RESEARCH PAPER

Human Vaccines & Immunotherapeutics 10:7, 2098–2103; July 2014; © 2014 Landes Bioscience

Influenza vaccine hesitancy in a low-income community in central New York State

Manika Suryadevara[1,*], Cynthia A Bonville[1], Paula F Rosenbaum[2], and Joseph B Domachowske[1]

[1]Department of Pediatrics; State University of New York; Upstate Medical University; Syracuse, NY USA; [2]Department of Public Health and Preventive Medicine; State University of New York; Upstate Medical University; Syracuse, NY USA

Keywords: influenza, vaccine hesitancy, vaccine attitudes, low-income community, vaccine misperceptions

Abbreviations: Advisory Committee on Immunization Practices, ACIP; influenza vaccine, IV; trivalent influenza vaccine, TIV

Objective: Influenza vaccine (IV) coverage rates remain suboptimal among US adults. Socioeconomic disparities exist in IV coverage. We describe influenza vaccine attitudes among a low-income community in central New York.

Methods: Adults attending a Salvation Army function during December 2012 were surveyed regarding IV including their intention to be immunized. On-site IV was offered to eligible participants.

Results: The 1041 participants included Whites (non-Hispanics), African Americans, Hispanics, Native Americans, and multi-racial ethnicities. At time of enrollment, 386 (37%) participants had already received 2012–13 IV. Of the 655 unimmunized participants, 299 (46%) stated intent to receive IV, evenly distributed by age, gender, and ethnicity. Of the 312 participants who declined IV, 46% did so because of IV misperceptions. Of the 299 participants who intended to receive vaccine but had not yet done so, 284 (95%) stated the reason for delay was difficult access to vaccine. Intent to receive vaccine was strongly associated with the belief that IV is safe and/or effective ($P < 0.05$).

Conclusion: IV misperceptions regarding IV efficacy and safety result in suboptimal vaccine uptake in this low-income community, regardless of age, gender, or ethnicity.

Introduction

Influenza infection causes significant disease burden in the United States, with annual seasonal increases in work and school absenteeism, medically attended visits, hospitalizations, and deaths.[1,2] In the last decade, the Advisory Committee on Immunization Practices (ACIP) recommendations for seasonal influenza vaccine (IV) have evolved from targeting high-risk patients only to recommendations for annual vaccination of all Americans 6 mo of age and older.[3,4] However, despite the now universal recommendation for IV, adult coverage rates at the end of the 2011–12 influenza season were only 45% in the US, significantly lower than the HealthyPeople 2020 goal of 80% in adults aged 18 to 64 y and 90% in those over 65 y of age.[1]

Socioeconomic and racial/ethnic disparities exist in IV coverage rates.[5-9] IV uptake is lower in circumstances associated with poverty. Poverty accounts for numerous barriers that interfere with receipt of immunizations, including the financial burden of vaccine administration, lack of access to medical care, and lack of understanding of vaccine importance and safety.[5,9] African Americans and Hispanics are less likely than non-Hispanic Whites to have received IV, possibly due to cultural and ethnic differences in vaccine attitudes.[7] There are few studies, however, describing vaccine attitudes by age, gender, or race/ethnicity in low-income communities.

Understanding the obstacles to vaccine uptake, with regard to both attitudes and access, is necessary to effectively increase IV coverage rates in this population. Here, we partnered with a local community-based organization to describe attitudes regarding influenza infection and vaccine in low-income adults of central New York and offer on-site IV to those eligible.

Results

A total of 1041 participants were enrolled in this study, 931 (89%) were female. The ages of the participants ranged from 18 to 88 y, with a mean and median age of 35 and 33 y, respectively. Non-Hispanic White (44%) and African American (37%) were the most common ethnicities represented (**Table 1**). In total, 395 adults, including 9 pregnant women, and 135 children less than 18 y of age, were immunized during the 2-wk study period.

