

# SEASONAL INFLUENZA VACCINATION PATTERNS AMONG PREGNANT WOMEN IN NEW MEXICO



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PRAMS

# Who should get Influenza (flu) vaccine?

- **Everyone 6 months age and older**
- Flu shot is particularly important for people who are at high risk of developing serious complications from flu:
  - Children younger than 5, but especially younger than 2 years old
  - Adult aged 65 years and older
  - Pregnant women and women up to 2 weeks of postpartum
  - Hospitalized patients
  - Those with underlying medical conditions
  - Also, American Indians and Alaska Natives seem to be at high risk of developing severe complication form Flu

# BACKGROUND

- Pregnant women accounted approximately 5% of all 2009 pandemic flu related death in the United States (US)<sup>2</sup>
- Pregnant women are more susceptible to influenza than their non pregnant peers
- Complications:
  - *Mother: premature labor and delivery, febrile illness, hospitalization, and even death*<sup>3</sup>
  - *Infants: preterm birth, low birth weight, small-for-gestational age, spontaneous abortion, and other adverse outcomes*<sup>4</sup>
- Vaccinating a pregnant mother against influenza is the best way to prevent these risks to both mother and baby through 6 months of age<sup>5,6</sup>

# BACKGROUND

- In 2004, the Advisory Committee on Immunization Practices (ACIP) and American College of Obstetricians and Gynecologists (ACOG) recommended seasonal influenza vaccine (flu shot) for all women who are or will be pregnant during the flu season<sup>7,8</sup>
- Healthy People (HP) 2020 goal: Increase the percentage of pregnant women who are vaccinated against seasonal influenza
  - Baseline: 27.6% (2008)
  - Target: 80.0%<sup>9</sup>

# Half of pregnant women protect themselves and their babies against flu. Time to bump it up!

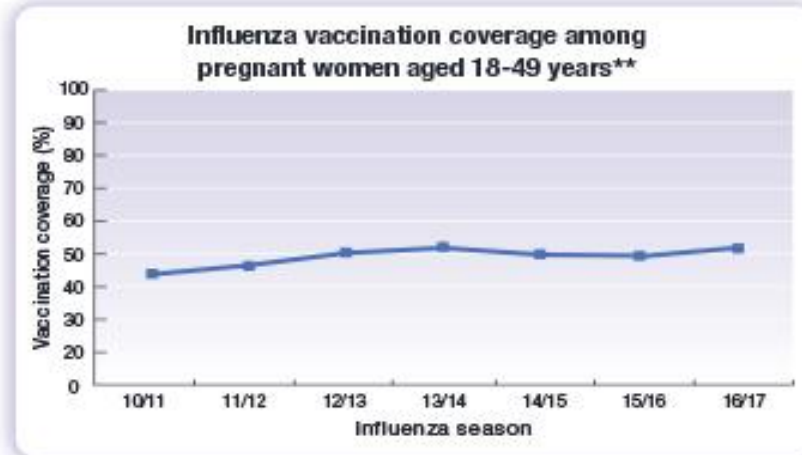


**With only half of pregnant moms getting their flu shot, too many remain unprotected.**

Flu shots help protect pregnant women and their babies from potentially serious flu illness during and after pregnancy.

During the 2016-2017 flu season, an estimated 50%\* of pregnant women in the U.S. protected themselves and their babies from flu by getting a flu shot. While this is a significant improvement since the years before the 2009 pandemic, about half of pregnant women and their babies, still remain unprotected from influenza.

**We can do better.** All pregnant women need flu shots to protect themselves and their babies.



***If you're pregnant, a flu shot:***

- is recommended at any time during your pregnancy
- can reduce your risk of getting sick from flu
- can protect your baby from flu for several months after birth

***Pregnant women also need a whooping cough (Tdap) shot. Talk to your doctor.***

**Get vaccinated to protect yourself and your baby.**

[www.cdc.gov/flu/protect/vaccine/pregnant.htm](http://www.cdc.gov/flu/protect/vaccine/pregnant.htm)





# WIDE VARIATION IN STATE RATES

**TABLE 2**  
**State-specific seasonal influenza vaccination coverage among women with live births, PRAMS, 2009–2010 influenza season<sup>a</sup>**

State	n	% <sup>b</sup>	95% CI
Arkansas	1055	46.7	±4.1
Colorado	1317	52.8	±3.8
Florida	927	26.1	±3.3
Georgia	614	29.9	±5.6
Hawaii	974	50.3	±4.0
Illinois	1071	47.1	±3.2
Louisiana	540	39.6	±5.2
Maine	709	64.0	±4.0
Maryland	1080	46.1	±4.5
Massachusetts	996	67.5	±4.0
Michigan	1000	44.7	±3.6
Minnesota	917	67.9	±3.3
Mississippi	862	37.2	±4.0
Missouri	973	42.8	±3.7
Nebraska	1198	65.4	±3.2
New Jersey	1053	36.8	±3.2
New York	1587	50.5	±3.1
New York City (NYC)	894	45.9	±4.1
New York without NYC	693	54.7	±4.7
Ohio	829	42.7	±4.5
Oklahoma	1432	49.1	±4.4
Rhode Island	821	63.7	±3.9
South Carolina	676	45.3	±6.5
Tennessee	650	41.2	±5.1

Low rates

High rates

Texas	898	44.9	±4.1
Utah	1124	57.8	±3.2
Vermont	742	66.3	±3.4
Virginia	318	51.2	±7.3
Washington	1052	53.3	±4.0
West Virginia	1121	44.2	±3.6
Wyoming	617	55.6	±4.6
Median	973	47.1	
Minimum	318	26.1	
Maximum	1587	67.9	

n = 27,153.

PRAMS, Pregnancy Risk Assessment Monitoring System.

<sup>a</sup> Women with live births between September 1, 2009, and May 31, 2010, with nonmissing seasonal influenza vaccination status;

<sup>b</sup> Weighted to adjust for complex survey design and nonresponse.

Kennedy. Influenza vaccination coverage of pregnant women. *Am J Obstet Gynecol* 2012.

