Tdap and Influenza Immunization in Pregnant Women

2015 Maternal and Infant Health Assessment Survey

Pertussis (Whooping Cough)

In 2014, California experienced a pertussis epidemic with over 11,000 reported cases. Young infants have the highest reported rates of illness, hospitalization and death from pertussis.[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. To confer the most protection to infants, pregnant women should receive Tdap as soon as possible between 27-36 weeks gestation.[6] Postpartum immunization does not provide direct antibody protection to the infant.

Influenza (Flu)

Influenza immunization during pregnancy helps protect both mother and baby from influenza and its complications.[2] Changes to the immune system, heart, and lungs during pregnancy make pregnant women more susceptible to severe influenza illness, pneumonia, and hospitalization.[3] Influenza during pregnancy can result in pre-term birth, low birth weight, and stillbirth of the baby.[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; maternal vaccination helps protect our youngest infants from influenza.

Immunization Recommendations for Pregnant Women

The best way to protect young infants from pertussis and influenza is by immunizing their mothers during pregnancy. The American College of Obstetricians and Gynecologists (ACOG), the American Academy of Family Physicians (AAFP), the American Academy of Pediatrics (AAP), and the Centers for Disease Control and Prevention (CDC) recommend that all pregnant women receive Tdap and influenza immunizations.[6,7]

Tdap Vaccine:

- At the earliest opportunity between 27-36 weeks gestation of EACH pregnancy, regardless of past Tdap immunizations
- Cocooning and postpartum immunization do not provide direct protection to the infant; these two strategies alone are no longer considered optimal for preventing infant pertussis[8,9]

Flu Vaccine:

- Women who are pregnant, or plan to become pregnant during a given influenza season should be immunized with the current influenza vaccine as soon as it becomes available

Maternal and Infant Health Assessment (MIHA) Survey

MIHA is an annual population-based survey of California resident women with a live birth. The most recent survey includes women who had a live birth in 2015.[*] Two of the assessments on the MIHA survey were self-reported Tdap and Influenza vaccine rates among pregnant women. Survey results are available for women statewide, for the 20 California counties with the largest number of births, and for the 9 MIHA regions[10] of California.

Among women giving birth in 2015, self-reported Tdap and influenza immunization rates for pregnant women were low, with significant disparities across select populations. Additionally, most self-reported influenza immunization rates are below the Healthy People 2020 goal (80%) of pregnant women receiving influenza vaccine. Efforts to improve prenatal immunization rates for all populations, particularly Hispanic and African-American women as well as women with Medi-Cal coverage are warranted.

[*] MIHA 2015 data presented in this report is provisional data only. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Self-Reported Prenatal Immunization Coverage in California: The 2015 MIHA Survey

