

Prenatal Vaccinations in California

2016 Maternal and Infant Health Assessment Survey



Pertussis (Whooping Cough)

Young infants are at the greatest risk of serious pertussis disease, which can result in hospitalization or death.¹ The best way to protect young infants from pertussis is by immunizing the mother during **each** pregnancy. Transplacental transfer of antibodies during pregnancy protects young infants against pertussis during the critical period before they begin receiving the primary infant pertussis immunization (DTaP) series at 6-8 weeks of age.

Influenza (Flu)

Influenza immunization during pregnancy helps protect both mother and baby from influenza and its complications.² Pregnant women more susceptible to severe influenza illness.³ Influenza during pregnancy can result in pre-term birth, low birth weight, and stillbirth of the infant.⁴ Infants of mothers immunized during pregnancy are less likely to be hospitalized for acute respiratory illnesses.⁵ Infants cannot receive their first dose of influenza vaccine until 6 months of age.

Immunization Recommendations for Pregnant Women

The best way to protect young infants from pertussis and influenza is by immunizing their mothers during pregnancy. The Centers for Disease Control and Prevention (CDC) recommends that all pregnant women receive Tdap and influenza immunizations.^{6,7}

Tdap Vaccine:

- Should be administered to pregnant women at the earliest opportunity between 27-36 weeks gestation during EACH pregnancy, regardless of past Tdap immunizations.*^{8,9}

Flu Vaccine:

- Should be administered to women who are pregnant, or plan to become pregnant during a given influenza season as soon as the vaccine is available for that season.

Summary of findings

Among surveyed women giving birth in 2016, self-reported Tdap immunization coverage for pregnant women was 52% and remained consistent with 2015¹⁰ with significantly lower rates observed among Hispanic and African-American women, and women with Medi-Cal coverage. Among women who received Tdap during pregnancy, most (85%) were vaccinated at the same clinic where they received their prenatal care, and only 7% were vaccinated at a pharmacy or supermarket. Note that these data do not fully reflect implementation of the new Medi-Cal policy that covers all routine adult immunizations in pharmacies.¹¹ Self-reported influenza vaccination coverage was 59%, which is below the Healthy People 2020 goal (80%), and significant disparities by race/ethnic and prenatal insurance persist. CDPH is working with local health departments and health plans to improve prenatal immunization coverage and assist medical providers in California in establishing vaccination programs in prenatal clinics. Additional information, including provider tool kits, patient declination forms, educational materials, and prenatal immunization prescription pads may be found at <http://eziz.org/resources/pertussis-promo-materials/prenatal-tdap/>

Maternal and Infant Health Assessment (MIHA) Survey

MIHA is an annual population-based survey of California resident women with a live birth. Immunization questions on the 2016 MIHA survey included self-reported receipt of Tdap and Influenza vaccines. The specific questions are shown on page 11 in the Appendix; no documentation of vaccination was collected. Survey results are available for women statewide, for the 20 California counties with the largest number of births, and for the 9 MIHA regions¹² of California.

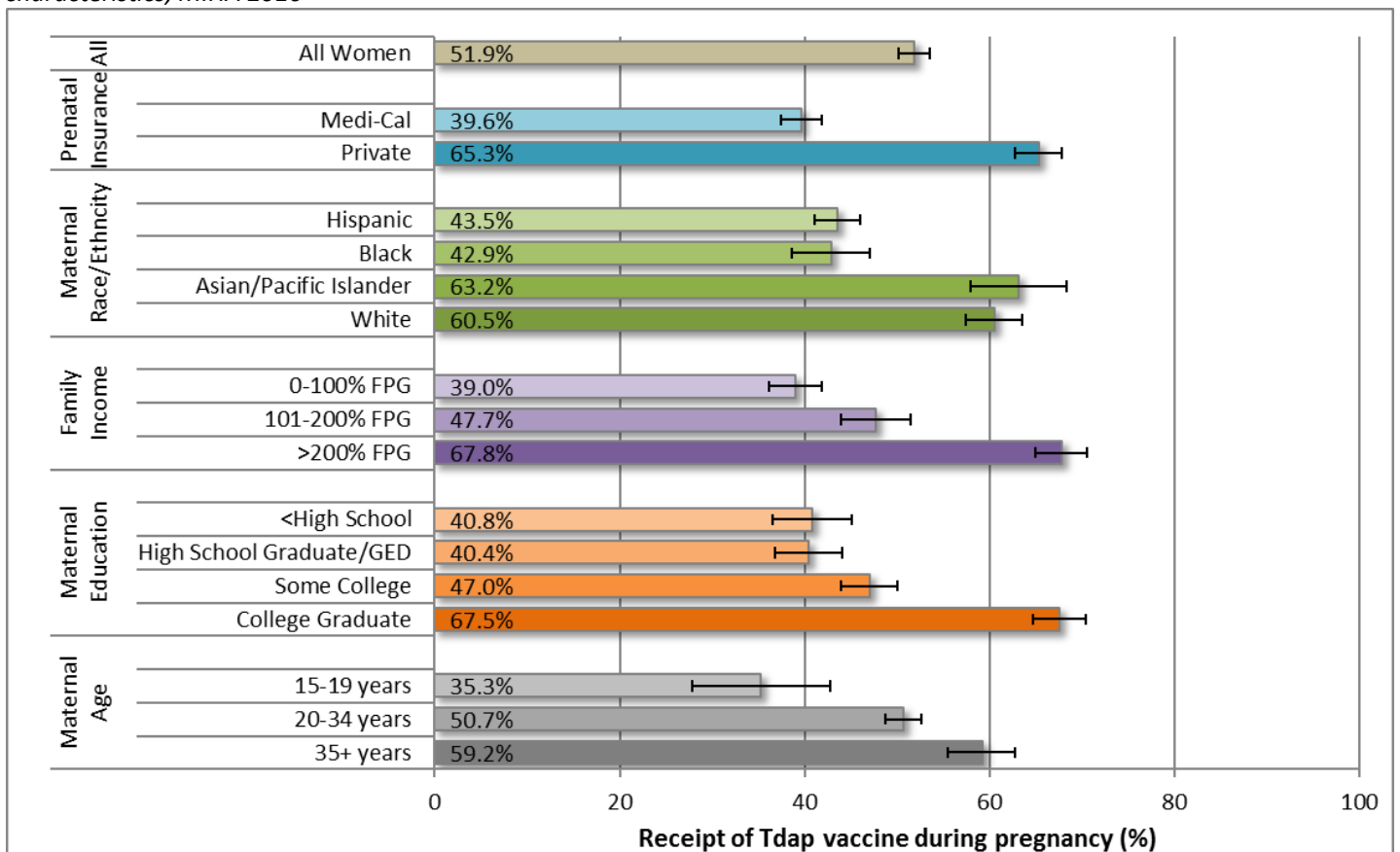
* Tdap vaccination of postpartum women and other care providers for cocooning does not provide direct protection to the infant and is no longer considered optimal for preventing infant pertussis