# NEW MEXICO

- The US- Mexico border region of New Mexico (NM) includes 6 counties: Hidalgo, Luna, Doña Ana, Grant, Sierra, and Otero counties<sup>11</sup>



# FACTS ABOUT NEW MEXICO

- Approximately half Hispanic population<sup>13</sup>
- As compared to the US, people living in NM are more impoverished<sup>13</sup> and have less access to health care services<sup>14</sup>
- As compared to the US there is low use of first trimester prenatal care in the NM<sup>14</sup>
- Approximately 10.1 % of pregnant women giving birth in NM are without insurance<sup>15</sup>
- Almost 40% of NM women are within a primary care health care professional shortage area<sup>14</sup>
- Over 71% of NM births are covered by Medicaid<sup>15</sup> as compared to nearly 50% of the nation<sup>16</sup>



# US-MEXICO BORDER POPULATION

- As compared to the US overall, the people living in the US-Mexico border region of the US are more impoverished, less educated, and have less access to health care providers, health centers, and insurance coverage<sup>17</sup>
- Low rate of prenatal care during first trimester and higher rates of preterm births, unintended pregnancies, teenage pregnancies as compared to the non-border region<sup>11,18</sup>

# INFLUENZA RISK

- Pneumonia / influenza is one of the 10<sup>th</sup> leading causes of death in NM<sup>20</sup>
- During the 2009 to 2010 influenza pandemic, there were 1056 hospitalizations and 58 deaths due to influenza in NM<sup>21</sup>
- The hospitalization rate in NM was highest among 0-4 years as compared to other age groups<sup>21</sup>

# PREGNANCY RISK ASSESSMENT AND MONITORING SYSTEM (PRAMS)

- A surveillance system that collects wide range of maternal and child health data among women with recent deliveries (2 to 6 months)
  - *NM PRAMS randomly samples live birth certificates to survey more than 2000 recently pregnant women each year<sup>22</sup>*
  - *Stratifies data based on maternal race/ethnicity, geographic area, Medicaid/WIC<sup>23</sup>*
- In 2012, flu shot questions were added to the NM PRAMS survey
- Our study uses data from NM PRAMS to study trends and determinants of seasonal influenza vaccination among pregnant women in NM

# STUDY OBJECTIVES

- 1) to explore the rate and trends of seasonal influenza vaccination among pregnant women in NM during year 2012-2014
- 2) to identify the factors associated with seasonal influenza vaccination including known and other potential risk factors such as border or non-border residence, and
- 3) to investigate the reasons for not receiving seasonal influenza vaccination during pregnancy in NM.

# MATERIALS AND METHOD

- Descriptive, cross sectional study
- Study population: All women who gave live birth in NM during year 2012 -2014
  - *Exclusion: Missing flu shot status (whether vaccinated or not)*
- NM PRAMS data, including linked natality data, is obtained from the New Mexico Department of Health.
- Mail is the primary means of contact with the telephone follow up
- Average response rate: 70%

# FLU SHOT RELATED PRAMS QUESTIONS

- **Q. No 23 to 26**
- Received provider's recommendation / offer of flu shot?
- During the 12 months before the delivery of your new baby, did you get a flu shot?
  - *No*
  - *Yes, before my pregnancy*
  - *Yes, during my pregnancy*
- Month and year you got the flu shot
- What were your reasons for not getting a flu shot during the 12 months before the delivery of your new baby?
  - *6 reasons, other...*



# STUDY VARIABLES

- We studied 18 co-variates in relation to the vaccination status (vaccinated / not vaccinated)
- **Demographic:** maternal age, race, and ethnicity, maternal education years, border residence, marital status, mother's birthplace, payer of Prenatal Care (PNC), employment status (during pregnancy), and income level
- **Health care service use:** Kotelchuck Adequacy of Prenatal Care (APNC) and flu shot recommendation or offer
- **Behavioral factors:** breast feeding initiation, smoking  $\geq 1$  cigarette (last 2 years), and drinking (last 2 years)
- **Medical factors:** medical risk factors for pregnancy, previous live birth, and previous preterm birth

# STATISTICAL ANALYSIS

- Total participants: 4035 ; excluded: 160 (missing vaccination status)
- SPSS version 20
- CDC's protocol for complex sample analyses<sup>24</sup>
- Descriptive analyses
- Adjusted F test,  $\alpha = 0.05$  were used to find out the factors associated with the vaccination status
- Logistic regression analyses, 95% confidence limit was used to estimate statistically significant difference in the odds of vaccination among different strata

# POPULATION DESCRIPTIONS

- **Age group**
  - <25 (45.7%)
  - 25-29 (23.1%)
  - 30-34 (20.3%)
  - >34 (11.0%)
  - Mean: 22.6, SD: 5.9 years
- **Maternal race**
  - Other- Asian (1.3 %)
  - White (71.0%)
  - Black (2.0%)
  - American Indian (14.1%)
  - Non – White / Mixed (7.0%)
- **Maternal ethnicity**
  - Non-Hispanic White (30.5%)
  - Native American (15.7%)
  - Hispanic White (53.8%)
- **Maternal education years**
  - <12 years (19.1%)
  - 12-15 (26.8%)
  - >15 years (54.2%)
- **Employment status**
  - Employed (57%)
  - Unemployed (43%)

# POPULATION DESCRIPTIONS

- **Income Level**

- 0 - \$15,000 (35.6%)
- \$15,001-\$29,000 (27.1%)
- \$29,001-\$52,000 (16.7%)
- >\$52,000 (20.6%)

- **Border residence**

- Border (15.8%)
- Non-border (84.2%)

- **Marital status**

- Married (47.1%)
- Not married (52.9%)

- **Mother's birth place**

- United States (85.6%)
- Mexico (11.0%)
- Other (3.4%)