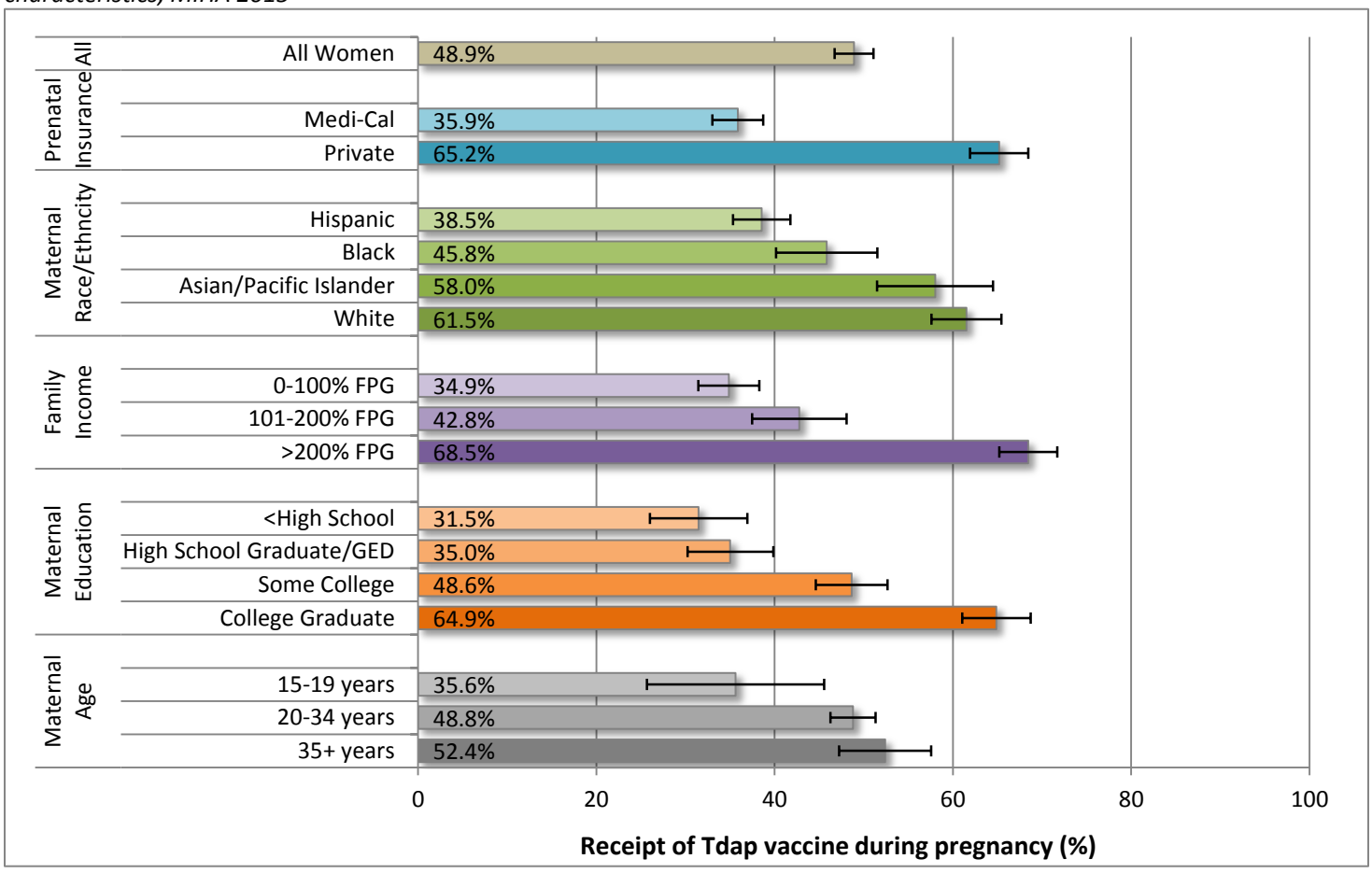
Tdap immunization status, by maternal characteristics during pregnancy:

Overall, self-reported prenatal Tdap vaccine coverage in California among women who delivered in 2015 was 49%.

During pregnancy, Tdap immunization:

- Was lower among mothers insured by Medi-Cal (36%) than by private insurance (65%)
- Was lower among Hispanic (39%) and Black (46%) women compared to Asian (58%) or White (62%) women
- Was lower among mothers with reported family incomes of 0-100% (35%) or 101-200% (43%) of Federal Poverty Guidelines (FPG) compared to mothers who reported incomes >200% of FPG (69%)
- Was lower among women who had graduated from high school (35%) compared to those who had graduated from college (65%)
- Was lower among women who gave birth between 15-19 years of age (36%) compared to women who gave birth at 20-34 years (49%) or 35 years of age and older (52%)

Figure 1. *Receipt of Tdap vaccine during pregnancy among women with a live birth in 2015, in California, by maternal characteristics, MIHA 2015*[*]



[*] See Appendix for additional estimates. Note: 2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