Prenatal Tdap Immunization Coverage in California

Overall, self-reported prenatal Tdap vaccine coverage in California among women who delivered in 2016 was 52%. During pregnancy, Tdap immunization:

- Was lower among mothers insured by Medi-Cal (40%) than by private insurance (65%).
- Was lower among Hispanic (44%) and Black (43%) women compared to Asian (63%) or White (61%) women.
- Was lower among mothers with reported family incomes of 0-100% (39%) or 101-200% (48%) of Federal Poverty Guidelines (FPG) compared to mothers who reported incomes >200% of FPG (68%).
- Was lower among women whose highest education level was less than high school (41%) or high school (40%) compared to those who had graduated from college (68%).
- Was lower among women who gave birth between 15-19 years of age (35%) compared to women who gave birth at 20-34 years (51%) or 35 years of age and older (59%).
- Was approximately the same among Hispanic women who primarily speak English at home (45%) compared to women who primarily speak Spanish (44%).
- Among women who received Tdap during pregnancy, 85% were vaccinated at the same clinic where they received their prenatal care, 5% were vaccinated at a different doctor's office or clinic, 7% were vaccinated at a pharmacy or supermarket, and the remaining were vaccinated at other or unknown locations.

Figure 1. Receipt of Tdap vaccine during pregnancy among women with a live birth in 2016, in California, by maternal characteristics, MIHA 2016



Receipt of Tdap vaccine during pregnancy varied geographically. Southeastern California¹⁰ had the lowest self-reported prenatal Tdap coverage (38%) and the San Francisco Bay area had the highest coverage (73%) (Figure 3 and 4).

Figure 2. Receipt of Tdap vaccine during pregnancy among women with a live birth in 2016, by MIHA region¹⁰, 2016