At the time of study enrollment, 386 (37%) participants had already received 2012–13 IV. Of the 655 unimmunized participants, 299 (46%) stated intent to receive 2012–13 IV, 312 (30%) stated they had no intent to receive IV, and 44 (4%) were

*Correspondence to: Manika Suryadevara; Email: suryadem@upstate.edu
Submitted: 03/20/2014; Accepted: 03/31/2014; Published Online: 04/29/2014
http://dx.doi.org/10.4161/hv.28716

Table 1. Demographics of enrolled participants

	N (%)	Immunized (%)	Unimmunized (%)	Intent to receive influenza vaccine			
				Y (%)	N (%)	Do not know (%)	P*
Enrolled	1041	386 (37)	655 (63)	299 (46)	312 (47)	44 (7)	
Gender							0.62
Female	931 (89)	344 (37)	587 (63)	266 (45)	279 (48)	42 (7)	
Male	110 (11)	42 (38)	68 (62)	33 (49)	33 (49)	2 (2)	
Age (y)	1025 (98)[a]						0.4
18–29	350 (34)	126 (36)	224 (64)	96 (43)	112 (50)	16 (7)	
30–39	387 (38)	136 (35)	251 (65)	107 (43)	125 (50)	19 (7)	
40–49	184 (18)	65 (35)	119 (65)	62 (52)	51 (43)	6 (5)	
50–59	80 (8)	39 (49)	41 (51)	24 (59)	15 (37)	2 (4)	
60–69	22 (2)	11 (50)	11 (50)	6 (55)	4 (36)	1 (9)	
70+	3 (<1)	2 (67)	1 (33)				
Ethnicity	987 (95)[b]						0.86
Whites	433 (44)	147 (34)	287 (66)	139 (48)	129 (45)	18 (7)	
African American	364 (37)	149 (41)	215 (59)	91 (43)	106 (49)	18 (8)	
Hispanic	84 (9)	31 (37)	53 (63)	26 (49)	25 (47)	2 (4)	
Native American	32 (3)	14 (44)	18 (56)	9 (50)	8 (44)	1 (6)	
Multi-racial	62 (6)	22 (35)	40 (65)	16 (40)	21 (53)	3 (7)	
Other[c]	12 (1)	5 (42)	7 (58)	3 (43)	3 (43)	1 (14)	

[a]The total 1025 is less than the total of the enrolled participants because 16 individuals did not provide age. [b]The total of 987 is less than the total of enrolled participants because 54 individuals did not provide ethnicity. [c]Other ethnicities include Asian, Pacific Islander, African, and Middle Eastern; *Represents *P* value, using the Pearson chi-square test, comparing intent to vaccinate among the unimmunized by age, gender, or ethnicity.

unsure about their intent. There was even distribution of IV hesitancy among the different age groups, genders, and ethnicities (**Table 1**). Of the 299 participants who intended to receive vaccine but had not yet done so, 284 (95%) stated the reason for delay was difficult access to vaccine (cost, lack of insurance, no doctor, or no time).

Of the 128/299 participants who provided reasons for having intent to receive vaccine, the majority (94,) did so for protection of self and/or family (**Table 2**). In general, the younger age groups were more likely than the elders ($P < 0.01$), and females were more likely than males, to state this as a reason for intent to receive vaccine ($P = 0.03$). There were no associations between ethnicity and reason for intent to receive vaccine.

Of the 312 participants who provided reasons for their vaccine hesitancy, 145 (46%) stated a misperception (vaccine leads to illness, is unnecessary or ineffective) (**Table 2**). Males (9/33, 27%) were more likely than females (23/284, 8%) to be vaccine hesitant because of the belief that the vaccine was unnecessary ($P = 0.01$). Four of the six participants who were vaccine hesitant because of lack of trust of the government were African American. There were no associations between age or ethnicity and the stated reason for declining vaccine.

Influenza was correctly identified as a respiratory infection by 467 (45%) of the 1,041 participants, a proportion consistent through age groups, gender, and ethnicities. Potential influenza complications, including pneumonia, worsening of underlying medical condition, hospitalization, and death were correctly identified by 237 (23%) of the 1041 participants. The older age groups were more likely than the younger, and non-Hispanic Whites were more likely than other ethnicities, to correctly identify potential influenza complications ($P < 0.01$). Populations at high-risk for developing influenza complications, including young infants, elderly, people with underlying medical conditions, and pregnant women, were correctly identified by 457 (44%) of the 1,041 participants. While females (425/932, 46%) were more likely than males (32/110, 29%) to identify these high-risk populations ($P < 0.01$), there were no differences noted between age groups or ethnicities. There were no statistical

associations observed between the participants' understanding of influenza symptoms, complications, or high-risk populations and their intent to receive vaccine, even when controlled for socio-demographic factors (**Table 3**).