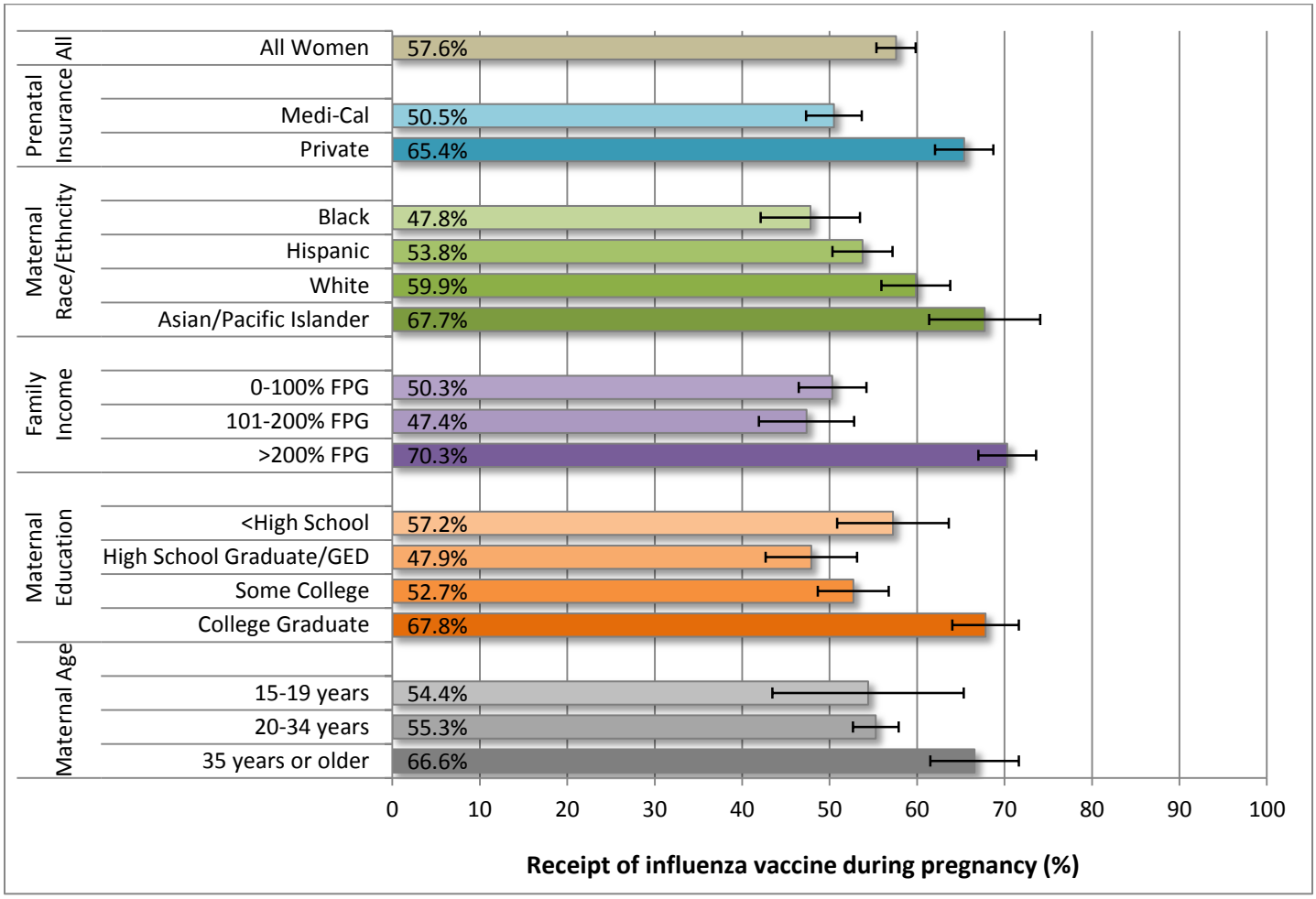
Influenza immunization status, by maternal characteristics during pregnancy

Overall, self-reported prenatal Influenza vaccine coverage in California among women who delivered in 2015 was 58%.

During pregnancy, influenza immunization:

- Was lower among mothers insured by Medi-Cal (51%) than by private insurance (65%)
- Was lower among Black (48%) women compared to White (60%) or Asian (68%) women
- Was lower among Hispanic (54%) compared to Asian (68%) women
- Was lower among mothers with reported family incomes of 0-100% FPG (50%) and 101-200% (47%) compared to mothers who reported incomes >200% of FPG (70%)
- Was lower among mothers who had completed high school (48%) compared to those who have graduated college (68%)
- Was lower among women who gave birth between 20-34 years of age (55%) compared to women who gave birth at 35 years of age and older (67%)

Figure 2. *Receipt of influenza vaccine during pregnancy among women with a live birth in 2015, in California, by maternal characteristics, MIHA 2015*[*]



[*] See Appendix for additional estimates. Note: 2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Geographic Coverage: The 2015 MIHA Survey

Receipt of Tdap and influenza vaccine during pregnancy varies geographically. Southeastern California[10] (31%) had the lowest self-reported prenatal Tdap coverage and the San Francisco Bay area had the highest (75%) (Figure 3 and 4). For prenatal influenza vaccine, once again women in Southeastern California reported the lowest coverage (40%) and San Francisco Bay Area reported the highest (78%) (Figure 5 and 6).

