. The likelihood of receiving influenza vaccinations within the past year increased by 5% with increasing age (OR: 1.05; 95% CI: 1.04–1.06). Gender was associated with influenza vaccination, with men having a 19% lower likelihood of receiving influenza vaccinations within the past year compared to women (OR: 0.81; 95% CI: 0.73–0.91). Education was found to be associated with influenza vaccinations; compared to patients with less than high school education, patients with a Bachelor's degree and a Master's degree or higher had a greater likelihood of receiving influenza vaccinations within the past year (OR: 1.45; 95% CI: 1.15–1.84 and OR: 1.52; 95% CI: 1.12–2.06, respectively). Patients with any private health insurance had a greater likelihood of receiving influenza vaccinations within the past year compared to those without any private health insurance (OR: 1.30; 95% CI: 1.10–1.53). Compared to patients without Medicare, patients with Medicare were more likely to receive influenza vaccinations within the past year (OR: 1.28; 95% CI: 1.01–1.63). Compared to patients with ≤1 chronic conditions, patients with 2–4 chronic conditions and those with 5 or more chronic conditions had a greater likelihood of receiving influenza vaccinations within the past year (OR: 1.59; 95% CI: 1.14–2.23 and OR: 3.09; 95% CI: 2.19–4.37, respectively).

Among non-community pharmacy respondents (Table 5), Blacks were found to have a 34% lower likelihood of receiving the influenza vaccination within the past year compared to Whites (OR: 0.66; 95% CI: 0.46–0.94). No significant ethnic disparities between Whites and Hispanics were found within this population.

Finally, influenza vaccination rates were compared between community pharmacy patients and non-community pharmacy respondents (Table 6). It was found that community pharmacy patients reported higher influenza vaccination rates in comparison to non-community pharmacy respondents (59.0% vs. 37.2%; $P < 0.0001$). Additionally, community pharmacy patients were 21% more likely to report receiving influenza vaccinations within the past year in 2009 compared to non-community pharmacy respondents, after adjusting for all the sociodemographic and health status characteristics (OR: 1.21; 95% CI: 1.03–1.42) [results not shown].

Discussion

The present study examined racial and ethnic disparities in the receipt of influenza vaccinations within the past year in 2009 as reported by the MEPS respondents. The existence of such disparities was examined among community pharmacy patients and non-community pharmacy respondents, using a nationally representative sample of

noninstitutionalized civilians. The descriptive results showed that Whites were more likely to report receiving influenza vaccinations than Hispanics and Blacks. Significant disparities were found between Whites and Blacks in the likelihood of receiving an influenza vaccination in the past year, among community pharmacy patients and non-community pharmacy respondents, after adjusting for various confounders according to the Andersen's Behavioral Model of Health Services Utilization. Disparities between Whites and Hispanics were not significant after adjusting for sociodemographic and health status characteristics. Overall, community pharmacy patients were significantly more likely to report receiving influenza vaccinations within the past year than non-community pharmacy respondents.

Previous studies have not examined racial and ethnic disparities in receiving influenza vaccinations among community pharmacy patients and non-community pharmacy respondents. However, studies have examined influenza vaccination rates among the community pharmacy patients and among the general population. The influenza vaccination rates in previous studies examining racial and ethnic disparities in influenza vaccinations ranged from 48.2 to 80.6%.[17,18,21–23,25–28] The overall influenza vaccination rate among the non-community pharmacy respondents in the present study was 37.2%, which was lower than the influenza vaccination rates found in the literature. The influenza vaccination rate of 59.0% among the community pharmacy patients in this study was within the range of influenza vaccination rates previously reported.

Among community pharmacy patients in the present study, the influenza vaccination rates for Whites, Hispanics, and Blacks were 60.9%, 51.7% and 49.1%, respectively. The influenza vaccination rates for Whites, Hispanics, and Blacks among non-community pharmacy respondents in the present study were 41.0%, 26.0% and 24.3%, respectively. Previous studies showed that Whites had higher influenza vaccination rates, which ranged from 52.4 to 82.1%, compared to Hispanics and Blacks, whose rates ranged from 39.9 to 79.0% and 32.2–70.9%, respectively.[17,18,21–28] For instance, Sambamoorthi et al[17] examined the predictors of influenza immunization among individuals aged 50 years or older, using the 2000 MEPS data. The influenza vaccination rates reported in that study for Whites, Hispanics, and Blacks were 52.4%, 39.9% and 32.2%, respectively. Straits-Troster et al[18] examined influenza vaccination disparities among veterans aged 50 years or older with in the Veterans Affairs Healthcare System. The influenza vaccination rates for White veterans, Hispanic veterans and Black veterans were 82.1%, 79.0% and 70.9%, respectively. The influenza vaccination rates reported in the 2009 National Health Interview Survey among elderly aged 65 years or older for Whites, Hispanics and Blacks were 68.6%, 50.6% and 50.8%, respectively.[38] These rates were also different from the influenza vaccination rates among the community pharmacy patients in the present study for Whites, Hispanics and Blacks, which were 60.9%, 51.7% and 49.1%, respectively. These observed variations in influenza vaccination rates could be attributed to the differences in the study population characteristics such as age, or differences in the sources of data and their sampling methodologies. However, the significant Black–White disparities in influenza vaccinations found in this study were in agreement with the findings from literature.[16–28]