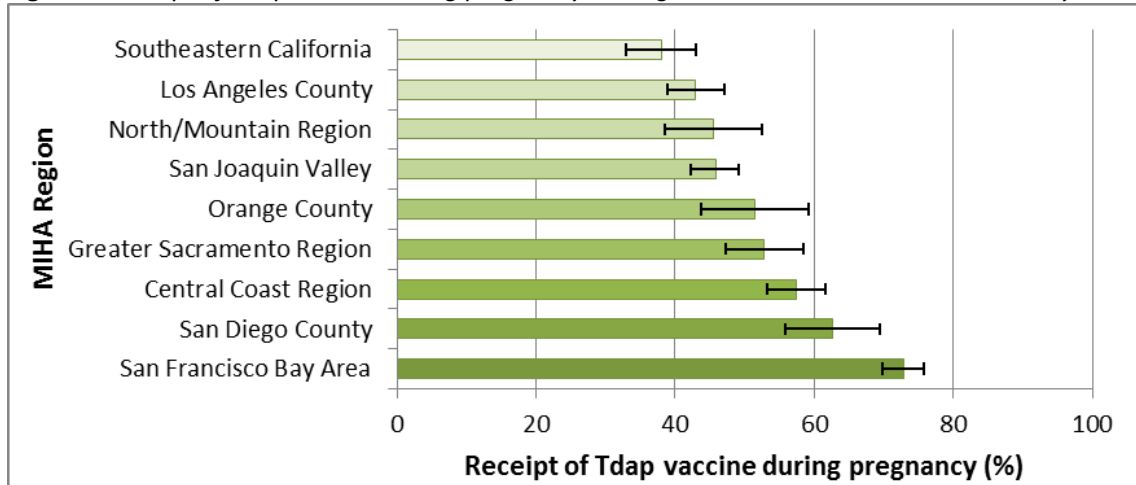
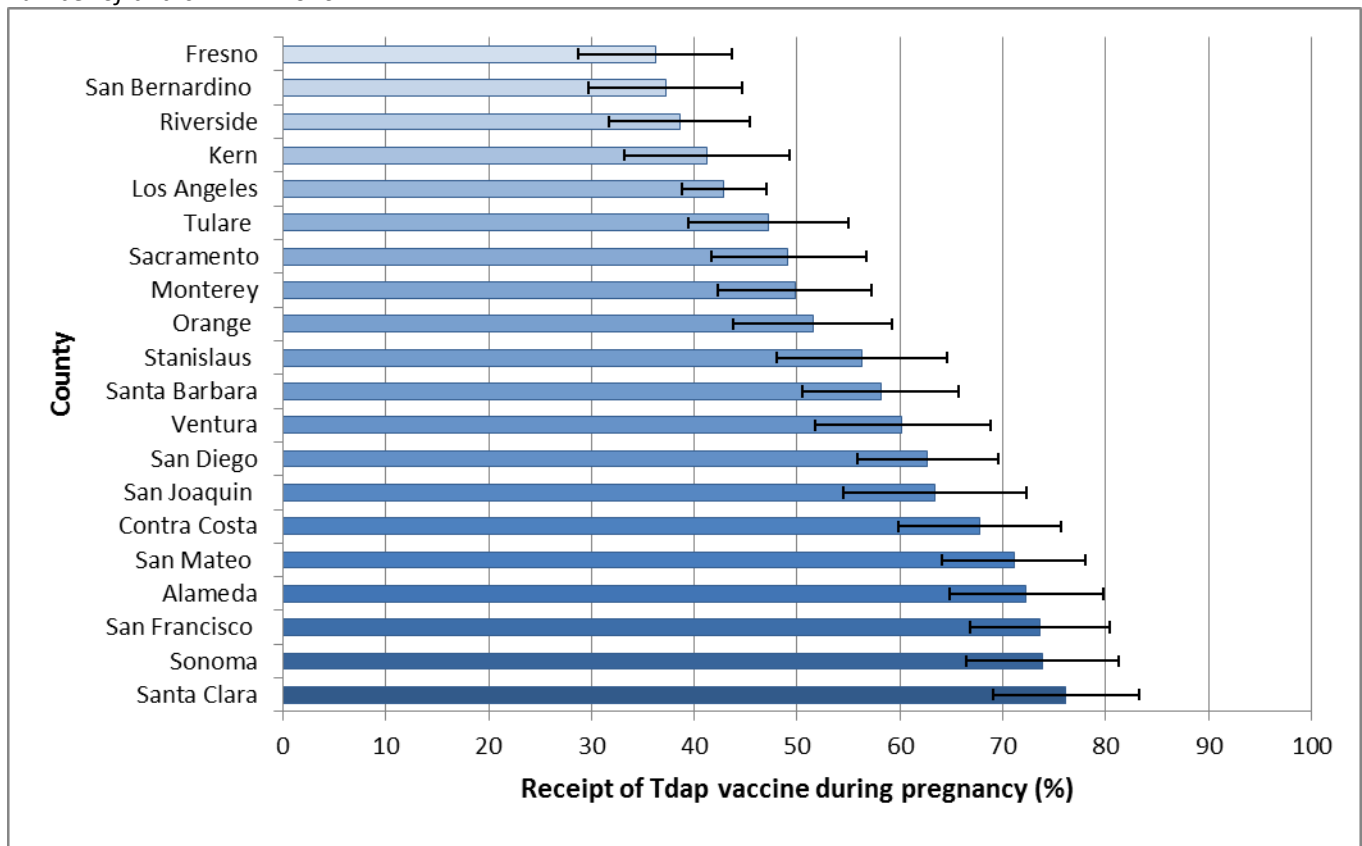


Figure 3. Receipt of Tdap vaccine during pregnancy among women with a live birth in 2016, by the 20 counties with the highest number of births. MIHA 2016