Figure 3. *Receipt of Tdap vaccine during pregnancy among women with a live birth in 2015, by MIHA region[10], 2015*[*]

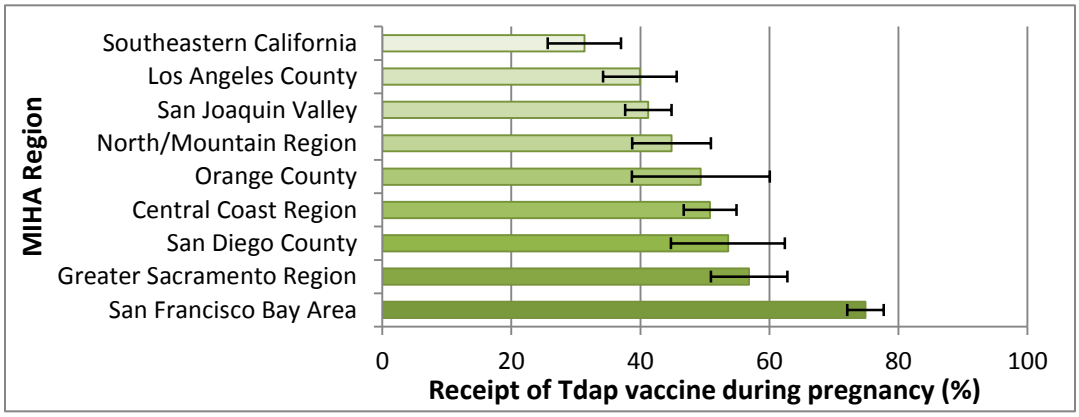
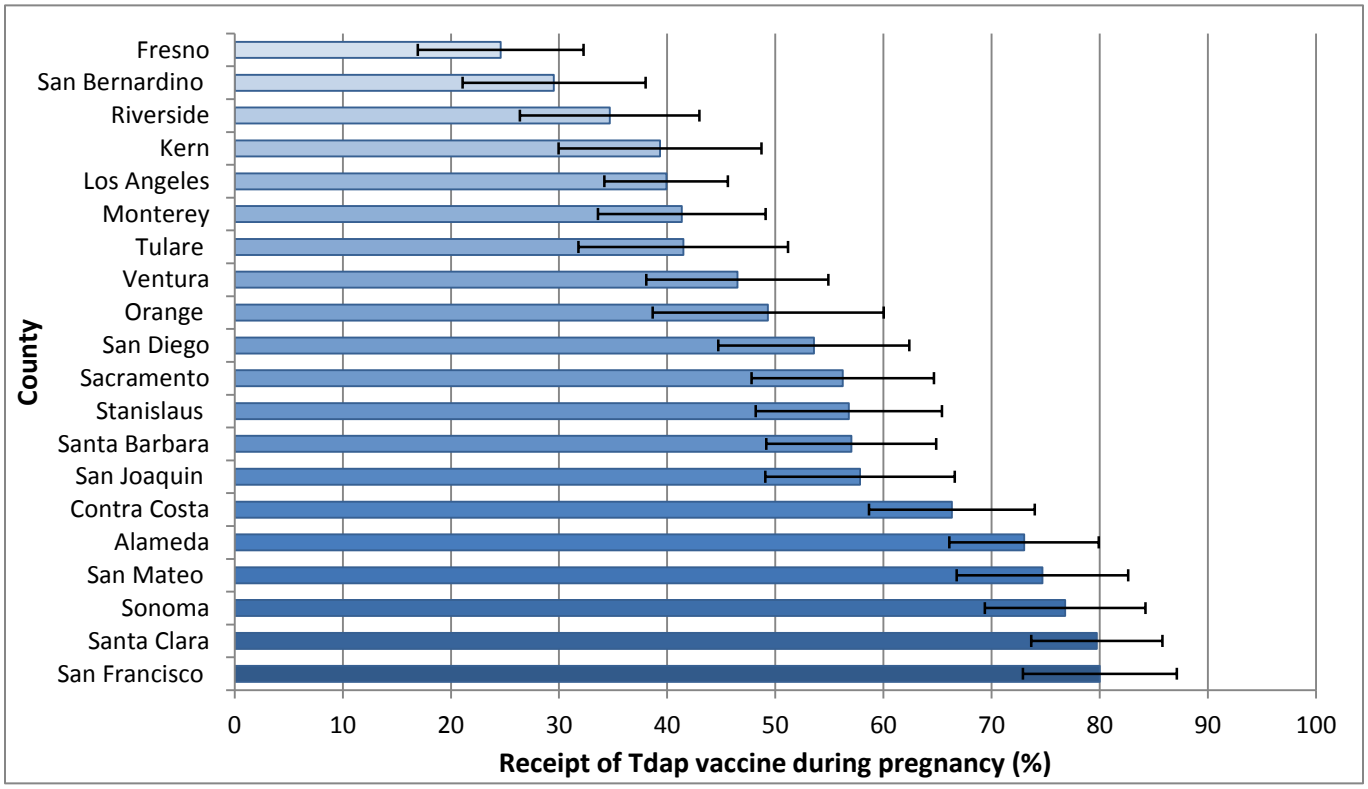