It has been established from prior research that resistant attitudes and beliefs about vaccinations are highly prevalent among Blacks, in comparison to Hispanics and Whites, with Black Medicare beneficiaries being the least likely among all three groups to make health care visits primarily for the purpose of influenza vaccination.[22] African Americans who are able to recall past violations of medical and research ethics may be reluctant to seek vaccinations, and other forms of health care interventions due to mistrust in the health care system.[39,40] Additionally, provider-related factors might also have contributed to the widening gap in influenza vaccinations between Whites and minorities.[22,29,41] Lack of

support for in-pharmacy vaccinations among pharmacy staff practicing in minority neighborhoods could be another possible reason for these observed disparities.[42]

Several federal initiatives have been implemented to increase immunization coverage across the country. In 2002, the CDC launched the Racial and Ethnic Adult Disparities in Immunization Initiatives (READII), a three- year demonstration project to address racial and ethnic barriers in immunization rates among minorities, in five sites across the country.[43] The results were mixed. Although overall influenza and pneumonia vaccination disparities decreased among the project sites, the overall changes were not statistically significant, with certain sites performing better than others.[26] Some federal initiatives by CMS have targeted Medicare beneficiaries in general, but not minority groups in particular.[44,45] The Healthy People 2020 has proposed similar goals as Healthy People 2010 of 90% influenza vaccination rates for all adults aged 18 and above because Healthy People 2010 failed to achieve its goal.[9] A greater emphasis is needed on implementing more effective strategies to increase influenza vaccinations, especially among the minority populations.

Increased access to vaccination through non-traditional settings is often advocated as a measure to increase national vaccination coverage. Pharmacists, particularly those who practice within community pharmacies, are in a unique position to deliver timely vaccinations within their communities. Pharmacists are the most accessible health care professionals, and this enables them to effectively provide preventive services, including vaccinations, owing to the potential for frequent interactions with consumers and patients.[12] Traditionally, pharmacists have educated their patients about the benefits of influenza vaccinations, and have recommended them to receive their influenza vaccinations from their local health providers. However, with the increased legislative support across the country, pharmacists are now able to provide most of those vaccination services themselves.

Despite the increased access to immunization through the changing legislative environment and the increasing emphasis on non-traditional immunization settings, the present study found significant racial disparities in receiving influenza vaccinations among community pharmacy patients. Beginning in 2010, the ACIP's modified recommendations included an annual influenza vaccination for all individuals aged 6 months or older, in light of the 2009 pandemic outbreak of influenza A (H1N1) and for fear of continuation in the spread of H1N1-like viruses during the 2010–2011 influenza season.[46] The modified recommendations to immunize a greater proportion of the population than before may put additional pressure on the system and consequently, could even further exacerbate the disparities in influenza vaccinations in the community pharmacy setting. Thus, there is a need to implement educational and awareness campaigns among the pharmacists, pharmacy staff, and the pharmacy patients, especially minorities, about the importance and benefits of influenza vaccinations and address any concerns the patients may have about the side effects of these vaccines. Providing influenza vaccinations at subsidized rates for certain low-income groups or to patients with store loyalty cards may also help in reaching out to price-sensitive individuals. Pharmacists have indeed attempted to increase awareness of the benefits and importance of influenza vaccinations. Instore mass influenza vaccination services during the fall have increasingly become a common sight. The results from this study indicate that far greater, more strategic, and more comprehensive interventions may be required on the part of community pharmacists to ensure greater influenza coverage rates and significantly reduced racial and ethnic disparities in influenza vaccinations. The 2010 Patient Protection and Affordable Care Act (PPACA) requires health plans and encourages state Medicaid programs to place a strong emphasis on prevention, specifically by encouraging coverage for: 1) any clinical preventive service recommended with a grade A or B by the United States Preventive Services Task Force; and 2) for immunizations recommended by the ACIP.[47] Pharmacists are poised to play a critical role in ensuring that

preventive services, including vaccinations, are administered as per the federal recommendations or guidelines, and that health disparities are significantly reduced or even eliminated in the receipt of these preventive measures.

Limitations

This study has limitations pertaining to the use of MEPS data. The target population for MEPS comprises of noninstitutionalized civilians; as such, the study findings may not be generalizable to institutionalized individuals and other racial and ethnic populations, nor can they be generalized to years other than 2009. In addition, the data are self-reported and subject to potential recall and misclassification bias, particularly for questions that require recall over a longer period. It should be noted, though, that MEPS is a widely utilized database for documenting health care disparities by researchers, academicians and policy analysts for critical studies and federal reports.[37,48,49] An additional limitation is that some survey respondents may not have had a face-to-face interaction with a pharmacist when filling their prescriptions, since some pharmacies offer home delivery services. Moreover, respondents may have had another person pick up their medication for them at the community pharmacy, which is difficult to determine in MEPS. Also, it is possible that individuals may have purchased medications for acute illnesses during late spring or summer, and as a result, may not have had the opportunity to receive influenza vaccinations at that time. However, the higher influenza vaccination rates among the community pharmacy patients compared to the non-community pharmacy respondents indicate that such occurrences may not have had a significant impact on the study findings. Another potential limitation of this study is the absence of information in the MEPS regarding beliefs, behaviors, and attitudes of the study population and their providers. Future research may examine cultural, attitudinal, and ethnographic characteristics among Blacks to better understand the causes of the racial disparities in influenza vaccination.