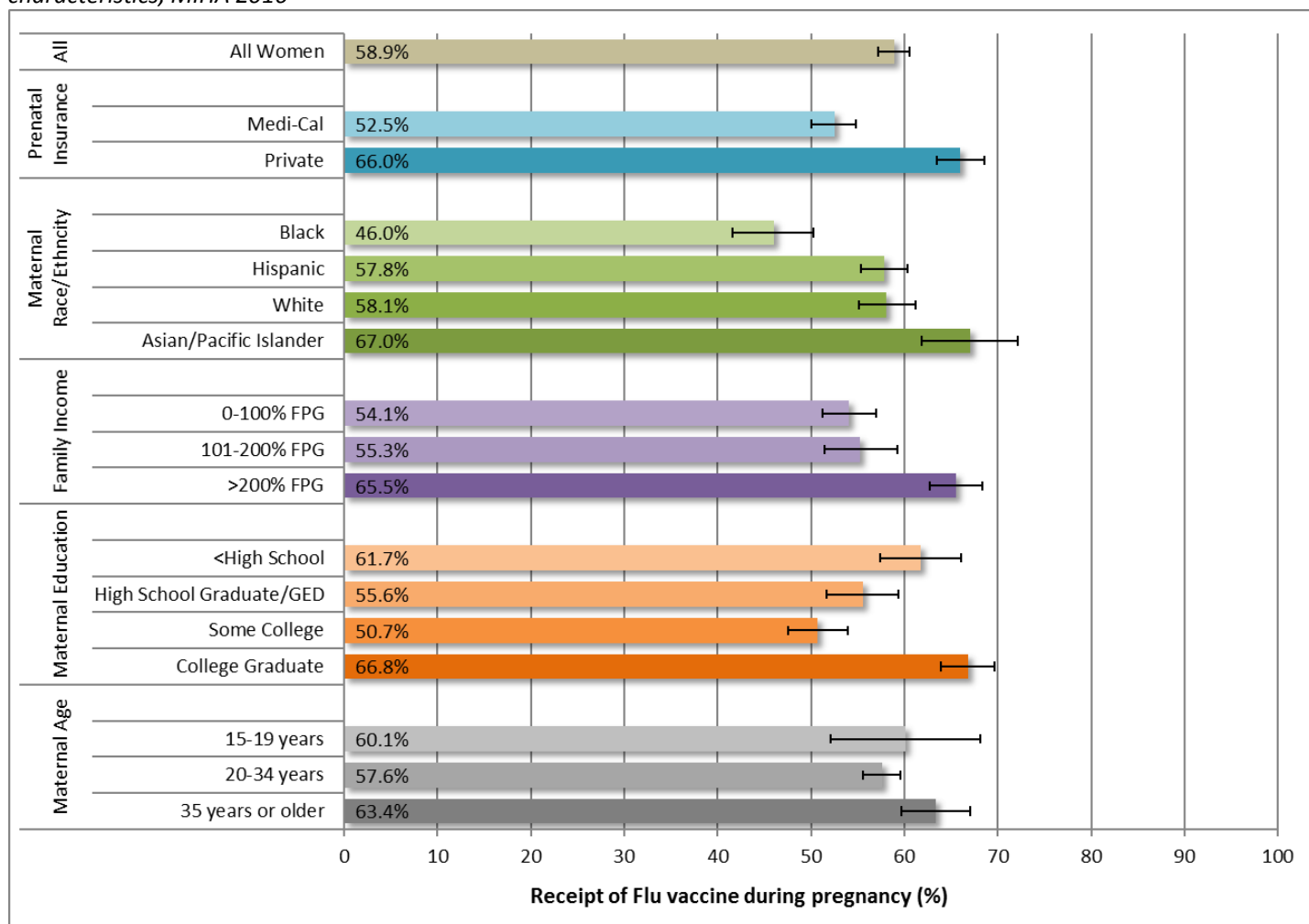


Prenatal Influenza Immunization Coverage in California

Overall, self-reported prenatal Influenza vaccine coverage in California among women who delivered in 2016 was 59%. During pregnancy, influenza immunization:

- Was lower among mothers insured by Medi-Cal (53%) than by private insurance (66%).
- Was lower among Black (46%) women compared to White (58%), Hispanic (58%) or Asian (67%) women.
- Was lower among mothers with reported family incomes of 0-100% FPG (54%) and 101-200% (55%) compared to mothers who reported incomes >200% of FPG (67%).
- Was lower among mothers whose highest education level was high school (56%) compared to those who have graduated college (67%).
- Was lower among women who gave birth between 20-34 years of age (58%) compared to women who gave birth at 35 years of age and older (63%).

Figure 4. Receipt of influenza vaccine during pregnancy among women with a live birth in 2016, in California, by maternal characteristics, MIHA 2016



Receipt of influenza vaccine during pregnancy varies geographically. Women in Southeastern California¹⁰ reported the lowest prenatal influenza coverage (45%) and women in the San Francisco Bay Area reported the highest coverage (78%) (Figure 5 and 6).

Figure 5. Receipt of influenza vaccine during pregnancy among women with a live birth in 2016, by MIHA region¹⁰, 2016