- **Payer of PNC**

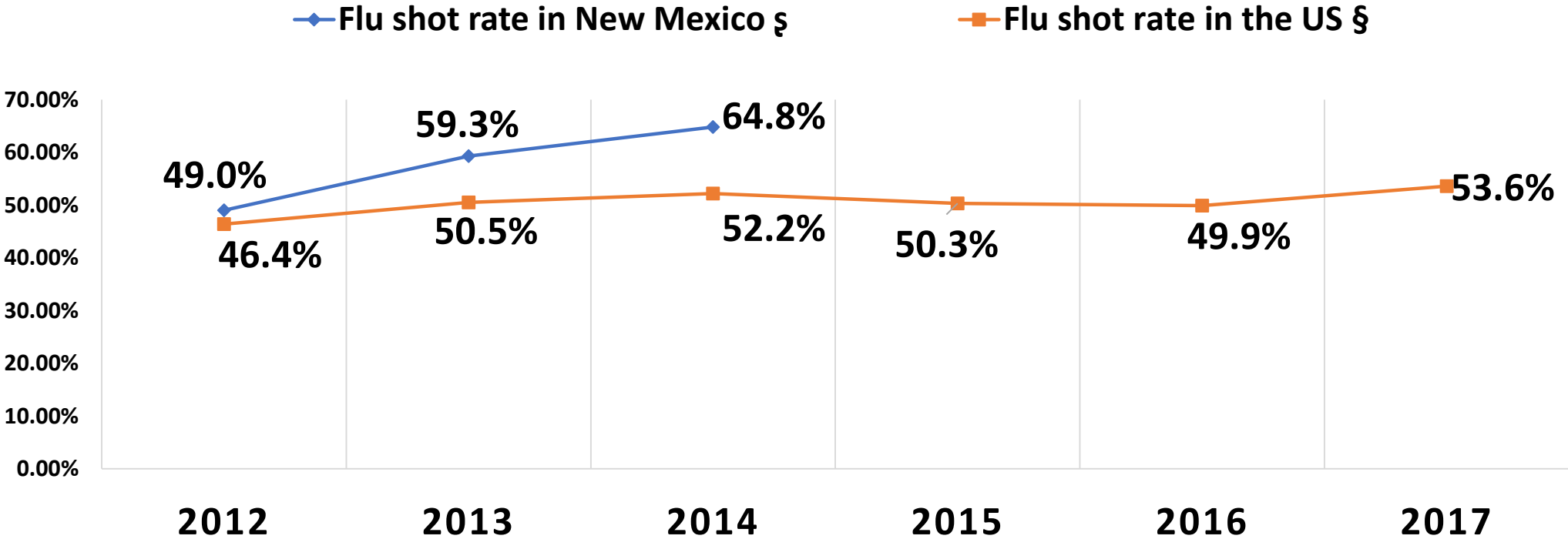
- Medicaid (68.6%)
- Indian Health Service (5.6%)
- Private insurance (21.1%)
- Other insurance (4.8%)

# RESULTS

## Flu shot rate among pregnant women in NM



**FIGURE 1. FLU SHOT RATE AMONG PREGNANT WOMEN IN NEW MEXICO AND THE US , 2012-2014**



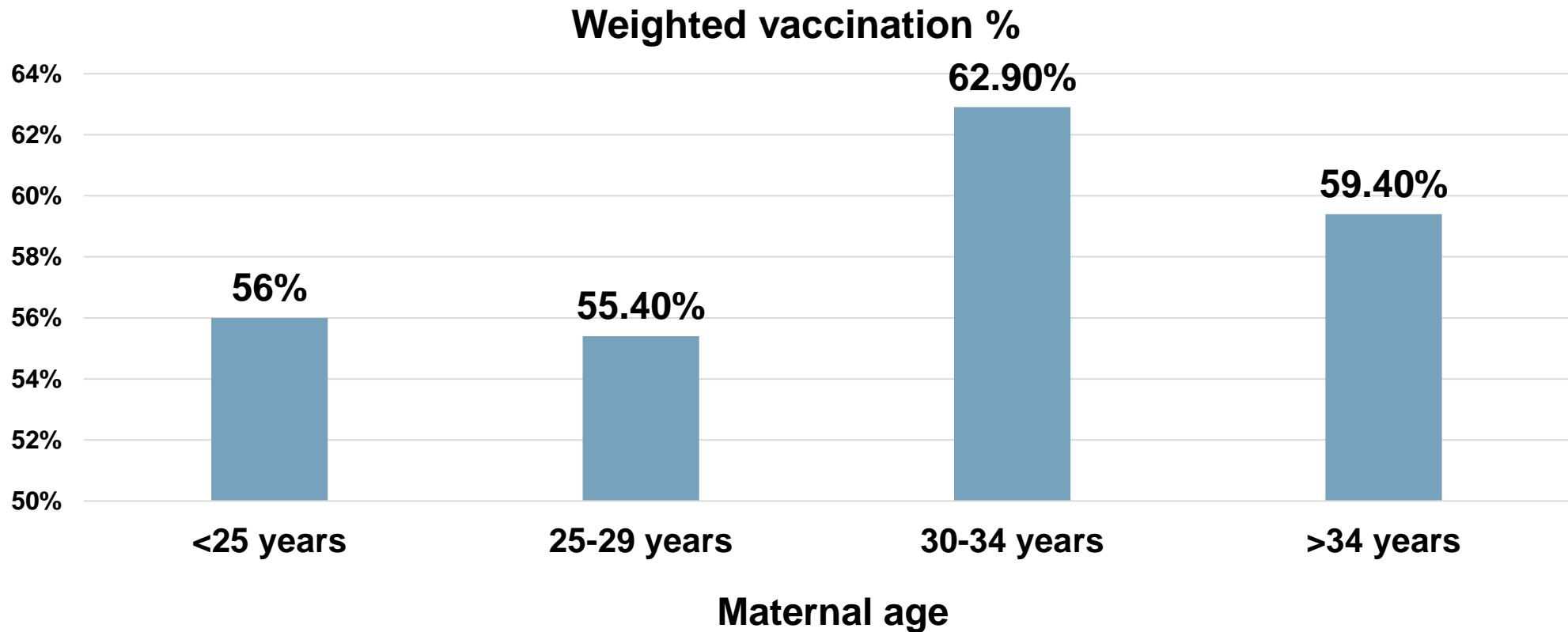
§ This study's finding of seasonal influenza vaccination rate among women giving live birth in NM during year 2012-2014, analyzing NM PRAMS data. § CDC's Morbidity and Mortality Weekly Report (MMWR) of seasonal influenza vaccination rate among pregnant women in the US during 2011-2012 influenza season to 2016-2017 influenza season, analyzing internet panel survey data<sup>2,10</sup>.