Conclusion

The present study found significant racial disparities between Whites and Blacks in the reported influenza vaccinations among community pharmacy patients and non-community pharmacy respondents. Ethnic disparities between Whites and Hispanics were accounted for by socioeconomic characteristics and perceived health needs. Non-community pharmacy respondents reported significantly lower influenza vaccination rates compared to community pharmacy patients; however, Blacks and Hispanics reported significantly lower influenza vaccination rates compared to Whites among both community pharmacy patients and non-community pharmacy respondents. These findings represent a potential opportunity for community pharmacists to increase influenza vaccination rates among their patients.

Acknowledgments

The project described was supported by Grant Number R01AG040146 from the National Institute On Aging. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute On Aging or the National Institutes of Health.

The authors would like to thank Yanru Qiao and Satya Surbhi for editorial assistance.

References

1. Fiore AE, Shay DK, Broder K, et al. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2009. MMWR Recomm Rep. 2009; 58(RR-8):1–52. [PubMed: 19644442]
2. Rothberg MB, Haessler SD, Brown RB. Complications of viral influenza. Am J Med. 2008; 121:258–264. [PubMed: 18374680]

3. Thompson WW, Shay DK, Weintraub E, et al. Influenza-associated hospitalizations in the United States. JAMA. 2004; 292:1333–1340. [PubMed: 15367555]
4. Thompson WW, Shay DK, Weintraub E, et al. Mortality associated with influenza and respiratory syncytial virus in the United States. JAMA. 2003; 289:179–186. [PubMed: 12517228]
5. Kenneth D, Kochanek MA, Xu MDJ, et al. Deaths: final data for 2009. Natl Vital Stat Rep. 2011; 60(3):1–166. [PubMed: 22670489]
6. Nichol KL. Cost-benefit analysis of a strategy to vaccinate healthy working adults against influenza. Arch Intern Med. 2001; 161:749–759. [PubMed: 11231710]
7. Nichol KL, Mallon KP, Mendelman PM. Cost benefit of influenza vaccination in healthy, working adults: an economic analysis based on the results of a clinical trial of trivalent live attenuated influenza virus vaccine. Vaccine. 2003; 21:2207–2217. [PubMed: 12706712]
8. Wang CS, Wang ST, Chou P. Efficacy and cost-effectiveness of influenza vaccination of the elderly in a densely populated and unvaccinated community. Vaccine. 2002; 20:2494–2499. [PubMed: 12057604]
9. Department of Health and Human Services. [Accessed 23.09.12] Healthy People 2020 Summary of Objectives: Immunization and Infectious Diseases. Available at: www.healthypeople.gov/2020/topicsobjectives2020/pdfs/Immunization.pdf
10. Hogue MD, Grabenstein JD, Foster SL, Rothholz MC. Pharmacist involvement with immunizations: a decade of professional advancement. J Am Pharm Assoc. 2006; 46:168–179.
11. Skelton JB. Pharmacist-provided immunization compensation and recognition: white paper summarizing APhA/AMCP stakeholder meeting. J Am Pharm Assoc. 2011; 51:704–712.
12. Steyer TE, Ragucci KR, Pearson WS, Mainous AG III. The role of pharmacists in the delivery of influenza vaccinations. Vaccine. 2004; 22:1001–1006. [PubMed: 15161077]
13. Grabenstein JD, Guess HA, Hartzema AG, Koch GG, Konrad TR. Effect of vaccination by community pharmacists among adult prescription recipients. Med Care. 2001; 39:340–348. [PubMed: 11329521]
14. Prosser LA, O'Brien MA, Molinari NA, et al. Nontraditional settings for influenza vaccination of adults: costs and cost effectiveness. Pharmacoeconomics. 2008; 26:163–178. [PubMed: 18198935]
15. Smedley, BD.; Stith, AY.; Nelson, AR. Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care. Washington, DC: National Academies Press; 2002. p. 79
16. Egede LE, Zheng D. Racial/ethnic differences in influenza vaccination coverage in high-risk adults. Am J Public Health. 2003; 93:2074–2078. [PubMed: 14652337]
17. Sambamoorthi U, Findley PA. Who are the elderly who never receive influenza immunization? Prev Med. 2005; 40:469–478. [PubMed: 15530600]
18. Straits-Troster KA, Kahwati LC, Kinsinger LS, Orelien J, Burdick MB, Yevich SJ. Racial/ethnic differences in influenza vaccination in the Veterans Affairs Healthcare System. Am J Prev Med. 2006; 31:375–382. [PubMed: 17046408]
19. Ostbye T, Taylor DH, Lee AM, Greenberg G, van Scoyoc L. Racial differences in influenza vaccination among older Americans 1996–2000: longitudinal analysis of the Health and Retirement Study (HRS) and the Asset and Health Dynamics Among the Oldest Old (AHEAD) survey. BMC Public Health. 2003; 3:41. [PubMed: 14678561]
20. Chen JY, Fox SA, Cantrell CH, Stockdale SE, Kagawa-Singer M. Health disparities and prevention: racial/ethnic barriers to flu vaccinations. J Community Health. 2007; 32:5–20. [PubMed: 17269310]
21. Schneider EC, Cleary PD, Zaslavsky AM, Epstein AM. Racial disparity in influenza vaccination: does managed care narrow the gap between African Americans and whites? JAMA. 2001; 286:1455–1460. [PubMed: 11572737]
22. Hebert PL, Frick KD, Kane RL, McBean AM. The causes of racial and ethnic differences in influenza vaccination rates among elderly Medicare beneficiaries. Health Serv Res. 2005; 40:517–537. [PubMed: 15762905]
23. Marin MG, Johanson WG Jr, Salas-Lopez D. Influenza vaccination among minority populations in the United States. Prev Med. 2002; 34:235–241. [PubMed: 11817920]