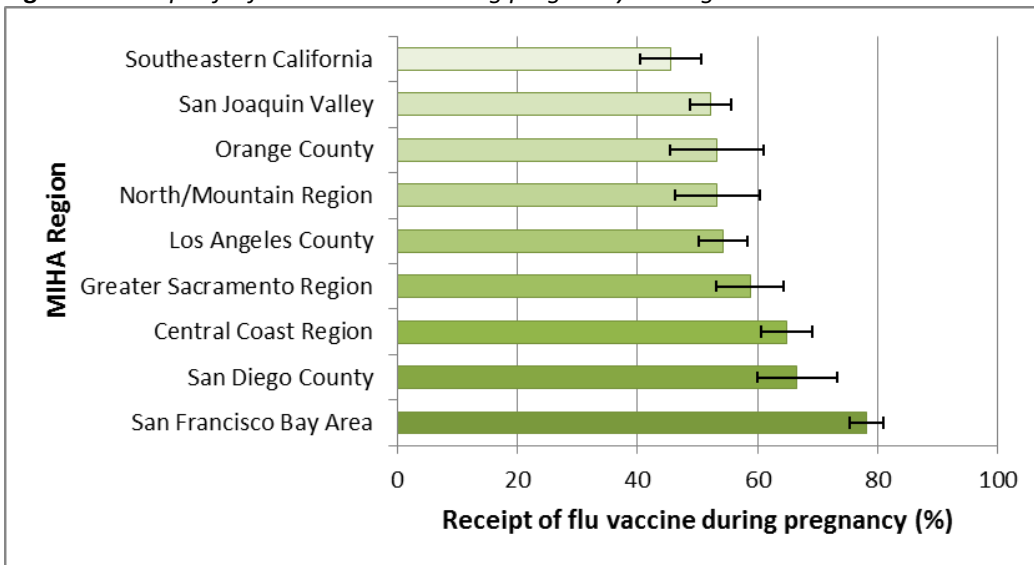
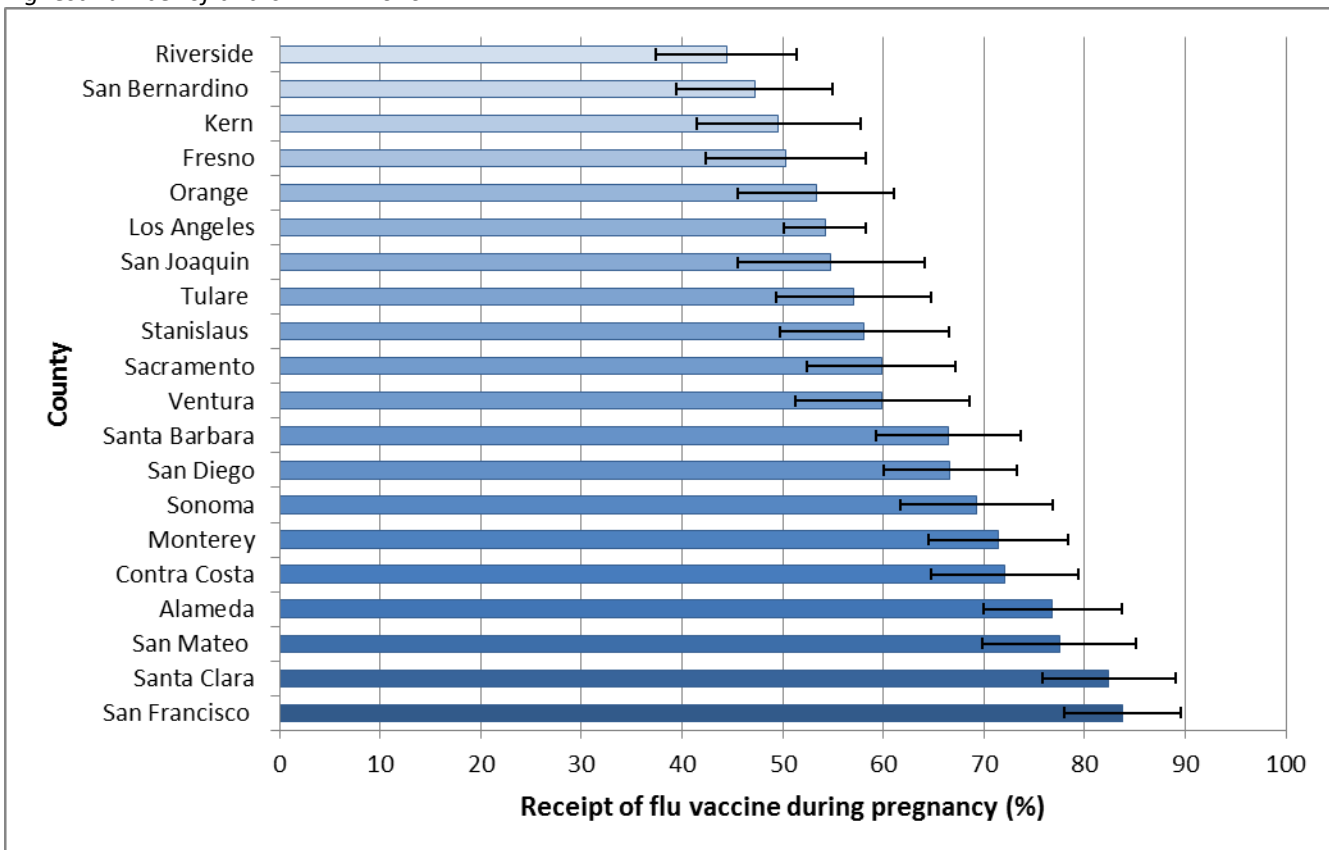


Figure 6. Receipt of influenza vaccine during pregnancy among women with a live birth in 2016, by the 20 counties with the highest number of births. MIHA 2016



Appendix

Table 1. Receipt of Tdap vaccine among women with a live birth in 2016, by maternal characteristics, MIHA 2016