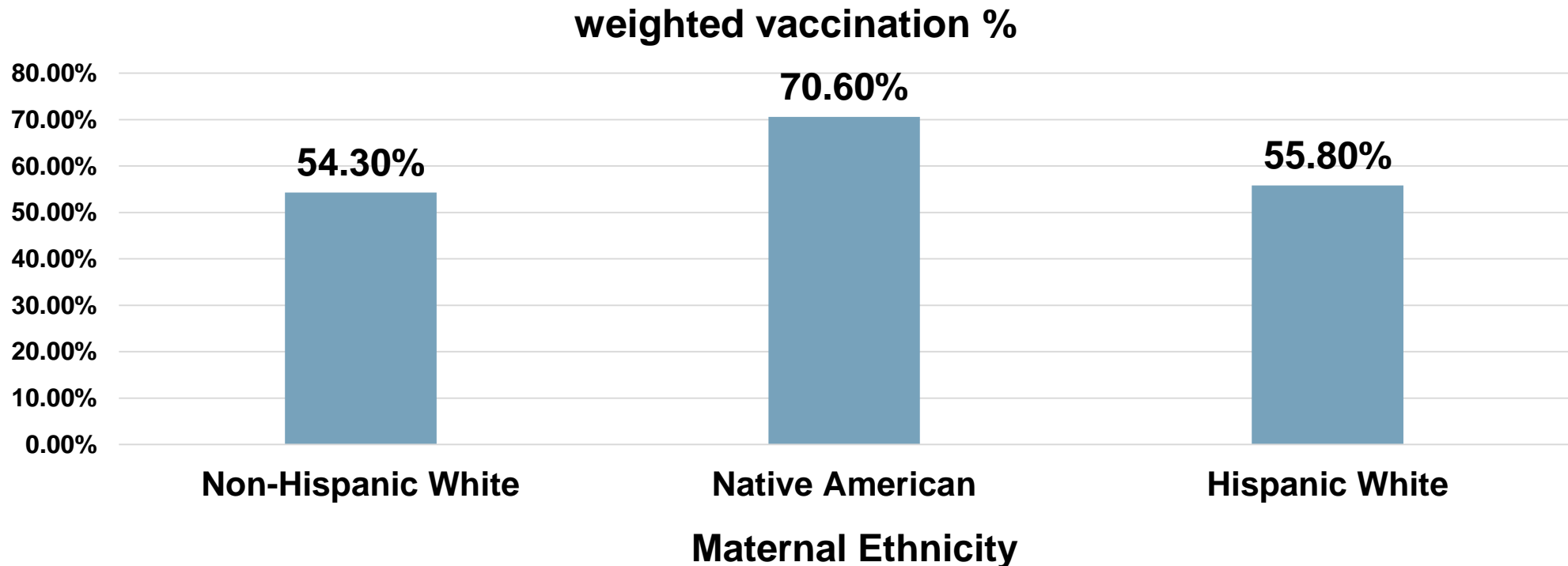
# FACTORS ASSOCIATED WITH VACCINATION (ADJUSTED F TEST)

- The flu shot status of pregnant women was found to be associated ( $p < 0.05$ ) with all study variables except for drinking status.

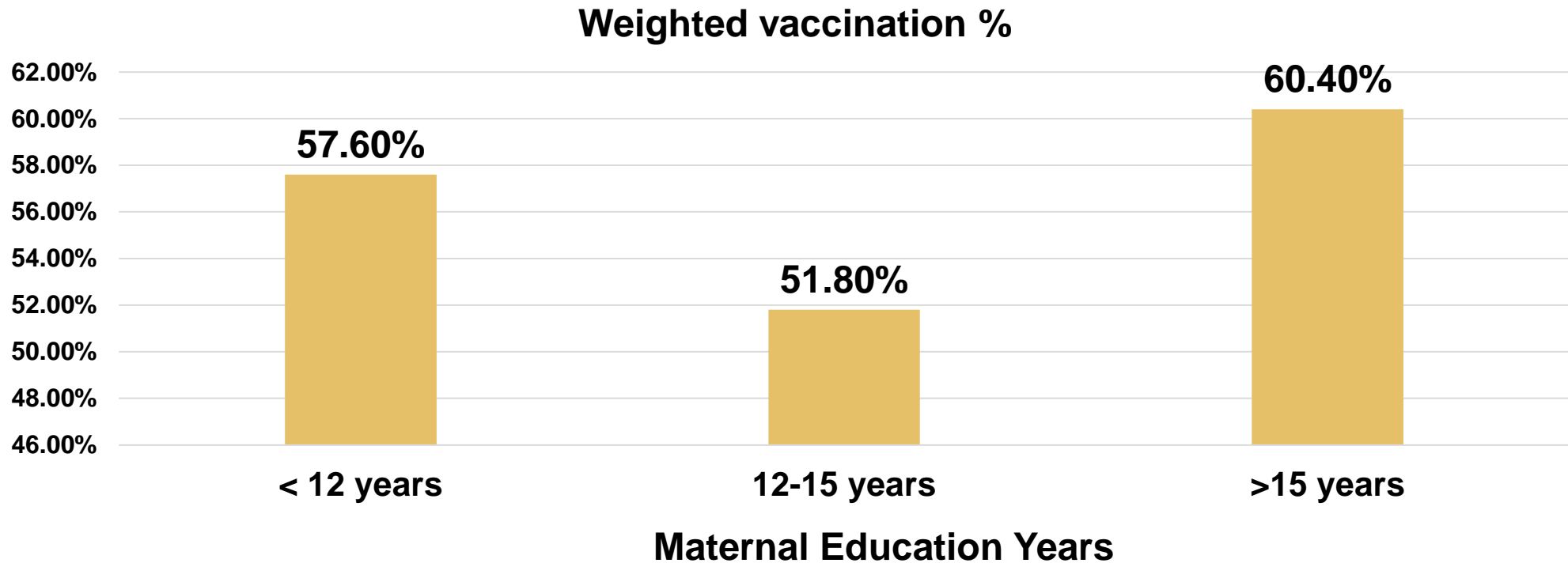
# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY AGE GROUPS