24. Link MW, Ahuwalia IB, Euler GL, Bridges CB, Chu SY, Wortley PM. Racial and ethnic disparities in influenza vaccination coverage among adults during the 2004–2005 season. Am J Epidemiol. 2006; 163:571–578. [PubMed: 16443801]
25. Rangel MC, Shoenbach VJ, Weigle KA, Hogan VK, Strauss RP, Bangdiwala SI. Racial and ethnic disparities in influenza vaccination among elderly adults. J Gen Intern Med. 2005; 20:426–431. [PubMed: 15963166]
26. Winston CA, Wortley PM, Lees KA. Factors associated with vaccination of Medicare beneficiaries in five U.S. communities: results from the racial and ethnic adult disparities in immunization initiative survey, 2003. J Am Geriatr Soc. 2006; 54:303–310. [PubMed: 16460383]
27. Bardenheier B, Wortley P, Ahmed F, Gravenstein S, Hogue CJ. Racial inequities in receipt of influenza vaccination among long-term care residents within and between facilities in Michigan. Med Care. 2011; 49:371–377. [PubMed: 21368681]
28. Singleton JA, Santibanez TA, Wortley PM. Influenza and pneumococcal vaccination of adults aged ≥ 65: racial/ethnic differences. Am J Prev Med. 2005; 29:412–420. [PubMed: 16376704]
29. Bratzler DW, Houck PM, Jiang H, et al. Failure to vaccinate Medicare inpatients: a missed opportunity. Arch Intern Med. 2002; 162:2349–2356. [PubMed: 12418949]
30. Ernst ME, Chalstrom CV, Currie JD, Sorofman B. Implementation of a community pharmacy-based influenza vaccination program. J Am Pharm Assoc. 1997; NS37:570–580.
31. Grabenstein JD, Guess HA, Hartzema AG. People vaccinated by pharmacists: descriptive epidemiology. J Am Pharm Assoc. 2001; 41:46–52.
32. Grabenstein JD, Guess HA, Hartzema AG, Koch GG, Konrad TR. Attitudinal factors among adult prescription recipients associated with choice of where to be vaccinated. J Clin Epidemiol. 2002; 55:279–284. [PubMed: 11864799]
33. Agency for Healthcare Research and Quality. [Accessed 22.09.12] Medical Expenditure Panel Survey. Available at: www.meps.ahrq.gov/mepsweb/about_meps/survey_back.jsp
34. Smith JC, Snider DE, Pickering LK. Immunization policy development in the United States: the role of the Advisory Committee on Immunization Practices. Ann Intern Med. 2009; 150:45–49. [PubMed: 19124820]
35. Andersen R, Newman JF. Societal and individual determinants of medical care utilization in the United States. Milbank Mem Fund Q Health Soc. 1973; 51:95–124. [PubMed: 4198894]
36. Daniel GW, Malone DC. Characteristics of older adults who meet the annual prescription drug expenditure threshold for Medicare medication therapy management programs. J Manag Care Pharm. 2007; 13:142–154. [PubMed: 17330975]
37. Wang J, Mullins CD, Brown LM, et al. Disparity implications of Medicare eligibility criteria for medication therapy management services. Health Serv Res. 2010; 45:1061–1082. [PubMed: 20500223]
38. Centers for Disease Control and Prevention. [Accessed 15.02.13] 2009, Adult Vaccination Coverage, NHIS. Available at: http://www.cdc.gov/vaccines/stats-surv/nhis/2009-nhis.htm
39. Corbie-Smith G. The continuing legacy of the Tuskegee Syphilis study: considerations for clinical investigation. Am J Med Sci. 1999; 317:5–8. [PubMed: 9892266]
40. Corbie-Smith G, Thomas SB, Williams MV, Moody-Ayers S. Attitudes and beliefs of African Americans toward participation in medical research. J Gen Intern Med. 1999; 14:537–546. [PubMed: 10491242]
41. Bach PB, Pham HH, Schrag D, Tate RC, Hargraves JL. Primary care physicians who treat blacks and whites. N Engl J Med. 2004; 351:575–584. [PubMed: 15295050]
42. Crawford ND, Blaney S, Amesty S, et al. Individual and neighborhood-level characteristics associated with support of in-pharmacy vaccination among ESAP-registered pharmacies: pharmacists' role in reducing racial/ethnic disparities in influenza vaccinations in New York city. J Urban Health. 2011; 88:176–185. [PubMed: 21279450]
43. Kicera TJ, Douglas M, Guerra FA. Best-practice models that work: the CDC's Racial and Ethnic Adult Disparities Immunization Initiative (READII) programs. Ethn Dis. 2005; 15(2 Suppl 3):S3-S17–S3-S20. [PubMed: 15945362]
44. Medicare and Medicaid programs. Condition of participation: immunization standard for long term care facilities. Final rule. Fed Regist. 2005; 70(194):58833–58852. [PubMed: 16211747]

45. Centers for Medicare and Medicaid Services. [Accessed 24.09.12] Hhs, CMS Officials Kick off a Healthier US Starts Here Initiative. Available at: www.hhs.gov/news/press/2007pres/04/20070420a.html

46. Fiore AE, Uyeki TM, Broder K, et al. Prevention and control of influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2010. MMWR Recomm Rep. 2010; 59(RR-8):1–62. [PubMed: 20689501]

47. Department of Health and Human Services. [Accessed 24.09.12] Hhs Action Plan to Reduce Racial and Ethnic Health Disparities. Available at: www.minorityhealth.hhs.gov/npa/files/Plans/HHS/HHS_Plan_complete.pdf

48. Wang J, Mullins CD, Zuckerman IH, et al. Medical Expenditure Panel Survey: a valuable database for studying racial and ethnic disparities in prescription drug use. Res Social Admin Pharm. 2008; 4:206–217.