Of the 1,041 participants, 752 (72%) stated that they had received an IV prior to the 2012–13 season. Females (682/931, 73%) were more likely than males (70/110, 64%) to have received a prior IV (P = 0.045). There were no associations between receiving a prior IV and age or ethnicity. Of the 299 participants with intent to receive 2012–13 vaccine, 241 (81%) had received a prior IV, when compared with only 166 (47%) of the 356 vaccine hesitant. Having received a prior IV was associated with intent to receive IV this season (P < 0.01).

Of the 989 participants with children, 627 (63%) stated that their children had already received IV this season. Interestingly, 150 (44%) of the 343 vaccine hesitant participants who had children stated that their children have already received 2012–13 IV. Of the 984 participants who answered the question, 791 (80%) stated that children should receive annual IV, while 869 (88%) stated that children should receive all routine pediatric vaccines. Non-Hispanic Whites were the most likely, and African Americans the least likely, to believe that children should receive IV as well as all routine vaccines (P = 0.01).

Of the 985 participants who answered the questions regarding vaccine safety and efficacy, 687 (70%) and 624 (63%) believed that the IV was safe and effective, respectively. There were no associations observed between the belief that IV was safe and age, gender, or ethnicity. Increasing age was, however, associated with an increased belief that IV was effective (P = 0.02). Of the 299 participants who expressed intent to receive vaccine, 239 (80%) stated belief that IV was safe and 226 (76%) stated belief that IV was effective. On the other hand, of the 356 vaccine hesitant, only 134 (38%) stated belief that IV was safe and 117 (33%) stated belief that IV was effective. The belief that IV was safe and/or effective was strongly associated with intent to receive vaccine (P < 0.01), even when controlled for socio-demographic factors (**Table 4**).

Influenza vaccine attitudes/beliefs among those who have already been immunized were similar to the unimmunized participants with intent to receive IV. 85% of those with intent to receive IV and 87% of those who had already received an IV thought it was safe whereas 37% of participants who were not planning on an IV and 55% who were not certain of their intent thought it was safe (P < 0.001 for comparison of safety belief across all 4 categories). The percentage of participants who believed IV was effective also was similar for those with intent to receive vaccine (79%) and those who had already received IV (78%); the opinion of effectiveness was lower among those without intent to receive IV (33%) and those who were uncertain of their intent (48%) (P < 0.001 for comparison of effectiveness belief across all 4 categories). Of the 386 immunized participants, 345 (89%) stated that they had received IV in the past while 81% of those intending to receive IV had previously had a flu shot. Knowledge of influenza symptoms, complications or high risk groups was not associated with immunization/intent status (P > 0.05 for each comparison across 4 category variable).

Table 2. Summary of common responses to why participants who had not yet received 2012–2013 influenza vaccine had intention to receive or decline influenza vaccine

Reasons for receiving IV—299 participants, intention 'Yes'	N (%)
To protect self/family	94 (32)
Participant has an underlying medical condition	13 (5)
Required by job	12 (4)
"Always get it"	7 (2)
Reasons for declining IV—312 participants, intention 'No'	**N (%)**
Participants "do not want it"	123 (39)
Vaccine leads to illness	100 (32)
Vaccine is unnecessary	33 (11)
Vaccine is ineffective	12 (4)
Participant is scared of vaccine	11 (4)
Participants do not believe in it	9 (3)
Medical contraindication	9 (3)
Participants do not trust the government	6 (2)
Doctor did not recommend	5 (2)
Difficult access to vaccine	4 (1)

Discussion

We developed a novel community-based program to assess understanding and attitudes of influenza infection and vaccine among low-income adults in central New York and to offer on-site IV to those eligible. Non-medical settings for IV administration are becoming increasingly common and acceptable to both health care providers and the general public.[7,10-13] The Behavioral Risk Factor Surveillance survey reported that 41% of adults received 2010–11 IV in a non-medical setting, most commonly retail stores and the workplace.[14] In 2006, the Vote and Vax program provided IV to people accessing the voting polls.[15] These vaccine clinics have been found to be safe, convenient, and cost-effective in the prevention of influenza in the community.[16-18] While previously published work describe community-based vaccine delivery at grocery stores, pharmacies, work place, and voting polls, this is the first report of offering influenza education and on-site IV at a community-based organization gift program known to be accessed by a large number of low-income families. We provided IV, free of charge, at a location already utilized for other community services and vaccinated over 500 individuals in 2 wk, reinforcing the importance of improving access to vaccine, in both location and cost, to increase IV uptake in low-income populations.