Figure 4. *Receipt of Tdap vaccine during pregnancy among women with a live birth in 2015, by the 20 counties with the highest number of births. MIHA 2015*



[*] 2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Figure 5. *Receipt of influenza vaccine during pregnancy among women with a live birth in 2015, by MIHA region[10], 2015[*]*

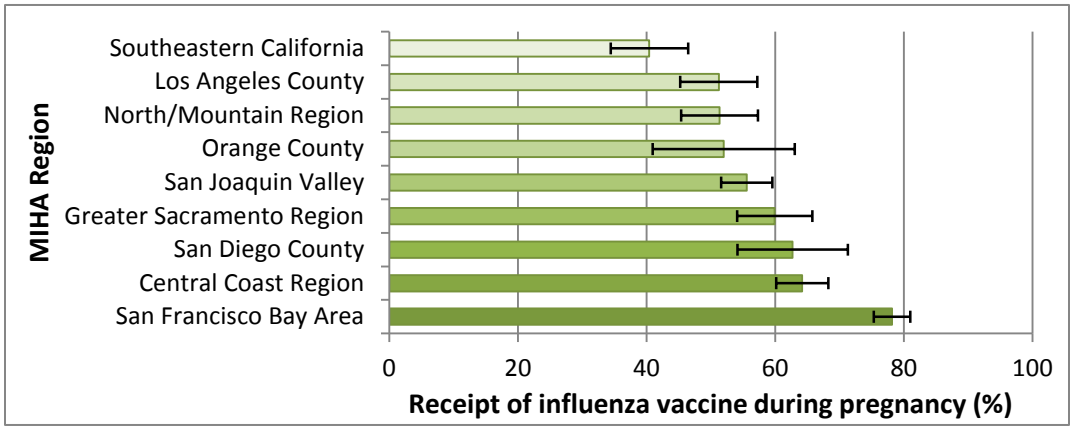
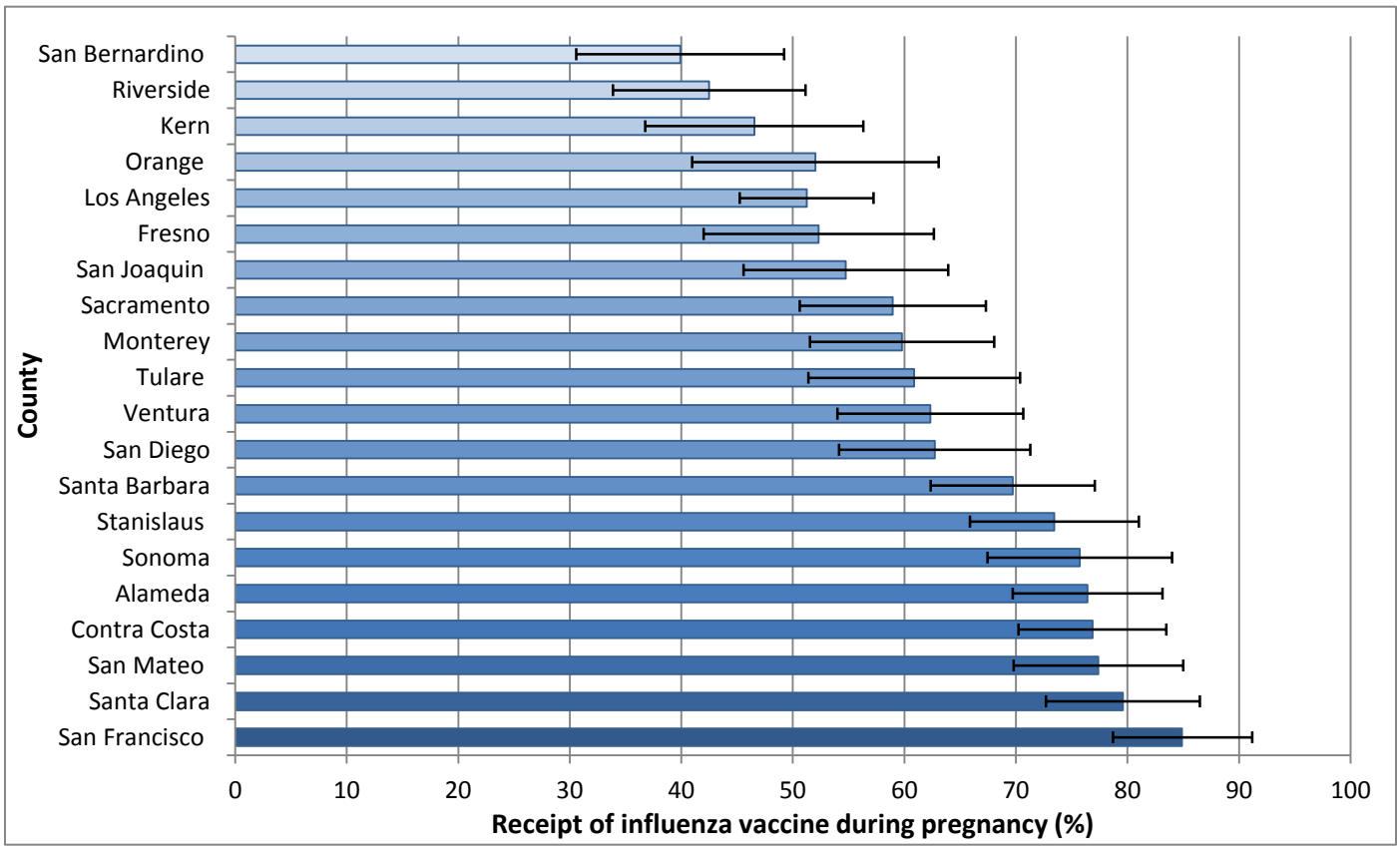