49. Agency for Healthcare Research and Quality. [Accessed 29.09.12] 2011 National Healthcare Quality & Disparities Reports. Available at: www.ahrq.gov/qual/qrdr11.htm

Table 1

Sociodemographic characteristics of the community pharmacy patients across racial and ethnic groups, 2009

Characteristics	Groups	Non-Hispanic Whites (*N* = 4215; weighted *N* = 58,152,471)			Non-Hispanic Blacks (*N* = 1437; weighted *N* = 7,122,068)			Hispanics (*N* = 1193; weighted *N* = 5,860,710)		
		Frequency	Weighted number	%	Frequency	Weighted number	%	Frequency	Weighted number	%
Age (years)[a,b]	50–59	1574	22,056,662	37.9	628	3,181,451	44.7	578	2,581,595	44.1
	60–69	1292	17,708,854	30.4	451	2,115,247	29.7	337	1,614,428	27.5
	70–79	783	10,565,428	18.2	212	1,101,001	15.4	197	1,149,422	19.6
	≥80	566	7,821,526	13.5	146	724,368	10.2	81	515,265	8.8
Gender[a]	Female	2376	32,227,571	55.4	923	4,372,059	61.4	701	3,333,909	56.9
	Male	1839	25,924,900	44.6	514	2,750,009	38.6	492	2,526,801	43.1
Marital status[a,b]	Not married	1561	21,075,663	36.2	881	4,187,288	58.8	492	2,590,226	44.2
	Married	2654	37,076,808	63.8	556	2,934,780	41.2	701	3,270,484	55.8
Highest degree[a,b,c]	Lower than high school	697	8,339,705	14.4	463	2,048,407	29.1	696	3,051,703	52.5
	High school	979	28,304,364	48.9	657	3,288,827	46.6	314	1,716,026	29.5
	Bachelor	239	9,975,273	17.2	133	721,718	10.2	85	491,130	8.4
	Master and higher	157	6,305,657	10.9	82	506,520	7.2	33	247,155	4.3
	Other	122	5,003,954	8.6	89	489,424	6.9	54	309,322	5.3
Private health insurance[a,b]	No	1488	18,950,724	32.6	759	3,546,096	49.8	722	3,436,874	58.6
	Yes	2727	39,201,746	67.4	678	3,575,971	50.2	471	2,423,836	41.4
Medicare[a,b]	No	2082	29,759,394	51.2	757	3,879,548	54.5	737	3,368,120	57.5
	Yes	2133	28,393,077	48.8	680	3,242,520	45.5	456	2,492,590	42.5
Medicaid[a,b]	No	3912	54,847,423	94.3	1108	5,690,168	79.9	869	4,432,662	75.6
	Yes	303	3,305,048	5.7	329	1,431,900	20.1	324	1,428,048	24.4
Poverty categories[a,b,d]	Poor	405	4,246,845	7.3	316	1,261,625	17.7	250	1,007,408	17.2
	Near poor	211	2,581,945	4.4	107	550,790	7.7	82	418,948	7.2
	Low income	509	6,539,693	11.2	269	1,347,096	18.9	224	1,226,137	20.9
	Middle income	1277	16,775,196	28.9	430	2,063,239	29.0	387	1,764,856	30.1
	High income	1813	28,008,792	48.2	315	1,899,317	26.7	250	1,443,361	24.6
Region[a,b]	Northeast	658	11,155,304	19.2	241	1,169,343	16.4	206	940,118	16.0
	Midwest	1128	15,119,455	26.0	209	1,200,342	16.8	88	407,568	7.0

Characteristics	Groups	Non-Hispanic Whites (*N* = 4215; weighted *N* = 58,152,471)			Non-Hispanic Blacks (*N* = 1437; weighted *N* = 7,122,068)			Hispanics (*N* = 1193; weighted *N* = 5,860,710)		
		Frequency	Weighted number	%	Frequency	Weighted number	%	Frequency	Weighted number	%
	South	1573	20,481,608	35.2	865	4,078,240	57.3	417	2,185,495	37.3
	West	856	11,396,104	19.6	122	674,142	9.5	482	2,327,529	39.7
Metropolitan Statistical Area[a,b]	No	988	12,354,218	21.2	243	832,548	11.7	88	444,648	7.6
	Yes	3227	45,798,253	78.8	1194	6,289,519	88.3	1105	5,416,062	92.4
Self-perceived Health status[a,b,e]	Excellent	641	9,003,152	15.6	102	545,064	7.8	94	586,910	10.1
	Very good	1314	18,984,883	32.9	340	1,721,457	24.5	236	1,195,127	20.5
	Good	1345	18,378,837	31.8	511	2,596,180	37.0	403	1,960,106	33.6
	Fair	609	7,992,483	13.9	359	1,696,910	24.2	350	1,640,113	28.0
	Poor	276	3,342,843	5.8	103	453,873	6.5	104	455,110	7.8
No. of chronic conditions[a,b]	≤1	171	2,420,632	4.1	104	548,927	7.7	94	442,324	7.6
	2–4	1242	17,542,725	30.2	472	2,367,972	33.3	434	2,133,079	36.4
	≥5	2802	38,189,115	65.7	861	4,205,168	59.0	665	3,285,307	56.0

[a] $P < 0.05$ for the difference between non-Hispanic Whites (Whites) and non-Hispanic Blacks (Blacks).