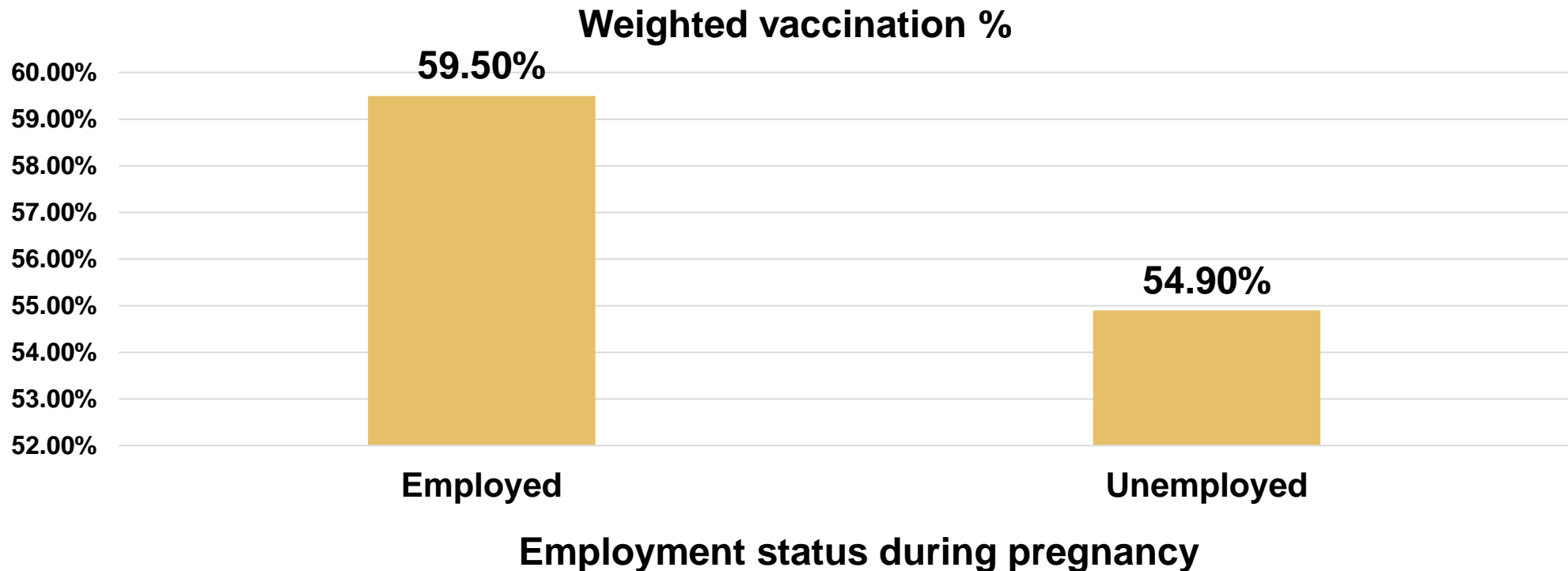
# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY MATERNAL ETHNICITY



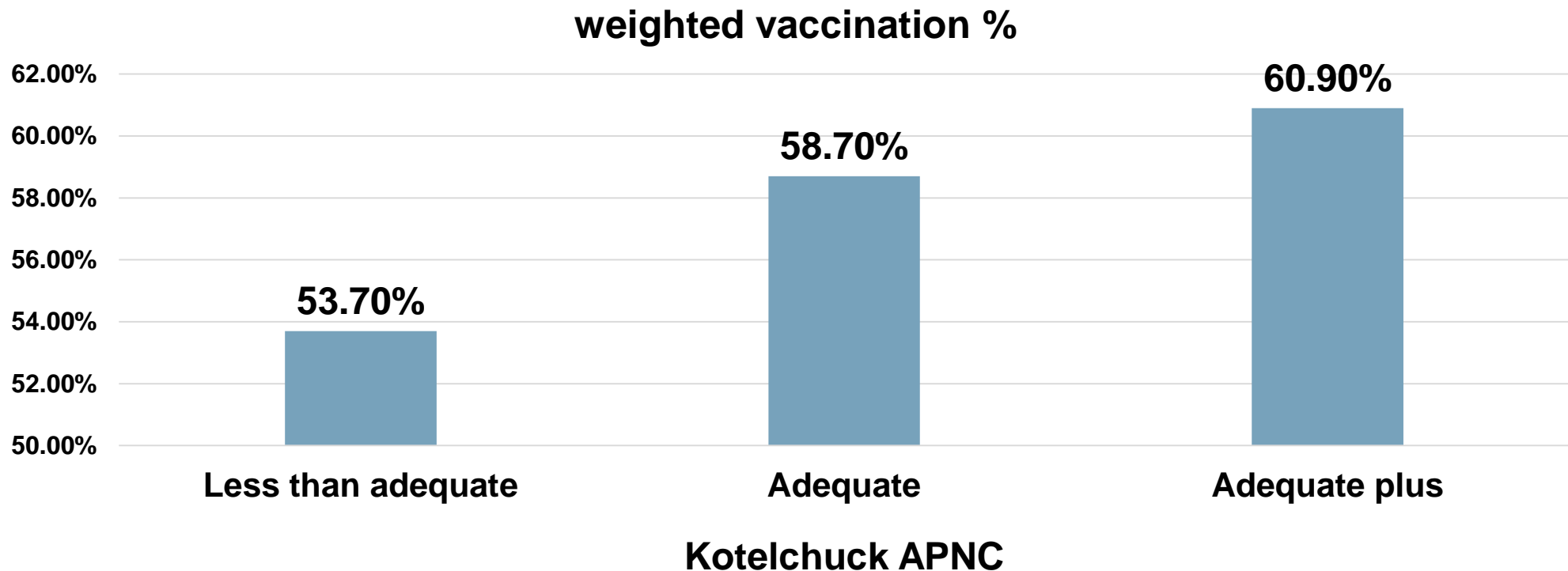
# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY MATERNAL EDUCATION YEARS



# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY EMPLOYMENT STATUS

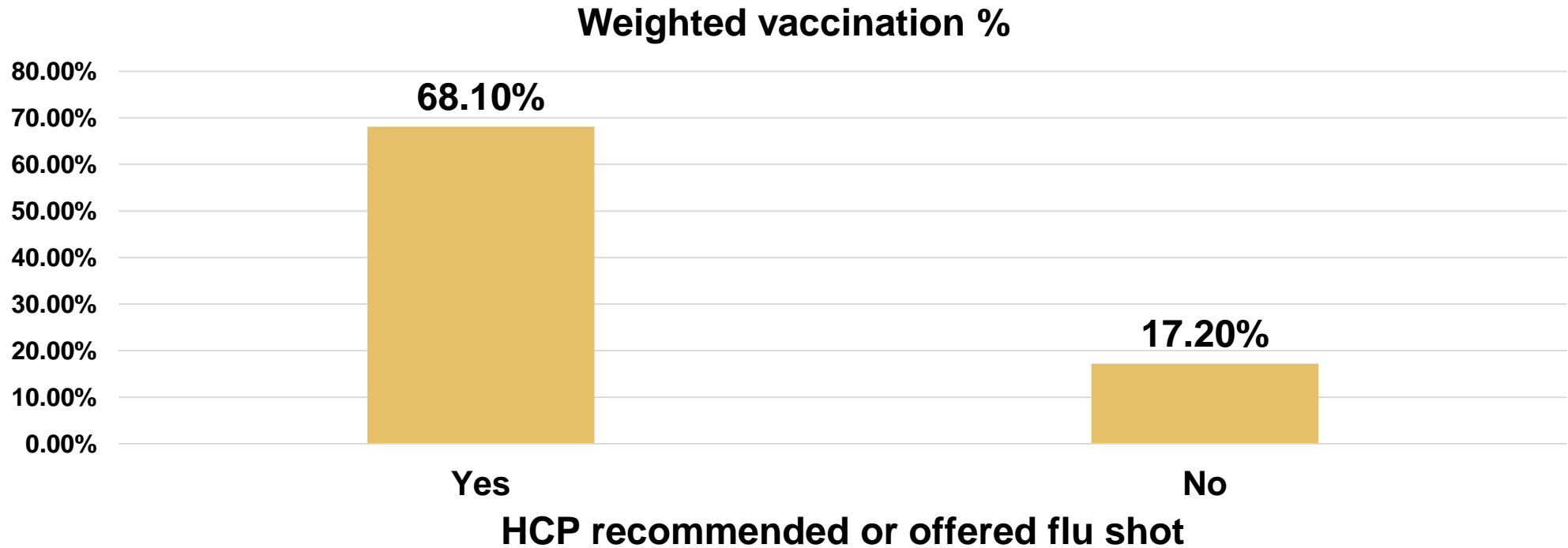


# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY KOTELCHUCK APNC

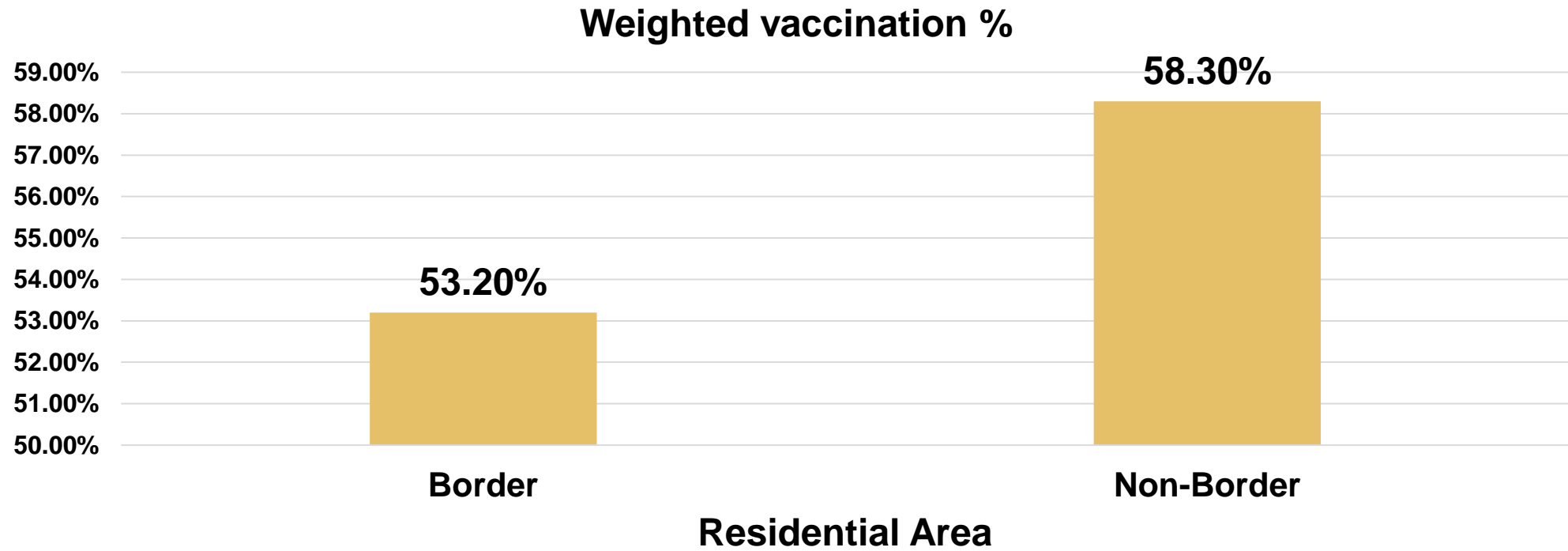




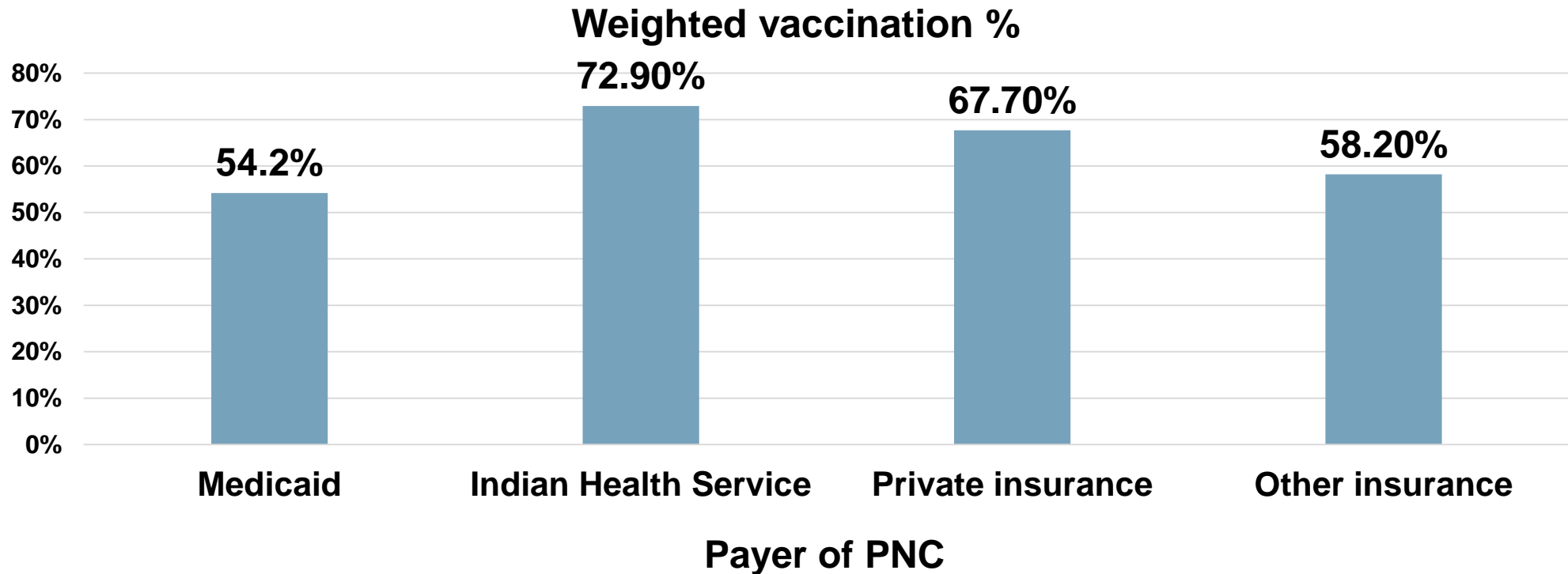
# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY HCP RECOMMENDATION / OFFER



# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY RESIDENTIAL AREA



# PERCENTAGE OF WOMEN WHO HAD FLU SHOT BEFORE / DURING PREGNANCY BY PAYER OF PNC



- The vaccination coverage was also found significantly higher among:
  - *married as compared to not married*
  - *Born in Mexico as compared to those born in the US or other countries*
  - *With Annual income level >\$52,000*
  - *Who initiated breast feeding*
  - *Non-smoker*
  - *With medical risk factor for pregnancy*
  - *Without previous preterm birth*