Unlike previous studies which describe IV acceptance rates by ethnicity/race or age over a range of socioeconomic status, we chose to focus our assessment of IV attitudes on a low-income community. In this study, intention to receive IV was evenly distributed among age, gender, and race/ethnicity. However, the reasons behind intent differed, with self and/or family protection provided most commonly by the younger age groups and the females. In a study of adults ≥60 y in rural Vermont, Bosompra

Table 3. Influenza infection knowledge as predictors of vaccine receipt intention among participants who had not already received an influenza vaccination in 2012–2013. Unadjusted and covariate-adjusted logistic regression models, odds ratios (OR), and 95 percent confidence intervals (CI)

Model A					
Know respiratory symptoms					
No					
Yes				**Model B**	
Model C				1.00	
Know flu complications	353	1.00	Referent	1.09	Referent
No	264	1.06	(0.77–1.46)	**Model D**	(0.79–1.50)
Yes	478	1.00	Referent	1.00	Referent
Model E	139	1.33	(0.91–1.94)	1.21	(0.82–1.79)
Know high risk groups	359	1.00	Referent	**Model F**	Referent
No	258	0.88	(0.64–1.21)	1.00	(0.61–1.18)
Yes	545	1.00	Referent	0.85	Referent
Model G	434	1.03	(0.74–1.42)	**Model H**	(0.77–1.49)
Know respiratory symptoms	749	1.00	Referent	1.00	Referent
No	230	1.40	(0.94–2.09)	1.07	(0.85–1.92)
Yes	540	1.00	Referent	1.00	Referent
Know flu complications	439	0.82	(0.59–1.14)	1.27	(0.57–1.13)
No				1.00	
Yes				0.80	
Know high risk groups					
No					
Yes					

Adjusted for age (y), gender, race; Unadjusted Predictor Models Adjusted for Covariates; N OR (95% CI) OR (95% CI).

showed that perceived benefits of vaccine were strongly correlated with intention to receive IV.[19] Thus, understanding the trends in positive attitudes can guide future educational interventions to impact this subpopulation's intent to receive vaccine.

Surprisingly, intention to receive IV was not associated with the participants' understanding of influenza symptoms, complications, or high-risk groups, but instead associated with the belief that IV was safe and/or effective. Misperceptions regarding IV safety and efficacy, particularly that IV results in illness and/or is ineffective were provided by almost half of the 312 participants with no intent to receive IV. While prior studies have described this finding in adults ≥65 y of age, in this study, vaccine hesitancy due to a misperception of vaccine safety and/or efficacy was present in all age groups, gender, and race/ethnicities.[7,20] Buchner found that reversals in intent to receive IV were closely related to change in attitudes concerning IV side effects.[21] Along the same lines, Wray used vaccine safety messages to effectively improve vaccine attitudes in African Americans ≥50 y of age.[6] Expanding these educational interventions to low-income adults of all demographic backgrounds is crucial to improving vaccine attitudes and uptake in this community.

There were no racial/ethnic differences among the vaccine hesitant population. While prior publications have shown that African Americans were more likely to be resistant to vaccine and Hispanics were more likely to believe IV was unnecessary, in this study of low-income adults, there were no associations between race/ethnicity and vaccine hesitancy.[7,8]

Despite not having any racial/ethnic differences among the population declining IV, African Americans were more likely to state that children should not receive routine pediatric vaccines, including IV. Similarly, 4 out of the 6 participants who stated their refusal to receive IV was a result of mistrust in the government were African-Americans. This finding is consistent with previously published work. Vlahov, who reported that African Americans were less likely than other races/ethnicities to be interested in IV and more likely to be uncomfortable with the government, went on to suggest the benefit of health care collaboration with non-governmental community agencies to provide influenza education to this population.[22]

There are several limitations to this study. First, we administered surveys to people in this low-income community who were accessing holiday gift distribution services, and therefore most of our participants were female and had children in their household. This could have resulted in selection bias and thus may not be generalizable to the low-income population without children. Second, there is no data collected for adults who were approached but declined enrollment in the study. On the other hand, we surveyed over 1000 low-income adults in this community. While generally a limited methodology, the use of a survey in this study allowed us to describe influenza vaccine attitudes and determine areas for future educational interventions to increase IV coverage rates in this population.