[b] $P < 0.05$ for the difference between Whites and Hispanics.

[c] Information on Highest degree was missing for 41 community pharmacy patients.

[d] Categories of poverty status: Poor, <100% of poverty line; Near poor, 100– <125% of poverty line; Low income, 125– <200% of poverty line; Middle income, 200– <400% of poverty line; High income, 400% and greater.

[e] Information on self-perceived health status was missing for 58 community pharmacy patients.

Table 2

Sociodemographic characteristics of the non-community pharmacy respondents across racial and ethnic groups, 2009

Characteristics	Groups	Non-Hispanic Whites (*N* = 1117; weighted *N* = 15,902,451)			Non-Hispanic Blacks (*N* = 449; weighted *N* = 2,343,748)			Hispanics (*N* = 511; weighted *N* = 2,319,054)		
		Frequency	Weighted Number	%	Frequency	Weighted Number	%	Frequency	Weighted Number	%
Age (years)[b]	50–59	586	8,583,475	54.0	274	1,470,421	62.7	338	1,447,862	62.4
	60–69	315	4,268,172	26.8	107	546,637	23.3	128	601,146	25.9
	70–79	146	2,060,599	13.0	45	213,987	9.2	29	180,525	7.8
	≥80	70	990,206	6.2	23	112,702	4.8	16	89,522	3.9
Gender[a]	Female	488	6,802,140	42.8	220	1,123,009	47.9	224	995,115	42.9
	Male	629	9,100,310	57.2	229	1,220,739	52.1	287	1,323,939	57.1
Marital status[a]	Not married	384	5,304,522	33.4	229	1,118,612	47.7	162	794,732	34.3
	Married	733	10,597,929	66.6	220	1,225,136	52.3	349	1,524,322	65.7
Highest degree[a,b,c]	Lower than high school	133	1,602,211	10.1	123	521,261	22.8	271	1,140,352	50.1
	High school	538	7,430,926	46.9	217	1,207,268	52.7	163	729,964	32.1
	Bachelor	219	3,323,661	21.0	42	253,856	11.1	37	197,019	8.7
	Master and higher	140	2,214,072	14.0	29	181,124	7.9	14	99,064	4.4
	Other	81	1,267,726	8.0	26	125,556	5.5	17	107,904	4.7
Private health insurance[a,b]	No	357	4,612,249	29.0	206	962,118	41.1	300	1,323,771	57.1
	Yes	760	11,290,202	71.0	243	1,381,630	58.9	211	995,284	42.9
Medicare[a,b]	No	754	11,074,775	69.6	335	1,792,127	76.5	431	1,869,151	80.6
	Yes	363	4,827,675	30.4	114	551,621	23.5	80	449,903	19.4
Medicaid[a,b]	No	1088	15,573,247	97.9	410	2,161,638	92.2	473	2,173,057	93.7
	Yes	29	329,203	2.1	39	182,110	78	38	145,998	6.3
Poverty categories[a,b,d]	Poor	83	857,628	5.4	86	366,880	15.7	86	388,728	16.8
	Near poor	41	449,605	2.8	23	129,778	5.6	25	118,298	5.1
	Low income	116	1,669,664	10.5	75	366,535	15.6	98	394,435	17.0
	Middle income	340	4,596,467	28.9	132	640,511	27.3	197	828,975	35.7
	High income	537	8,329,087	52.4	133	840,045	35.8	105	588,618	25.4
Region[a,b]	Northeast	193	3,310,333	20.8	83	450,201	19.2	82	353,914	15.3
	Midwest	281	3,903,668	24.6	72	402,486	17.2	41	119,622	5.1

Characteristics	Groups	Non-Hispanic Whites (*N* = 1117; weighted *N* = 15,902,451)			Non-Hispanic Blacks (*N* = 449; weighted *N* = 2,343,748)			Hispanics (*N* = 511; weighted *N* = 2,319,054)		
		Frequency	Weighted Number	%	Frequency	Weighted Number	%	Frequency	Weighted Number	%
	South	385	5,155,037	32.4	254	1,284,527	54.8	168	839,719	36.2
	West	258	3,533,413	22.2	40	206,534	8.8	220	1,005,799	43.4
Metropolitan Statistical area[a,b]	No	217	2,888,019	18.2	65	257,455	11.0	42	180,992	7.8
	Yes	900	13,014,432	81.8	384	2,086,293	89.0	469	2,138,062	92.2
Self-perceived Health status[a,b,e]	Excellent	328	4,812,734	30.5	92	512,184	22.1	94	480,426	20.7
	Very good	399	5,714,233	36.2	142	756,085	32.7	158	758,942	32.7
	Good	273	3,864,237	24.4	154	784,847	33.9	179	725,358	31.3
	Fair	79	936,892	5.9	47	234,497	10.1	71	313,277	13.5
	Poor	32	474,320	3.0	8	26,326	1.2	9	41,053	1.8
No. of chronic conditions	≤1	529	7,505,643	47.2	291	1,530,845	65.3	375	1,664,263	71.8
	2–4	348	4,921,819	30.9	112	565,476	24.1	106	505,134	21.8
	≥5	240	3,474,989	21.9	46	247,428	10.6	30	149,657	6.4

[a] $P < 0.05$ for the difference between non-Hispanic Whites (Whites) and non-Hispanic Blacks (Blacks).

