



## **Section 2**

### **Perinatal Hepatitis B Prevention Program**



## Perinatal Hepatitis B Prevention Program

### Background

California's Perinatal Hepatitis B Prevention Program (PHPP) was created in 1991 to eliminate the perinatal transmission of hepatitis B virus. The CDC estimates<sup>1</sup> that between 4,000 and 5,000 infants are born each year in California to hepatitis B surface antigen (HBsAg) positive women. Between 70 and 90 percent of infants that are born to women who are both HBsAg-positive and hepatitis B e antigen (HBeAg) positive develop chronic hepatitis B infection by age six months in the absence of postexposure immunoprophylaxis.<sup>2</sup> For infants of women who are HBsAg-positive but HBeAg-negative, the risk for chronic infection is less than ten percent in the absence of postexposure immunoprophylaxis.<sup>3</sup> Children born to HBsAg-positive mothers who do not become infected during the perinatal period remain at high risk of infection during early childhood.<sup>4</sup> In one study, 38 percent of infants who were not infected perinatally became infected by four years of age.<sup>5</sup>

The PHPP currently operates in 24 jurisdictions<sup>6</sup> including 23 of the 58 California counties where approximately 98 percent of the state's population at risk of chronic hepatitis B infection live. The objective of the program is to prevent the perinatal transmission of hepatitis B by facilitating the following:

- Prenatal testing of pregnant women for HBsAg to identify infected mothers.
- Appropriate immunoprophylaxis of infants born to HBsAg-positive women.
- Postvaccination serologic testing for the infants at 9 through 15 months of age to test for immunity; and
- Serologic screening and vaccination of susceptible household contacts.

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<sup>1</sup> Data from two National Health and Nutrition Examination Surveys (NHANES) performed during 1976-1980 (NHANES II) and 1988-1994 (NHANES III) are the primary source information about the prevalence of HBV infection in the general U.S. population.

<sup>2</sup> Okada K, Kamiyama I, Inomata M, Imai M, Miyakawa Y. e antigen and anti-e in the serum of asymptomatic carrier mothers as indicators of positive and negative transmission of hepatitis B virus to their infants. *N Engl J Med* 1976;294:746-9.

<sup>3</sup> Xu ZY, Liu CB, Francis DP, et al. Prevention of perinatal acquisition of hepatitis B virus carriage using vaccine: preliminary report of a randomized, double-blind placebo-controlled and comparative trial. *Pediatrics* 1985;76:713-8.

<sup>4</sup> Yao GB. Importance of perinatal versus horizontal transmission of hepatitis B virus infection in China. *Gut* 1996; 38 Suppl 2:S39-42.

<sup>5</sup> Beasley RP, Hwang LY. Postnatal infectivity of hepatitis B surface antigen-carrier mothers. *J Infect Dis* 1983;147:185-90.

<sup>6</sup> The jurisdictions include the Counties of Alameda, Butte, Contra Costa, Fresno, Kern, Los Angeles, Merced, Orange, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Joaquin, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare and Ventura as well as the City of Long Beach.

## Identification of HBsAg-positive pregnant women

California Law requires prenatal screening for hepatitis B surface antigen and reporting of positive HBsAg tests by health care providers and laboratories to the local health department<sup>7</sup>. The results of a statewide survey of birth hospitals conducted in 1996 showed that 96.3 percent of mothers had HBsAg status documented in either their own medical record or their infants' medical record.<sup>8</sup> Additionally, the results of a 1998-1999 survey conducted in birth hospitals in three counties (San Francisco, Contra Costa, and Alameda Counties) indicated that 99 percent of women had documented prenatal screening tests for HBsAg.<sup>9</sup>

Approximately 3,000 pregnant women infected with hepatitis B are identified and enrolled into the PHPP each year (Summary Table 2.5). Between 2001 and 2006, 77.8 percent of the over 18,000 HBsAg-positive pregnant women identified and enrolled in the PHPP were Asian or Pacific Islander, 6.0 percent were Hispanic, 3.6 percent were black, 4.1 percent were white, and 8.5 percent were of unknown race/ethnicity. Eighty percent of the women enrolled in the program were foreign-born, eight percent were born in the United States and the place of birth for 12 percent was unknown (Table 2.1).