While published studies describe health care provider and general public support of immunization clinics in local pharmacies, grocery stores, and churches, we opted to partner with the local Salvation Army to reach a large number of families in the two-week study period in mid-December.[7,10-13] Here, we have described a novel, multi-faceted, community-based program which allowed us the opportunity to describe influenza attitudes among low-income adults and provide IV on-site, free of charge, at a location already utilized for community services to those interested in being immunized. Future educational programs that focus on IV safety and efficacy are required to further improve IV uptake in this high-risk, low-income community.

Methods

This descriptive study was performed in collaboration with the New York State Onondaga County Health Department and the Salvation Army of the Greater Syracuse Area. Each December, the local Salvation Army hosts a gift distribution program where low-income families, with an income less than 150% of federal poverty guidelines, receive food and gifts for the holiday season. In 2012, registration for the gift distribution program occurred on 12 d (December 1–15, excluding Sundays) at 10 different community sites. Annually, approximately 5000 families register during this 2-wk period. The

Table 4. Influenza vaccine beliefs as predictors of vaccine receipt intention among participants who had not already received an influenza vaccination in 2012–2013. Unadjusted and adjusted logistic regression models, odds ratios (OR) and 95 percent confidence intervals (CI)

Model A							
Is it safe: No							
Yes				**Model B**			
DNK**	87			1.00	Referent		
Age (years)	355			24.01	(10.70–53.91)		
Gender:	143			4.75	(2.02–11.20)	**Model E**	
Female	585			1.02	(0.997–1.04)	1.00	
Male	527			1.00	Referent	11.36	Referent
Race/ethnicity:	58	1.00		1.15	(0.60–2.19)	3.46	(4.71–27.41)
White	272	24.80		1.00	Referent	1.01	(1.38–8.72)
African American	200	4.91		1.01	(0.66–1.53)	1.00	(0.99–1.03)
Native American	18	**NE	Referent	1.19	(0.40–3.53)	1.24	Referent
Hispanic	52	NE	(11.09–55.42)	1.11	(0.57–2.17)	1.00	(0.64–2.41)
Multiracial/other	43	NE	(2.10–1.51)	0.93	(0.44–1.99)	1.08	Referent
Model C	93	1.00	Referent	**Model D**	Referent	1.03	(0.70–1.67)
Is it effective: No	323	11.05	(6.13–19.90)	1.00	(5.96–19.64)	1.26	(0.34–3.07)
Yes	170	2.18	(1.16–4.09)	10.82	(1.14–4.04)	1.08	(0.63–2.51)
DNK	586	NE		2.15	(0.99–1.03)	1.00	(0.50–2.34)
Age (years)	528	NE		1.01	Referent	3.64	Referent
Gender:	58	NE		1.00	(0.65- 2.24)	1.33	(1.81–7.30)
Female	272			1.20	Referent	—	(0.64–2.75)
Male	201			1.00	(0.65–1.49)	—	
Race/ethnicity:	18			0.99	(0.29–2.35)	—	
White	52			0.82	(0.63–2.39)		
African American	43			1.23	(0.50–2.14)		
Native American				1.03			
Hispanic							
Multiracial/other							

*Adjusted for age, gender, race. ; †Both predictors and the covariates included; note covariates included once. **DNK, do not know; NE, not entered; Unadjusted Predictor Models Adjusted for Covariates* Fully Adjusted Model†; N OR (95% CI) OR (95% CI) OR (95% CI).

study team attended the Salvation Army gift program registration to pursue 2 goals. The first goal was to capture a large low-income population, with a desired sample size of 1000 participants, and describe their understanding of influenza infection and vaccine to guide future educational interventions aimed at improving vaccine coverage rates. Second, we aimed to improve access to vaccine to this population, at risk of poor medical access, by offering on-site IV, at no cost, to those eligible. Written informed consent was obtained (SUNY Upstate Medical University institutional review board study number 267177–3).

Demographic data collected included age, gender, and ethnicity. Each enrolled individual was asked a standardized set of questions to determine individual intention to receive 2012–13 IV and to assess understanding and attitudes regarding influenza infection and vaccine. The survey was self-administered, with both initial yes or no questions and open-ended questions as seen in **Table 5**. Participants who had no intent or unsure intent to receive IV were considered vaccine hesitant. The study team responded to the answers by providing specific individual-focused information regarding influenza infection and immunity, both through direct verbal interaction as well as printed material obtained from the Centers for Disease Control and Prevention. All eligible individuals and their family members were offered trivalent influenza vaccine (TIV), on-site, free-of-charge. At the time of enrollment, 2012–13 IV had already been available in the community for more than 4 mo.