[b] $P < 0.05$ for the difference between Whites and Hispanics.

[c] Information on Highest degree was missing for 27 non-community pharmacy respondents.

[d] Categories of poverty status: Poor, <100% of poverty line; Near Poor, 100– <125% of poverty line; Low income, 125– <200% of poverty line; Middle income, 200– <400% of poverty line; High income, 400% and greater.

[e] Information on self-perceived health status was missing for 12 non-community pharmacy respondents.

Table 3

Influenza vaccination status of the study population across racial and ethnic groups in 2009

Characteristics	Influenza vaccination within past year	Community pharmacy patients[e] (N = 6673; weighted N= 69,522,373)			Non-community pharmacy respondents[f] (N= 1972; weighted N = 19,791,089)		
		Number	Weighted number	%	Number	Weighted number	%
Non-Hispanic Whites	No	1611	22,244,445	39.1	628	9,104,799	59.0
	Yes	2517	34,666,066	60.9	455	6,330,276	41.0
Non-Hispanic Blacks[a,b]	No	715	3,493,619	50.9	311	1,651,802	75.7
	Yes	666	3,373,819	49.1	101	530,760	24.3
Hispanics[c,d]	No	574	2,774,630	48.3	360	1,608,214	74.0
	Yes	590	2,969,794	51.7	117	565,237	26.0

[a] $P < 0.05$ for the difference between non-Hispanic Whites (Whites) and non-Hispanic Blacks (Blacks) among community pharmacy patients.

[b] $P < 0.05$ for the difference between Whites and Blacks among non-community pharmacy respondents.

[c] $P < 0.05$ for the difference between Whites and Hispanics among community pharmacy patients.

[d] $P < 0.05$ for the difference between Whites and Hispanics among non-community pharmacy respondents.

[e] Information regarding influenza vaccinations was missing for 172 community pharmacy patients.

[f] Information regarding influenza vaccinations was missing for 105 non-community pharmacy respondents.

Table 4

Racial and ethnic disparities in influenza vaccinations within the past year among the community pharmacy patients, 2009

	Estimate	Standard error	Wald chi-square	*P*-value[a]	Odds ratio	95% Confidence interval for odds ratio
Intercept	−3.99	0.38	110.69	<0.0001	–	–
Non-Hispanic Whites	–	–	–	–	–	–
Non-Hispanic Blacks	−0.21	0.08	6.35	0.0117	0.81	0.69–0.95
Hispanics	0.02	0.10	0.03	0.8730	1.02	0.83–1.24
Age (years)	0.05	0.006	74.79	<0.0001	1.05	1.04–1.06
Female	–	–	–	–	–	–
Male	−0.21	0.06	13.38	0.0003	0.81	0.73–0.91
Not married	–	–	–	–	–	–
Married	0.12	0.08	2.55	0.1105	1.13	0.97–1.32
Lower than high school	–	–	–	–		–
High school	0.11	0.08	1.76	0.1853	1.11	0.95–1.31
Bachelor	0.37	0.12	9.42	0.0021	1.45	1.15–1.84
Master and higher	0.42	0.16	7.13	0.0076	1.52	1.12–2.06
Other degree	0.17	0.13	1.50	0.2201	1.18	0.91–1.54
No private insurance	–	–	–	–	–	–
Any private insurance	0.26	0.08	9.52	0.0020	1.30	1.10–1.53
No Medicare	–	–	–	–	–	–
Medicare	0.25	0.12	4.05	0.0441	1.28	1.01–1.63
No Medicaid	–	–	–	–	–	–
Medicaid	−0.04	0.13	0.09	0.7669	0.96	0.74–1.24
Poor[b]	–	–	–	–	–	–
Near poor	−0.21	0.15	2.02	0.1557	0.81	0.60–1.08
Low income	−0.07	0.14	0.28	0.5961	0.93	0.71–1.22
Middle income	−0.06	0.12	0.26	0.6096	0.94	0.74–1.19
High income	0.12	0.12	1.00	0.3165	1.13	0.89–1.42
Northeast	–	–	–	–	–	–
Midwest	0.22	0.11	3.65	0.0562	1.24	0.99–1.55
South	−0.03	0.10	0.10	0.7481	0.97	0.78–1.18

	Estimate	Standard error	Wald chi-square	*P*-value[a]	Odds ratio	95% Confidence interval for odds ratio
West	−0.06	0.12	0.21	0.6434	0.95	0.75–1.20
Non-MSA	–	–	–	–	–	–
MSA	−0.08	0.09	0.83	0.3628	0.92	0.77–1.10
Excellent self-perceived health status	–	–	–	–	–	–
Very good self-perceived health status	0.09	0.11	0.61	0.4334	1.09	0.87–1.37
Good self-perceived health status	0.06	0.10	0.29	0.5932	1.06	0.86–1.29
Fair self-perceived health status	0.06	0.12	0.27	0.6021	1.06	0.85–1.33
Poor self-perceived health status	0.14	0.1683	0.66	0.4169	1.15	0.82–1.59
≤ 1 Chronic conditions	–	–	–	–	–	–
2 – 4 Chronic conditions	0.47	0.17	7.45	0.0063	1.59	1.14–2.23
≥ 5 Chronic conditions	1.13	0.18	41.09	<0.0001	3.09	2.19–4.37

Model adjusted for variables based on the Andersen's model: predisposing factors (age, gender, and marital status), enabling factors (highest degree received, private health insurance, Medicare, Medicaid, poverty categories, geographic regions, and metropolitan statistical area [MSA]), and need factors (self-perceived health status and number of chronic conditions).