	Received Tdap vaccine during pregnancy			Received Tdap vaccine after delivery		
	Prevalence (%)	95% Confidence Interval		Prevalence (%)	95% Confidence Interval	
All Women	51.9	50.2	53.6	15.9	14.6	17.2
Prenatal Insurance						
Medi-Cal	39.6	37.4	41.8	20.3	18.3	22.3
Private	65.3	62.7	67.8	11.9	10.1	13.7
Maternal Race/Ethnicity						
Hispanic	43.5	41.1	46.0	19.7	17.7	21.8
Black	42.9	38.6	47.1	17.5	14.1	20.9
Asian/Pacific Islander	63.2	58.0	68.3	13.0	9.4	16.6
White	60.5	57.5	63.6	11.1	9.1	13.2
Family Income (% of Federal Poverty Guideline)						
0-100% FPG	39.0	36.2	41.8	20.8	18.4	23.3
101-200 % FPG	47.7	43.9	51.5	16.7	13.7	19.7
>200% FPG	67.8	65.0	70.5	10.8	8.9	12.7
Maternal Education						
<High School	40.8	36.6	45.1	19.3	15.9	22.7
High School Graduate/GED	40.4	36.8	44.1	21.7	18.3	25.2
Some College	47.0	43.9	50.1	17.2	14.7	19.6
College Graduate	67.5	64.7	70.4	10.6	8.6	12.5
Maternal Age						
15-19 years	35.3	27.8	42.8	22.3	15.4	29.2
20-34 years	50.7	48.7	52.7	15.9	14.4	17.5
35 years or older	59.2	55.5	62.8	14.4	11.6	17.3
Among US- and Foreign-Born Hispanic Women						
Language Spoken at Home						
English	45.3	40.9	49.7	18.1	14.6	21.7
Spanish	43.5	39.7	47.2	21.1	17.8	24.4
English and Spanish Equally	41.9	37.1	46.6	20.5	16.5	24.6
Maternal Birthplace						
US-Born	43.2	39.9	46.5	19.4	16.6	22.1
Foreign-Born	44.0	40.4	47.5	20.2	17.1	23.3
Years in the US (among Foreign-Born Hispanic Women)						
Less than five years	48.4	39.1	57.7	20.4	12.3	28.5
Five or more years	44.2	40.1	48.4	19.8	16.3	23.4

Appendix

Table 2. Receipt of Tdap vaccine during pregnancy and after delivery among women with a live birth in 2016, by county and MIHA Region, MIHA 2016

	Received Tdap vaccine during pregnancy			Received Tdap vaccine after delivery		
	Prevalence (%)	95% Confidence Interval		Prevalence (%)	95% Confidence Interval	
Top 20 Birthing Counties						
Alameda	72.2	64.8	79.7	7.8	3.8	11.8
Contra Costa	67.8	59.9	75.7	10.9	5.7	16.1
Fresno	36.2	28.7	43.7	21.2	14.6	27.8
Kern	41.2	33.2	49.3	17.1	11.1	23.2
Los Angeles	42.9	38.8	47.0	19.6	16.4	22.9
Monterey	49.8	42.3	57.2	17.0	11.4	22.6
Orange	51.5	43.8	59.2	21.2	14.6	27.8
Riverside	38.6	31.7	45.4	22.9	17.3	28.5
Sacramento	49.1	41.6	56.7	17.4	11.6	23.1
San Bernardino	37.2	29.7	44.7	23.7	16.9	30.6
San Diego	62.7	55.9	69.5	11.3	6.7	16.0
San Francisco	73.6	66.8	80.4	4.2*	0.6	7.8
San Joaquin	63.4	54.5	72.3	11.3	6.2	16.4
San Mateo	71.1	64.1	78.0	6.9	3.4	10.4
Santa Barbara	58.1	50.5	65.7	10.7	6.2	15.2
Santa Clara	76.1	69.1	83.2	4.9*	1.6	8.2
Sonoma	73.8	66.5	81.2	2.2*	0.4	4.0
Stanislaus	56.3	48.0	64.6	17.0	11.3	22.7
Tulare	47.2	39.4	55.0	13.9	8.3	19.6
Ventura	60.2	51.7	68.8	6.0	2.8	9.1
MIHA Regions						
Central Coast Region	57.4	53.2	61.6	11.1	8.7	13.4
Greater Sacramento Region	52.8	47.2	58.4	14.6	10.4	18.7
Los Angeles County	42.9	38.8	47.0	19.6	16.4	22.9
North/Mountain Region	45.5	38.6	52.4	17.8	12.8	22.8
Orange County	51.5	43.8	59.2	21.2	14.6	27.8
San Diego County	62.7	55.9	69.5	11.3	6.7	16.0
San Francisco Bay Area	72.8	69.8	75.8	6.7	5.1	8.3
San Joaquin Valley	45.8	42.3	49.2	17.2	14.6	19.8
Southeastern California	38.0	33.0	42.9	22.4	18.1	26.6

* Estimate should be interpreted with caution due to low statistical reliability – relative standard error (RSE) is between 30% and 50%.