Figure 6. *Receipt of influenza vaccine during pregnancy among women with a live birth in 2015, by the 20 counties with the highest number of births. MIHA 2015*



[*] 2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Appendix

Table 1. Receipt of Tdap vaccine among women with a live birth in 2015, by maternal characteristics, MIHA 2015*

	Received Tdap vaccine during pregnancy				Received Tdap vaccine after delivery			
	Prevalence (%)	*95% Confidence Interval*		*Population Estimate (N)*	*Prevalence (%)*	*95% Confidence Interval*		*Population Estimate (N)*
All Women	48.9	46.7	51.1	228,200	18.1	16.2	19.9	84,300
Prenatal Insurance								
Medi-Cal	35.9	33.0	38.7	84,700	21.2	18.5	23.8	50,000
Private	65.2	61.9	68.5	132,300	13.7	11.1	16.2	27,700
Maternal Race/Ethnicity								
Hispanic	38.5	35.3	41.8	86,600	20.7	17.9	23.5	46,500
Black	45.8	40.2	51.5	11,400	17.7	13.0	22.4	4,400
Asian/Pacific Islander	58.0	51.5	64.5	41,600	14.8	10.0	19.5	10,600
White	61.5	57.6	65.5	81,600	15.7	12.5	18.9	20,800
Family Income (% of Federal Poverty Guideline)								
0-100% FPG	34.9	31.4	38.3	56,300	20.1	17.1	23.1	32,400
101-200 % FPG	42.8	37.5	48.1	38,800	24.5	19.4	29.5	22,200
>200% FPG	68.5	65.2	71.7	118,100	12.2	9.8	14.7	21,100
Maternal Education								
<High School	31.5	26.0	36.9	22,900	22.8	17.1	28.5	16,600
High School Graduate/GED	35.0	30.2	39.9	30,700	23.3	18.9	27.8	20,500
Some College	48.6	44.6	52.7	68,900	18.2	15.1	21.3	25,800
College Graduate	64.9	61.0	68.7	102,700	12.9	10.1	15.8	20,500
Maternal Age								
15-19 years	35.6	25.7	45.6	8,100	17.1	9.3	24.9	3,900
20-34 years	48.8	46.3	51.3	169,200	18.6	16.5	20.7	64,400
35 years or older	52.4	47.2	57.6	50,900	16.5	12.4	20.6	16,000

* 2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Appendix

Table 1 (cont.) Receipt of Tdap vaccine among women with a live birth in 2015, by maternal characteristics, MIHA 2015*

	Received Tdap vaccine during pregnancy				Received Tdap vaccine after delivery			
	Prevalence (%)	*95% Confidence Interval*		*Population Estimate (N)*	*Prevalence (%)*	*95% Confidence Interval*		*Population Estimate (N)*
Among US- and Foreign-Born Hispanic Women								
Language Spoken at Home								
English	46.7	41.1	52.3	36,600	19.4	15.2	23.7	15,200
Spanish	32.1	27.2	36.9	27,700	19.9	15.4	24.5	17,200
English and Spanish Equally	36.5	30.1	42.9	20,700	24.3	18.0	30.6	13,700
Maternal Birthplace								
US-Born	43.7	39.2	48.2	56,400	18.7	15.4	22.0	24,100
Foreign-Born	31.6	27.2	35.9	30,200	23.4	18.6	28.2	22,400
Years in the US (among Foreign-Born Hispanic Women)								
Less than five years	34.0	20.2	47.8	3,900	20.1*	7.2	33.0	2,300
Five or more years	31.5	26.6	36.4	23,100	25.3	19.7	30.9	18,500