**TABLE 2.1 Number of HBsAg-positive women enrolled by race, ethnicity and foreign born status\* — California, 2001-06**

	2001		2002		2003		2004		2005		2006	
	No.	%										
Asian or Pacific Islander	2,324	78.4	2,319	79.8	2,558	79.7	2,419	77.3	2,255	77.0	2,128	74.0
Black	113	3.8	108	3.7	103	3.2	110	3.5	104	3.6	104	3.6
Hispanic	204	6.9	146	5.0	183	5.7	173	5.5	193	6.6	187	6.5
White	120	4.1	117	4.0	110	3.4	134	4.3	124	4.2	131	4.6
Other/Unknown	205	6.9	215	7.4	251	7.8	294	9.4	251	8.6	313	10.9
Foreign Born	2,438	82.2	2,372	81.7	2,598	81.1	2,477	79.2	2,321	79.2	2,154	74.9

\* Reported as of June 2007

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Of the women that reported being Asian or Pacific Islander and specified ethnicity, approximately 36 percent reported being ethnically Chinese, 30 percent Vietnamese,

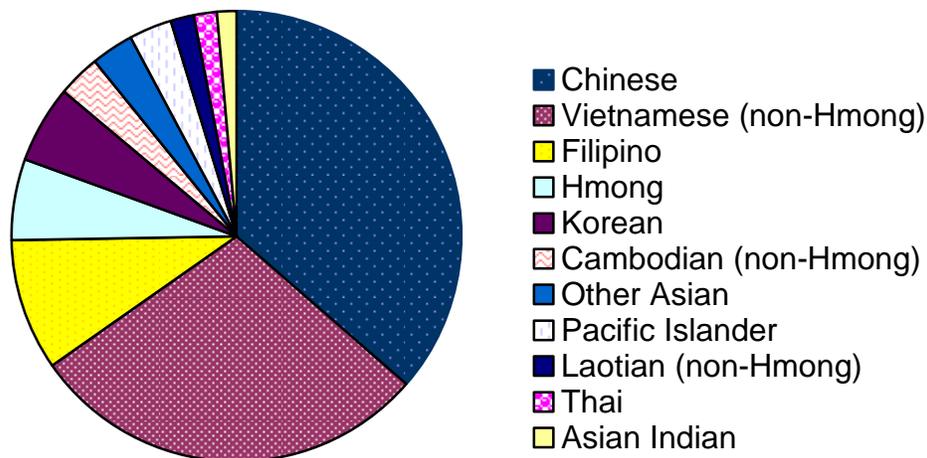
<sup>7</sup> Subdivision (b) of Section 125805 of California Health and Safety Code requires prenatal screening for hepatitis B surface antigen. However, this is not applicable if person providing prenatal care of a pregnant or attending the woman at the time of delivery has knowledge that the woman has previously been determined to be chronically infected with hepatitis B (Subdivision (b) of Section 125090). Positive HBsAg tests are notifiable by law from health care providers and laboratories to the local health department (Title 17, California Code of Regulations, Sections 2500 and 2505).

<sup>8</sup> California Department of Health Services, unpublished data, 1996.

<sup>9</sup> Schrag SJ, Arnold KE, Mohle-Boetani JC, Lynfield R, Zell ER, Stefonek K, Noga H, Craig AS, Sanza LT, Smith G, Schuchat A. Prenatal screening for infectious diseases and opportunities for prevention. *American College of Obstetricians and Gynecologists* 2003;102(4):753-60.