Appendix

Table 3. Receipt of Tdap vaccine during pregnancy and after delivery among California women with a recent live birth by county for 35 counties with the largest numbers of births, Maternal and Infant Health Assessment (MIHA) Survey, 2015-2016

	During pregnancy			After Delivery		
	Prevalence (%)	95% Confidence Interval		Prevalence (%)	95% Confidence Interval	
Total	50.4	49.0	51.7	17.0	15.9	18.1
Top 35 birthing counties						
Alameda	72.6	67.5	77.7	8.6	5.6	11.5
Butte	40.4	33.2	47.6	18.7	13.1	24.2
Contra Costa	67.1	61.6	72.6	11.9	8.1	15.7
El Dorado	69.0	61.9	76.1	8.6	5.0	12.2
Fresno	30.4	25.0	35.8	22.9	17.1	28.8
Humboldt	36.4	28.4	44.4	17.8	11.8	23.8
Imperial	27.6	18.6	36.6	14.0	9.5	18.4
Kern	40.4	34.2	46.5	16.6	11.7	21.5
Kings	42.3	34.8	49.9	13.5	7.7	19.3
Los Angeles	41.4	37.9	44.9	21.0	17.9	24.1
Madera	31.5	24.3	38.7	28.3	21.7	34.8
Marin	77.6	72.0	83.2	5.1	2.1	8.1
Merced	41.8	33.6	50.0	25.8	18.7	32.9
Monterey	45.5	40.1	50.9	17.3	13.0	21.6
Napa	74.7	69.0	80.4	6.9	3.9	9.9
Orange	50.4	43.8	56.9	16.9	12.0	21.8
Placer	53.2	44.5	61.9	10.6	5.6	15.5
Riverside	36.6	31.2	42.0	23.5	18.9	28.1
Sacramento	52.5	46.9	58.2	14.6	10.8	18.5
San Bernardino	33.4	27.8	39.1	26.8	21.1	32.6
San Diego	58.0	52.4	63.7	14.8	10.6	18.9
San Francisco	76.8	71.9	81.7	3.9*	1.5	6.4
San Joaquin	60.6	54.4	66.9	11.6	7.8	15.4
San Luis Obispo	69.1	61.4	76.8	10.8	5.9	15.8
San Mateo	72.9	67.6	78.2	7.6	4.6	10.6
Santa Barbara	57.5	52.1	63.0	14.3	10.6	18.1
Santa Clara	77.9	73.2	82.6	4.9	3.0	6.9
Santa Cruz	57.6	51.1	64.0	14.9	10.3	19.5
Shasta	16.6	11.7	21.6	35.9	28.5	43.3
Solano	70.0	64.6	75.5	8.5	5.3	11.8
Sonoma	75.4	70.1	80.6	3.0*	0.7	5.3
Stanislaus	56.5	50.5	62.5	17.8	13.3	22.3
Tulare	44.3	38.1	50.5	18.4	13.4	23.5
Ventura	53.2	47.2	59.2	13.9	10.0	17.8
Yolo	77.8	70.9	84.7	5.9*	1.1	10.8

Appendix

Table 4. Receipt of influenza vaccine during pregnancy among women with a live birth in 2016, by maternal characteristics, MIHA 2016

	<i>Prevalence (%)</i>	<i>95% Confidence Interval</i>	
Total	58.9	57.2	60.6
Prenatal Insurance			
Medi-Cal	52.5	50.1	54.8
Private	66.0	63.5	68.6
Maternal Race/Ethnicity			
Hispanic	57.8	55.4	60.3
Black	46.0	41.6	50.3
Asian/Pacific Islander	67.0	61.9	72.1
White	58.1	55.1	61.2
Maternal Age			
15-19 years	60.1	52.1	68.1
20-34 years	57.6	55.6	59.6
35 years or older	63.4	59.7	67.0
Maternal Education			
<High School	61.7	57.4	66.1
High School Graduate/GED	55.6	51.7	59.4
Some College	50.7	47.6	53.9
College Graduate	66.8	63.9	69.7
Family Income (% of Federal Poverty Guideline)			
0-100% FPG	54.1	51.2	68.3
101-200% FPG	55.3	51.5	59.6
>200% FPG	65.5	62.7	67.1
Among US- and Foreign-Born Hispanic Women			
Language Spoken at Home			
English	53.4	48.9	57.9
Spanish	63.1	59.2	67.0
English and Spanish equally	55.9	51.1	60.8
Maternal Birthplace			
US-Born	53.4	50.0	56.8
Foreign-Born	64.1	60.5	67.6
Years in the US (among Foreign-Born Hispanic Women)			
Less than five years	65.6	56.3	74.9
Five or more years	64.6	60.5	68.8

Appendix

Table 5. Receipt of influenza vaccine during pregnancy among women with a live birth in 2016, by county and MIHA Region, MIHA 2016