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

* 2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Appendix

Table 2. Receipt of Tdap vaccine during pregnancy and after delivery among women with a live birth in 2015, by county and MIHA Region, MIHA 2015*

	Received Tdap vaccine during pregnancy				Received Tdap vaccine after delivery			
	Prevalence (%)	*95% Confidence Interval*		*Population Estimate (N)*	*Prevalence (%)*	*95% Confidence Interval*		*Population Estimate (N)*
Top 20 Birthing Counties								
Alameda	73.0	66.1	79.9	13,500	9.3	5.0	13.6	1,700
Contra Costa	66.3	58.7	74.0	8,000	12.9	7.3	18.5	1,600
Fresno	24.6	16.9	32.3	3,600	24.7	15.1	34.4	3,600
Kern	39.3	30.0	48.7	4,900	16.1	8.3	23.8	2,000
Los Angeles	39.9	34.2	45.6	47,600	22.3	17.1	27.5	26,600
Monterey	41.4	33.6	49.1	2,500	17.6	11.2	24.1	1,100
Orange	49.3	38.7	60.0	17,300	12.5	5.3	19.7	4,400
Riverside	34.7	26.4	43.0	10,100	24.1	16.9	31.4	7,000
Sacramento	56.2	47.8	64.7	10,000	11.8	6.7	16.8	2,100
San Bernardino	29.5	21.1	38.0	8,500	30.1	21.0	39.2	8,700
San Diego	53.6	44.7	62.4	22,800	18.1	11.3	24.8	7,700
San Francisco	80.0	72.9	87.1	6,700	3.7*	0.4	7.0	300
San Joaquin	57.8	49.1	66.6	5,600	12.0	6.4	17.6	1,200
San Mateo	74.7	66.8	82.6	6,400	8.2*	3.3	13.0	700
Santa Barbara	57.0	49.2	64.9	3,100	17.7	11.9	23.5	1,000
Santa Clara	79.7	73.7	85.8	17,700	4.9	2.7	7.2	1,100
Sonoma	76.8	69.4	84.3	3,700	--			
Stanislaus	56.8	48.2	65.4	4,200	18.7	11.7	25.6	1,400
Tulare	41.5	31.8	51.2	2,800	22.8	14.5	31.1	1,600
Ventura	46.5	38.1	54.9	4,500	21.4	14.6	28.2	2,100
MIHA Regions								
Central Coast Region	50.8	46.7	54.9	13,800	17.6	14.5	20.8	4,800
Greater Sacramento Region	56.9	50.9	62.8	15,500	12.4	8.8	16.1	3,400
Los Angeles County	39.9	34.2	45.6	47,600	22.3	17.1	27.5	26,600
North/Mountain Region	44.8	38.7	50.9	5,500	24.6	19.5	29.7	3,000
Orange County	49.4	38.7	60.0	17,300	12.5	5.3	19.7	4,400
San Diego County	53.6	44.7	62.4	22,800	18.1	11.3	24.8	7,700
San Francisco Bay Area	74.9	72.1	77.7	62,200	7.4	5.9	9.0	6,200
San Joaquin Valley	41.2	37.6	44.8	24,300	20.1	16.7	23.5	11,800
Southeastern California	31.3	25.7	37.0	19,100	27.0	21.4	32.5	16,400

-- Estimate not shown because the relative standard error (RSE) is greater than 50% or fewer than 5 women reported.

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

* 2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Appendix

Table 3. Receipt of influenza vaccine during pregnancy among women with a live birth in 2015, by maternal characteristics, MIHA 2015*