Variables and Statistical analysis: The primary outcome variable, intent to receive influenza vaccine, was categorized as yes, no, do not know and already immunized. The intent outcome was dichotomized for use in logistic regression modeling as no/do not know (the reference category) and yes; individuals who were previously immunized during the 2012–2013 season were excluded from all the logistic regression models and some of the preliminary categorical analyses. Predictor variables used included knowledge of influenza symptoms, knowledge of influenza complications, and knowledge of sub-populations at high risk of developing complications (each as dichotomous yes/no variables), and beliefs that IV is safe and that IV is effective; the latter 2 belief variables were coded as no (the reference), yes and do not know. Possible confounders/covariates of interest were age (categorized by decade and also in years), gender (female was reference), and race/ethnicity which was coded as white (reference), African Americans, Hispanic, Native American, multi-racial, and other. Missing data were excluded from analyses. The Pearson two-sided chi square analyses were used to determine statistical differences in questionnaire responses based on categorical demographic characteristics and intent to receive influenza. Bivariable logistic regression models were fitted to evaluate possible associations between each of the predictors and intent to receive IV. Confounding by sociodemographic variables was evaluated based on a >10% change in the β coefficient for the predictor of intent following forced entry of age (years), gender and race/ethicity (dummy variable

Table 5. Set of standard questions asked each enrolled individual

1. Do you plan to get the 2012–13 influenza vaccine? If no, why not?
2. What are the symptoms of influenza infection?
3. What are some complications of influenza infection?
4. Who is at risk for complications from influenza infection?
5. Have you already received 2012–13 influenza vaccine? If no, why not?
6. Has your child received 2012–13 influenza vaccine? If no, why not?
7. Have you received previous influenza vaccines?
8. Has your child received previous influenza vaccines?
9.Do you have anyone in the household younger than 5, older than 65, with asthma, neurologic conditions, chronic lung disease, heart disease, sickle cell anemia, or immune supression?
10. Do you believe that influenza vaccine is safe?
11. Do you believe that influenza vaccine is effective in reducing influenza complications?
12. Do you believe that children should receive annual influenza vaccine?
13. Do you believe that children should receive all routinely recommended vaccines?

coding) into each of the bivariate models. Multivariable models also were constructed for each set of predictors (belief variables and knowledge based variables) plus the covariates to control for sociodemographic variation in the data. Odds ratios and 95% confidence intervals are reported for logistic regression models.

Disclosure of Potential Conflicts of Interest

No Potential Conflicts of Interest were disclosed.

Acknowledgment

Funding provided by Novartis Vaccines and Diagnostics Educational Grant.