	<i>Prevalence (%)</i>	<i>95% Confidence Interval</i>	
Top 20 Birthing Counties			
Alameda	76.8	70.0	83.7
Contra Costa	72.1	64.8	79.4
Fresno	50.3	42.3	58.2
Kern	49.6	41.4	57.7
Los Angeles	54.2	50.1	58.3
Monterey	71.4	64.5	78.3
Orange	53.3	45.5	61.1
Riverside	44.4	37.4	51.4
Sacramento	59.8	52.4	67.1
San Bernardino	47.2	39.4	55.0
San Diego	66.6	60.0	73.3
San Francisco	83.8	78.0	89.5
San Joaquin	54.8	45.5	64.1
San Mateo	77.5	69.8	85.1
Santa Barbara	66.5	59.3	73.7
Santa Clara	82.4	75.8	89.0
Sonoma	69.3	61.7	76.8
Stanislaus	58.1	49.7	66.5
Tulare	57.0	49.3	64.8
Ventura	59.9	51.2	68.6
MIHA Regions			
Central Coast Region	64.8	60.6	69.0
Greater Sacramento Region	58.8	53.2	64.3
Los Angeles County	54.2	50.1	58.3
North/Mountain Region	53.3	46.3	60.3
Orange County	53.3	45.5	61.1
San Diego County	66.6	60.0	73.3
San Francisco Bay Area	78.2	75.4	81.0
San Joaquin Valley	52.2	48.7	55.7
Southeastern California	45.5	40.5	50.6

Appendix

MIHA Regions of California



Appendix

2016 MIHA immunization questions:

- "During your most recent pregnancy, did you receive a Tdap vaccination or shot? A Tdap vaccination is a shot that protects against tetanus, diphtheria, and pertussis (whooping cough)." Responses included:
 - "Yes, I got a Tdap shot during my pregnancy"
 - "No, but I got a Tdap shot in the hospital after I delivered"
 - "No, I did not get a Tdap shot"
 - "Don't remember"
- Among women that reported receiving a Tdap shot during pregnancy, they were asked "During your most recent pregnancy, where did you get your Tdap shot?" Responses included:
 - "At the doctor's office or clinic where I had my prenatal care for this pregnancy"
 - "At a different doctor's office or clinic"
 - "At a pharmacy or supermarket"
 - "Other (Please tell us: _____)"
 - "Don't remember"
- "During your most recent pregnancy, did you get a flu shot?" Women could report Yes or No.

Data source: MIHA is an annual population-based survey of California resident women with a live birth, with a statewide sample size of 6,632 in 2016. Prevalence (%), 95% confidence interval (95% CI). MIHA is a collaborative effort of the Maternal, Child and Adolescent Health Division and the Women, Infants and Children Division in the California Department of Public Health and the Center on Social Disparities in Health at the University of California, San Francisco. MIHA is supported by federal Title V funds. Visit the MIHA website at www.cdph.ca.gov/MIHA.

Vaccination in pharmacy locations: Starting February 2016, all routine adult immunizations are covered as a Medi-Cal fee-for-service pharmacy benefit. This pharmacy benefit was expanded to Medi-Cal managed care health plans starting August 2016, therefore these data do not fully reflect implementation of this policy.

For programmatic-related inquiries and questions, please contact:

California Department of Public Health, Immunization Branch at IZBranch@cdph.ca.gov or (510) 620-3737.

References:

- ¹ California Department of Public Health (CDPH). Pertussis Summary Reports. <http://www.cdph.ca.gov/programs/immunize/Pages/PertussisSummaryReports.aspx> Updated June 27, 2016. Accessed 9/12/2016.
- ² Centers for Disease Control and Prevention. Flu Vaccine Safety and Pregnancy – Questions and Answers. http://www.cdc.gov/flu/protect/vaccine/qa_vacpregnant.htm Updated August 25, 2016. Accessed 9/12/2016.
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- ⁴ Creanga AA, et al. Severity of 2009 pandemic influenza (H1N1) virus infection in pregnant women. *Obstet Gynecol.* 2010; 115(4): 717-26
- ⁵ Poehling, KA, Szilagyi PG et al. Impact of Maternal Immunization on Influenza Hospitalizations in Infants. *Am J Obstet Gynecol.* 2011 June; 204(6 Suppl 1): S141-S148.
- ⁶ Centers for Disease Control and Prevention. Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine (Tdap) in Pregnant Women – Advisory Committee on Immunization Practices (ACIP), 2012. *MMWR Morb Mortal Wkly Rep.* 2013; 62(07); 131-135.

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- ⁷ Centers for Disease Control and Prevention. Prevention and Control of Seasonal Influenza with Vaccines. Recommendations of the Advisory Committee on Immunization Practices – United States, 2013-2014. MMWR Morb Mortal Wkly Rep. 2013; 62(07).
- ⁸ Centers for Disease Control and Prevention. Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine (Tdap) in Pregnant Women and Persons Who Have or Anticipate Having Close Contact with Infant Aged <12 Months --- Advisory Committee on Immunization Practices (ACIP), 2011. MMWR Morb Mortal Wkly Rep. 2011; 60(41); 1424-1426.
- ⁹ Centers for Disease Control and Prevention. Vaccinating Pregnant Patients. <http://www.cdc.gov/pertussis/pregnant/hcp/pregnant-patients.html> Updated January 27, 2015. Accessed 11/3/2016
- ¹⁰ <https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/Immunization/Pertussis-MihaFactSheet.pdf>
- ¹¹ Board Of Pharmacy Alert: Medi-Cal Expands Access to Adult Immunizations in Pharmacies (5/2017)
- ¹² California Department of Public Health Maternal Child and Adolescent Health Program. Maternal and Infant Health Assessment. MIHA Methods – Map of MIHA Regions of California. <http://www.cdph.ca.gov/data/surveys/MIHA/Pages/mihamethods.aspx> Accessed 11/04/2016