	Prevalence (%)	*95% Confidence Interval*		*Population Estimate (N)*
All Women	57.6	55.4	59.8	266,700
Prenatal Insurance				
Medi-Cal	50.5	47.3	53.7	117,900
Private	65.4	62.1	68.7	132,200
Maternal Race/Ethnicity				
Hispanic	53.8	50.3	57.2	119,500
Black	47.8	42.1	53.5	11,800
Asian/Pacific Islander	67.7	61.4	74.1	48,600
White	59.9	55.9	63.8	78,800
Family Income (% of Federal Poverty Guideline)				
0-100% FPG	50.3	46.5	54.2	79,800
101-200 % FPG	47.4	41.9	52.8	42,900
>200% FPG	70.3	67.0	73.6	121,100
Maternal Education				
<High School	57.2	50.9	63.6	41,600
High School Graduate/GED	47.9	42.7	53.1	40,900
Some College	52.7	48.7	56.8	74,000
College Graduate	67.8	64.0	71.6	107,400
Maternal Age				
15-19 years	54.4	43.5	65.3	12,100
20-34 years	55.3	52.7	57.9	190,100
35 years or older	66.6	61.5	71.6	64,600
Among US- and Foreign-Born Hispanic Women				
Language Spoken at Home				
English	51.0	45.4	56.6	39,700
Spanish	57.4	51.6	63.3	49,400
English and Spanish equally	51.0	44.1	57.8	28,100
Maternal Birthplace				
US-Born	49.4	44.9	53.9	63,100
Foreign-Born	59.6	54.3	65.0	56,500
Years in the US (among Foreign-Born Hispanic Women)				
Less than five years	53.4	37.6	69.2	6,100
Five or more years	62.2	56.2	68.2	44,800

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Appendix

Table 4. Receipt of influenza vaccine during pregnancy among women with a live birth in 2015, by county and MIHA Region, MIHA 2015*

	Prevalence (%)	*95% Confidence Interval*		*Population Estimate (N)*
Top 20 Birthing Counties				
Alameda	76.4	69.7	83.1	14,100
Contra Costa	76.9	70.2	83.5	9,100
Fresno	52.3	42.0	62.6	7,400
Kern	46.5	36.8	56.3	6,000
Los Angeles	51.2	45.2	57.2	60,400
Monterey	59.8	51.5	68.0	3,600
Orange	52.0	41.0	63.1	18,300
Riverside	42.5	33.9	51.1	12,100
Sacramento	59.0	50.6	67.3	10,400
San Bernardino	39.9	30.6	49.2	11,200
San Diego	62.7	54.1	71.3	26,700
San Francisco	84.9	78.7	91.2	7,100
San Joaquin	54.8	45.6	63.9	5,300
San Mateo	77.4	69.8	85.0	6,700
Santa Barbara	69.7	62.4	77.1	3,700
Santa Clara	79.6	72.7	86.5	17,600
Sonoma	75.7	67.5	84.0	3,600
Stanislaus	73.4	65.9	81.0	5,400
Tulare	60.9	51.4	70.4	4,200
Ventura	62.3	54.0	70.7	6,100
MIHA Regions				
Central Coast Region	64.2	60.1	68.3	17,300
Greater Sacramento Region	59.9	54.1	65.8	16,300
Los Angeles County	51.2	45.2	57.2	60,400
North/Mountain Region	51.3	45.4	57.3	6,300
Orange County	52.0	41.0	63.1	18,300
San Diego County	62.7	54.1	71.3	26,700
San Francisco Bay Area	78.2	75.3	81.0	64,700
San Joaquin Valley	55.6	51.6	59.5	32,700
Southeastern California	40.4	34.4	46.5	24,100

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Appendix


Counties in Each MIHA Region
Central Coast Region
Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, Ventura
Greater Sacramento Region
El Dorado, Placer, Sacramento, Sutter, Yolo, Yuba
Los Angeles County
North/Mountain Region
Alpine, Amador, Butte, Calaveras, Colusa, Del Norte, Glenn, Humboldt, Inyo, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Plumas, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tuolumne
Orange County
San Diego County
San Francisco Bay Area
Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma
San Joaquin Valley
Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare
Southeastern California
Imperial, Riverside, San Bernardino
North/Mountain
Greater Sacramento
San Francisco Bay Area
North/Mountain
San Joaquin Valley
Central Coast
Los Angeles
Southeastern California
Orange
San Diego

Appendix

2015 MIHA 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)." Women could report receiving a Tdap shot during pregnancy, during the hospital after delivery, not at all, or they don't remember.
"During your most recent pregnancy, did you get a flu shot?" Women could report Yes or No.

MIHA 2015 data presented in this report is provisional data only. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.

Data source: MIHA is an annual population-based survey of California resident women with a live birth, with a statewide sample size of 6,799 in 2015. Prevalence (%), 95% confidence interval (95% CI), and population estimates (rounded to the nearest hundred) are weighted to represent all women with a live birth. 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.

For programmatic-related inquiries and questions, please contact:
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[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.
[3] Centers for Disease Control and Prevention. Pregnant Women & Influenza (Flu). http://www.cdc.gov/flu/protect/vaccine/pregnant.htm Updated October 14, 2016. Accessed 11/3/2016
[4] Creanga AA, et al. Severity of 2009 pandemic influenza (H1N1) virus infection in pregnant women. Obstet Gynecol. 2010; 115(4): 717-26
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[10] 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