# Multivariate Logistic Regression

- **Outcome variable**

- Vaccination status (vaccinated / not vaccinated)

- **Significant Predictor variables (in adjusted analysis)**

- Border residence
- Payer of PNC
- Employment status
- Income level
- Kotelchuck APNC
- Flu shot recommendation / offer
- Previous preterm birth

# Multivariate Logistic Regression

	AOR 95% CI
<b>Border residence</b>	
Border	1 (Ref)
Non-Border	<b>1.30 (1.10-1.55)</b>
<b>Payer of PNC</b>	
Medicaid	1 (Ref)
Indian health service	<b>1.52 (1.06-2.19)</b>
Private insurance	<b>1.61 (1.31-1.99)</b>
Other insurance	<b>1.61 (1.18-2.19)</b>

# Multivariate Logistic Regression

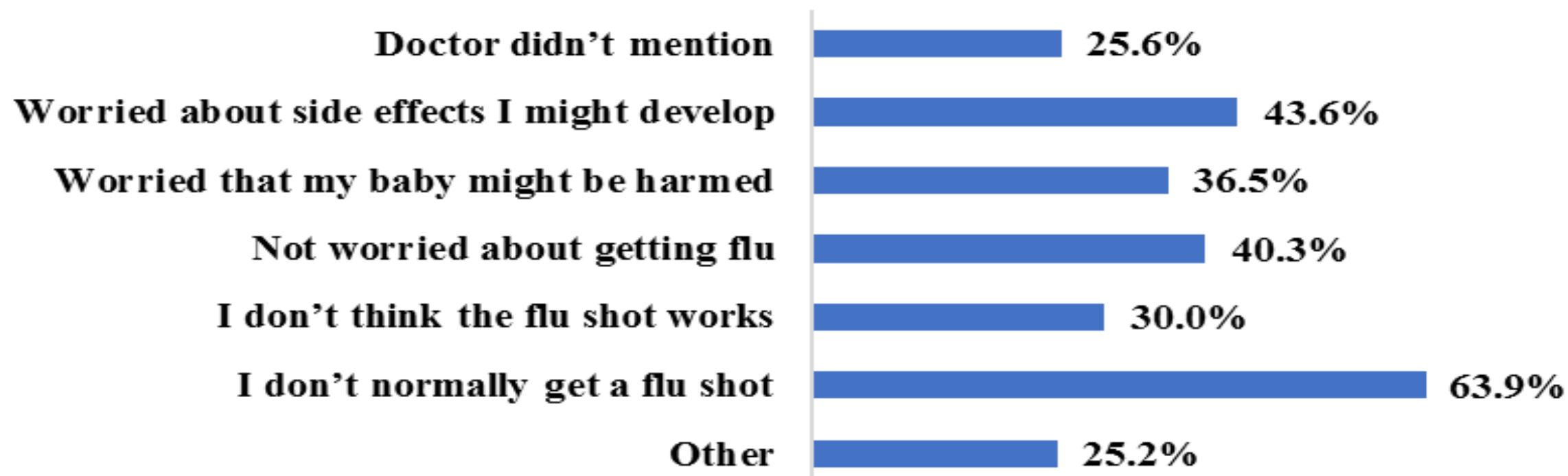
	AOR 95% CI
<b>Employment status (during pregnancy)</b>	
Unemployed	1 (Ref)
Employed	<b>1.17 (1.03-1.33)</b>
<b>Income level</b>	
0-\$15,000	1(Ref)
\$15,001-\$29,000	0.86 (0.72-1.01)
\$29,001- \$52,000	<b>0.58 (0.47-0.72)</b>
>\$52,000	0.94 (0.73-1.22)