9 percent Filipino, 6 percent Hmong, and 5 percent Korean. Figure 2.1 shows the specified ethnic groups reported by Asian or Pacific Islander women who enrolled in the PHPP in 2005. The majority of these women (91 percent) were foreign-born and many spoke little or no English. This highlights some of the many challenges facing the case managers in this program.

FIGURE 2.1 Reported ethnicity of Asian or Pacific Islander HBsAg-positive women enrolled – California, 2005



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### Immunoprophylaxis of infants born to HBsAg-positive women

Each year, approximately 2,500 infants born to HBsAg-positive women are case managed by local health department personnel (Summary Table 2.6). Approximately 96 percent of infants born between 2001 and 2006 received hepatitis B immune globulin (HBIG) and hepatitis B vaccine within 24 hours of birth and the completion rate for HBIG and three dose hepatitis B vaccine series by 12 months of age was 90.2 percent (Table 2.2 and Summary Tables 2.7 and 2.8). The case management outcomes for infants born in 2005 and 2006 are incomplete due to reporting delays and only include data reported up to June 2007. The actual vaccine series completion rates are expected to increase.

**TABLE 2.2 Prophylaxis completion rates of enrolled infants, by year of birth\* — California, 2001-06**

	2001		2002		2003		2004		2005		2006	
	No.	%										
Prophylaxed within												
24 hours of birth <sup>†</sup>	2,590	96.9	2,712	97.2	2,691	97.5	2,614	95.3	2,286	93.7	1,233	93.4
Prophylaxed by 12												
mos. of age <sup>§</sup>	2,418	81.5	2,517	90.2	2,509	90.9	2,468	90.0	2,211	90.6	1,159	87.8
Ever prophylaxed <sup>§</sup>	2,460	92.0	2,566	92.0	2,537	92.0	2,515	91.7	2,238	91.7	1,168	88.5

\* Reported as of June 2007

† Both HBIG and one dose of hepatitis B vaccine administered

§ Both HBIG and three doses of hepatitis B vaccine administered

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### Postvaccination serologic testing of infants

The PHPP recommends that infants are serologically tested for HBsAg and antibody to HBsAg (anti-HBs) after completion of the hepatitis B vaccine series. The postvaccine serologic test rate between 2001 and 2005 was 58.1 percent (Table 2.3 and Summary Table 2.9). Ninety-three percent of the infants tested for antibody to HBsAg were found to be immune (i.e., they tested anti-HBs positive) (Table 2.3 and Summary Table 2.11). Twenty-eight percent of those who tested anti-HBs negative were revaccinated and 100 percent of those revaccinated and retested infants were found to be immune (i.e., they tested anti-HBs positive).

Unfortunately, 2.3 percent of the tested infants were infected (i.e., they tested HBsAg-positive) (Table 2.3 and Summary Table 2.11). This is expected given that postexposure prophylaxis with hepatitis B vaccine and HBIG has been demonstrated to be only 85 to 95 percent effective in preventing acute and chronic HBV infection in infants who are born to women who are positive for both HBsAg and HBeAg. All but 2 of the 196 infected infants were identified and enrolled in the PHPP at birth. Ninety-five percent of the infected infants received HBIG and at least three doses of hepatitis B vaccine by 12 months of age. Of the HBsAg-positive infants, 91 percent were Asian or Pacific Islander, 2 percent were Hispanic, 1 percent was black, 2 percent were white, and 4 percent were of unknown race/ethnicity. Eighty-three percent of the mothers of the HBsAg-positive infants were foreign-born, eight percent were born in the United States and the place of birth for nine percent of the mothers was unknown.