[a]We used 4 decimal places for *P*-values because of some low *P*-values, e.g., <0.0001 has 4 decimal places.

[b]Categories of poverty status: Poor, <100% of poverty line; Near poor, 100– <125% of poverty line; Low income, 125– <200% of poverty line; Middle income, 200– <400% of poverty line; High income, 400% and greater.

Table 5

Racial and ethnic disparities in influenza vaccinations within the past year among the non-community pharmacy respondents, 2009

	Estimate	Standard error	Wald chi-square	*P*-value[a]	Odds ratio	95% Confidence interval for odds ratio
Intercept	−5.13	0.85	36.84	<0.0001	–	–
Non-Hispanic Whites	–	–	–	–	–	–
Non-Hispanic Blacks	−0.42	0.18	5.38	0.0203	0.66	0.46–0.94
Hispanics	0.02	0.22	0.01	0.9259	1.02	0.66–1.58
Age (years)	0.06	0.01	21.31	<0.0001	1.06	1.03–1.09
Female	–	–	–	–	–	–
Male	−0.53	0.12	20.53	<0.0001	0.59	0.47–0.74
Not married	–	–	–	–	–	–
Married	0.12	0.18	0.47	0.4929	1.13	0.80–1.61
Lower than high school	–	–	–	–		–
High school	−0.03	0.21	0.02	0.8858	0.97	0.64–1.47
Bachelor	0.81	0.24	10.94	0.0009	2.25	1.39–3.63
Master and higher	0.69	0.27	6.23	0.0125	1.98	1.16–3.40
Other degree	0.11	0.33	0.12	0.7321	1.12	0.59–2.13
No private insurance	–	–	–	–	–	–
Any private insurance	0.67	0.17	16.15	<0.0001	1.96	1.41–2.73
No medicare	–	–	–	–	–	–
Medicare	0.09	0.26	0.11	0.7385	1.09	0.65–1.83
No medicaid	–	–	–	–	–	–
Medicaid	0.35	0.32	1.22	0.2686	1.42	0.76–2.63
Poor[b]	–	–	–	–	–	–
Near poor	0.16	0.46	0.13	0.7223	1.18	0.48–2.90
Low income	−0.43	0.30	2.04	0.1527	0.65	0.36–1.17
Middle income	0.20	0.24	0.68	0.4106	1.22	0.76–1.96
High income	0.08	0.26	0.10	0.7534	1.09	0.65–1.81
Northeast	–	–	–	–	–	–
Midwest	0.02	0.23	0.01	0.9390	1.02	0.65–1.61
South	0.17	0.20	0.69	0.4045	1.18	0.80–1.76

	Estimate	Standard error	Wald chi-square	*P*-value[a]	Odds ratio	95% Confidence interval for odds ratio
West	−0.07	0.22	0.10	0.7543	0.93	0.61–1.43
Non-MSA	–	–	–	–	–	–
MSA	0.003	0.21	0.00	0.9878	1.00	0.66–1.52
Excellent self-perceived health status	–	–	–	–	–	–
Very good self-perceived health status	0.19	0.18	1.11	0.2910	1.21	0.85–1.73
Good self-perceived health status	0.02	0.20	0.01	0.9114	1.02	0.69–1.51
Fair self-perceived health status	−0.13	0.28	0.23	0.6351	0.88	0.50–1.52
Poor self-perceived health status	0.36	0.45	0.63	0.4290	1.43	0.59–3.45
≤ 1 Chronic conditions	–	–	–	–	–	–
2 – 4 Chronic conditions	0.40	0.14	8.13	0.0043	1.49	1.13–1.97
≥ 5 Chronic conditions	1.57	0.20	63.00	<0.0001	4.79	3.25–7.05

Model adjusted for variables based on the Andersen's model: predisposing factors (age, gender, and marital status), enabling factors (highest degree received, private health insurance, Medicare, Medicaid, poverty categories, geographic regions and metropolitan statistical area [MSA]) and need factors (self-perceived health status and number of chronic conditions).

[a]We used 4 decimal places for *P*-values because of some low *P*-values, e.g., <0.0001 has 4 decimal places.

[b]Categories of poverty status: Poor, <100% of poverty line; Near poor, 100 <125% of poverty line; Low income, 125– <200% of poverty line; Middle income, 200– <400% of poverty line; High income, 400% and greater.

Table 6

Comparison of the overall influenza vaccination rates reported between community pharmacy patients and non-community pharmacy respondents in 2009

Influenza vaccination within past year	Community pharmacy patients[a] (*N* = 7216; weighted *N* = 73,098,202), %	Non-community pharmacy respondents[a] (*N* = 2193; weighted *N* = 21,216,999), %	*P*-value
No	41.0	68.8	<0.0001
Yes	59.0	37.2	

[a] Information regarding influenza vaccinations was missing for 318 survey respondents aged 50 years or over.