# Multivariate Logistic Regression

	AOR 95% CI
<b>Kotelchuck APNC</b> Less than adequate Adequate Adequate plus	1 (Ref) 0.93 (0.80-1.04) <b>1.25 (1.04-1.50)</b>
<b>Flu shot recommendation / offer</b> No Yes	1 (Ref) <b>11.92 (9.86-14.42)</b>
<b>Previous preterm birth</b> Yes No	1 (Ref) <b>0.74 (0.56-0.98)</b>



**FIGURE 2. Major Reasons for Not Getting Flu Shot During Pregnancy**



# Discussion

- First study to study the rate and trends of flu shot among pregnant women living in NM
- Strengths: multivariate analysis, PRAMS data, large Hispanic population
- Key findings:
  - *Pregnant women living in US-Mexico border region on NM were found to be less often vaccinated as compared to those living in non-border region*
  - *Health care provider can be cues to influence towards positive health behavior like vaccination*

# Discussion: Vaccination rates

- Recent flu shot rate (64.8%) in NM was comparatively higher than that of most other state's rate and the national rate (53.6%), but still below Healthy 2020 target
- Similar to our study, other studies<sup>25,26</sup> also found the vaccination rate higher among women employed as compared those unemployed during their pregnancy.

# Discussion: Medicaid vs. Other insurance providers

- Other PRAMS studies<sup>27,28</sup> have also shown that pregnant women with Medicaid coverage had significantly lower vaccination rate than those with non-Medicaid insurance
- As our study, a PRAMS study from New Hampshire<sup>28</sup> had similar finding of lower rate of health care provider's recommendation and offer of flu shot among those enrolled in Medicaid as compared to those enrolled to all other insurance providers
- There needs addition studies on the socio-demographic disparities among pregnant women enrolled to Medicaid and non-Medicaid in relation to their vaccination status

# Discussion: US-Mexico Border vs Non-Border region on NM

- A high rate of late or no prenatal care and other existing maternal and child health disparities<sup>11,18</sup> in border region as compared to the non-border region aligns with our result
- Less access to health care centers, health care workers, and health insurance in US-Mexico border region as compared to non-border region<sup>11,17,29</sup> may contribute to this finding
- Limited studies in border states
- We are unable to generalize our findings to other border states

# Discussion: HCP's recommendation / Offer for flu shot (Yes vs. No)

- Important role of HCP influencing women to receive flu shot around the time of pregnancy: National internet panel survey study<sup>25,10</sup>, some - other surveillance<sup>30,31</sup>, and almost all- PRAMS studies including those in Georgia<sup>32</sup>, Rhode Island<sup>32</sup>, New Jersey<sup>33</sup>, Illinois<sup>34</sup>, and other states<sup>3,35</sup>
- Odds of vaccination among pregnant women who are recommended or offered flu shot by HCP as compared to those who are not:
  - Our study: more than 10-fold higher odds
  - Kennedy et al., 2012: 6 times more likely to get vaccinated<sup>3</sup>
  - An international review study: 200-100 times of odds<sup>31</sup>

# Discussion: Health Beliefs

- Pregnant women's vaccination history, their perception about the susceptibility and severity of influenza during pregnancy, and the knowledge regarding safety and importance of vaccine play an important role in the vaccination decision<sup>30,31,36</sup>

# Limitations:

- Unavailability of the more recent data at the beginning of the study
- We cannot predict that the rate is rising at the same pace till 2018 to reach Healthy People 2020 goal.
- Recall bias
- Unavailability of language variable
  - *Having a language variable would offer some insight to cultural factors, communication issues, etc., that might be operating in some of our findings*



# Conclusion

- The flu shot rate among pregnant women in NM is increasing, but there is still a long way to go to protect remaining unvaccinated women.
- Future intervention program to increase the seasonal influenza immunization among pregnant women should include health care provider education program.

***“I strongly recommend you get the flu shot today. I offer the influenza vaccine to all of my pregnant patients and to women who are considering becoming pregnant. The vaccine is safe and effective for pregnant women. The risks of getting sick with the flu are far greater for a pregnant woman and her baby than the possibility of having a complication from the vaccine. The flu shot will protect you as well as your baby in the first 6 months of life from getting the flu. Your family members who have contact with your newborn also should be vaccinated.”***



The American College of  
Obstetricians and Gynecologists  
WOMEN'S HEALTH CARE PHYSICIANS

## Physician Script on Influenza Immunization During Pregnancy

All women should receive the influenza vaccine; this is particularly important during pregnancy and the postpartum period. The influenza vaccination is an essential element of prenatal care because pregnant women are at an increased risk of serious illness and mortality due to influenza. In addition, maternal vaccination is the most effective strategy to protect newborns because the vaccine is not approved for use in infants younger than 6 months.

- Only the inactivated influenza vaccine is recommended during pregnancy. Live, attenuated influenza vaccine, which is given as a nasal spray, is contraindicated for pregnant women.
- Inadvertent administration of the live, attenuated influenza vaccine during pregnancy has not been shown to be harmful. The live, attenuated influenza vaccine is safe to administer postpartum and to family members.
- It is safe for pregnant women to receive a vaccine with thimerosal. Thimerosal, a mercury-containing preservative used in multidose vials, has not been shown to cause any adverse effects except for occasional local skin reactions.
- There is no scientific evidence that thimerosal-containing vaccines cause adverse effects in children born to women who received vaccines with thimerosal.
- Some women may still be concerned; preservative free single-dose influenza vaccines are available from certain manufacturers.
- It is required by law for you to give your patients a Vaccine Information Statement upon receiving an immunization. Vaccine Information Statement forms can be found in multiple languages at [www.immunize.org/vis/](http://www.immunize.org/vis/).
- Multiple studies show that the most effective way to increase your patient's vaccination acceptance rate is for you to directly recommend and provide the vaccine. Talk to your patients about the flu shot today. Here is a script for your consideration:

***“I strongly recommend you get the flu shot today. I offer the influenza vaccine to all of my pregnant patients and to women who are considering becoming pregnant. The vaccine is safe and effective for pregnant women. The risks of getting sick with the flu are far greater for a pregnant woman and her baby than the possibility of having a complication from the vaccine. The flu shot will protect you as well as your baby in the first 6 months of life from getting the flu. Your family members who have contact with your newborn also should be vaccinated.”***

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*Thank  
You!*