References

1. CDC. National early season flu vaccination coverage. United States, 2012-13 Flu Season. http://www.cdc.gov/flu/fluvaxview/nifs-estimates-nov2012.htm
2. Centers for Disease Control and Prevention (CDC). Estimates of deaths associated with seasonal influenza --- United States, 1976-2007. MMWR Morb Mortal Wkly Rep 2010; 59:1057-62; PMID:20798667
3. Fiore AE, Epperson S, Perrotta D, Bernstein H, Neuzil K. Expanding the recommendations for annual influenza vaccination to school-age children in the United States. Pediatrics 2012; 129(Suppl 2):S54-62; PMID:22383482; http://dx.doi.org/10.1542/peds.2011-0737C
4. Centers for Disease Control and Prevention (CDC). Prevention and control of influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP)--United States, 2012-13 influenza season. MMWR Morb Mortal Wkly Rep 2012; 61:613-8; PMID:22895385
5. Galarce EM, Minsky S, Viswanath K. Socioeconomic status, demographics, beliefs and A(H1N1) vaccine uptake in the United States. Vaccine 2011; 29:5284-9; PMID:21621577; http://dx.doi.org/10.1016/j.vaccine.2011.05.014
6. Wray RJ, Buskirk TD, Jupka K, Lapka C, Jacobsen H, Pakpahan R, Gary E, Wortley P. Influenza vaccination concerns among older blacks: a randomized controlled trial. Am J Prev Med 2009; 36:429-34, e6; PMID:19269130; http://dx.doi.org/10.1016/j.amepre.2009.01.025
7. Singleton JA, Santibanez TA, Wortley PM. Influenza and pneumococcal vaccination of adults aged > or = 65: racial/ethnic differences. Am J Prev Med 2005; 29:412-20; PMID:16376704; http://dx.doi.org/10.1016/j.amepre.2005.08.012
8. 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; 40:517-37; PMID:15762905; http://dx.doi.org/10.1111/j.1475-6773.2005.0e371.x
9. Liao Y, Bang D, Cosgrove S, Dulin R, Harris Z, Taylor A, White S, Yatabe G, Liburd L, Giles W; Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion; Centers for Disease Control and Prevention (CDC). Surveillance of health status in minority communities - Racial and Ethnic Approaches to Community Health Across the U.S. (REACH U.S.) Risk Factor Survey, United States, 2009. MMWR Surveill Summ 2011; 60:1-44; PMID:21597458
10. Frew PM, Painter JE, Hixson B, Kulb C, Moore K, del Rio C, Esteves-Jaramillo A, Omer SB. Factors mediating seasonal and influenza A (H1N1) vaccine acceptance among ethnically diverse populations in the urban south. Vaccine 2012; 30:4200-8; PMID:22537991; http://dx.doi.org/10.1016/j.vaccine.2012.04.053
11. Hurley LP, Wortley P, Allison MA, O'Leary S, Daley MF, Babbel C, Crane LA, Stokley S, Beaty B, Dickinson LM, et al. Seasonal influenza vaccination in adults: practice and attitudes about collaborative delivery with community vaccinators. Vaccine 2011; 29:8649-55; PMID:21933693; http://dx.doi.org/10.1016/j.vaccine.2011.08.126
12. Daniels NA, Juarbe T, Rangel-Lugo M, Moreno-John G, Pérez-Stable EJ. Focus group interviews on racial and ethnic attitudes regarding adult vaccinations. J Natl Med Assoc 2004; 96:1455-61; PMID:15586649
13. Crawford ND, Blaney S, Amesty S, Rivera AV, Turner AK, Ompad DC, Fuller CM. 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; 88:176-85; PMID:21279450; http://dx.doi.org/10.1007/s11524-010-9541-6
14. Centers for Disease Control and Prevention (CDC). Place of influenza vaccination among adults – United States, 2010-2011 influenza season. MMWR Morb Mortal Wkly Rep 2013; 62:973-8; PMID:24304828
15. Shenson D, Adams M. The Vote and Vax program: public health at polling places. J Public Health Manag Pract 2008; 14:476-80; PMID:18708892; http://dx.doi.org/10.1097/01.PHH.0000333883.52893.c8
16. Prosser LA, O'Brien MA, Molinari NA, Hohman KH, Nichol KL, Messonnier ML, Lieu TA. Non-traditional settings for influenza vaccination of adults: costs and cost effectiveness. Pharmacoeconomics 2008; 26:163-78; PMID:18198935; http://dx.doi.org/10.2165/00019053-200826020-00006
17. Shenson D, Benson W, Harris AC. Expanding the delivery of clinical preventive services through community collaboration: the SPARC model. Prev Chronic Dis 2008; 5:A20; PMID:18082009
18. D'Heilly SJ, Blade MA, Nichol KL. Safety of influenza vaccinations administered in nontraditional settings. Vaccine 2006; 24:4024-7; PMID:16546307; http://dx.doi.org/10.1016/j.vaccine.2005.09.061
19. Bosompra K, Ashikaga T, Ruby A. Attitudes, perceived norms, and intentions: A needs assessment study of the influenza immunization intentions of elderly citizens in Vermont. J Rural Health. 2004; 20:125-30
20. Lindley MC, Wortley PM, Winston CA, Bardenheier BH. The role of attitudes in understanding disparities in adult influenza vaccination. Am J Prev Med 2006; 31:281-5; PMID:16979451; http://dx.doi.org/10.1016/j.amepre.2006.06.025
21. Buchner DM, Carter WB, Inui TS. The relationship of attitude changes to compliance with influenza immunization. A prospective study. Med Care 1985; 23:771-9; PMID:4010360; http://dx.doi.org/10.1097/00005650-198506000-00002
22. Vlahov D, Bond KT, Jones KC, Ompad DC. Factors associated with differential uptake of seasonal influenza immunizations among underserved communities during the 2009-2010 influenza season. J Community Health 2012; 37:282-7; PMID:21785857; http://dx.doi.org/10.1007/s10900-011-9443-x