**TABLE 2.3 Number and percent of enrolled infants that were post vaccination serologically tested for anti-HBs or HBsAg, number and percent of tested infants found to be immune and number and percent of tested infants found to be infected, by year of birth — California, 2001-05**

	2001		2002		2003		2004		2005	
	No.	%								
Total PVS tested <sup>†</sup>	1,546	57.8	1,621	58.1	1,787	64.8	1,678	61.2	1,181	48.4
Immune <sup>§</sup>	1,338	88.9	1,449	91.0	1,651	93.8	1,562	94.7	1,077	95.5
Infected <sup>¶</sup>	43	3.0	36	2.4	25	1.5	24	1.6	25	2.2

\* Reported as of June 2007

† Number and percent of enrolled infants post vaccination serology tested for either anti-HBs or HBsAg

§ Number and percent of enrolled infants post vaccination serology tested for anti-HBs with a positive result

¶ Number and percent of enrolled infants post vaccination serology tested for HBsAg with a positive result

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## Management of household contacts

Each year, local health departments identify approximately 5,000 household contacts of HBsAg-positive pregnant women enrolled in the PHPP (Table 2.4). The majority of these household contacts (85 percent) are not susceptible to hepatitis B infection (27 percent have been previously infected, 58 percent have been vaccinated).

Approximately 5 percent of the household contacts are found to be susceptible to hepatitis B infection and 16 percent are lost to follow-up. Of the susceptible household contacts, 60 to 70 percent received all three doses of the hepatitis B vaccine.

**TABLE 2.4 Number and percent of household contacts identified, screened and vaccinated\* — California, 2001-05**

	2001		2002		2003		2004		2005	
	No.	%								
Total contacts identified	5,406	—	5,177	—	5,593	—	4,969	—	3,699	—
Known to be infected	774	14.3	774	15.0	863	15.4	815	16.4	767	20.7
Screened and infected <sup>†</sup>	268	5.0	267	5.2	302	5.4	261	5.3	169	4.6
Previously vaccinated	3,160	58.5	3,010	58.1	3,269	58.4	2,831	57.0	2,141	57.9
Previously infected	1,042	19.3	1,041	20.1	1,165	20.8	1,076	21.7	936	25.3
Lost to follow-up	903	16.7	820	15.8	876	15.7	795	16.0	538	14.5
Susceptible <sup>§</sup>	280	5.2	278	5.4	255	4.6	250	5.0	154	4.2
Vaccinated without screening	22	0.4	29	0.6	29	0.5	26	0.5	14	0.4

\* Reported as of June 2007

† Tested HBsAg-positive

§ Tested anti-HBs-positive

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### **Birth hospital outreach**

The Advisory Committee for Immunization Practices (ACIP) recommends that all infants receive the “birth dose” of hepatitis B vaccine before hospital discharge regardless of their mother’s HBsAg status. Additionally, ACIP recommends that hospitals implement standing orders for HBsAg screening of pregnant women who present for delivery with unknown status and administration of appropriate immunoprophylaxis for infants born to HBsAg-positive and HBsAg-unknown women. Local health departments actively work with the birthing hospitals in their jurisdictions to promote adoption to these recommendations. There are 267 birthing hospitals and birthing centers in California that had at least ten births in 2006. Currently, 165 (61.8 percent) of these birthing hospitals and centers report having a policy to administer the universal birth dose of hepatitis B vaccine to all infants.

### **Summary**

Rates of postexposure immunoprophylaxis are high for infants enrolled in the PHPP. Nevertheless, there is still the possibility that some infants born to chronically infected women do not receive appropriate prophylaxis and thus are at risk of chronic hepatitis B infection and premature death from cirrhosis or liver cancer. Recently, ACIP and the American Academy of Pediatrics (AAP) updated their recommendation that all newborns receive a birth dose of hepatitis B vaccine before leaving the hospital in order to ensure that all infants born to HBsAg-positive women do receive immunoprophylaxis at birth. PHPP is working to ensure that all birth hospitals comply with these recommendations to eliminate perinatal hepatitis B transmission.

## Perinatal Hepatitis B Prevention Program

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TABLE 2.5 Number of HBsAg positive women enrolled by jurisdiction\*— California, 2001-06

	2001	2002	2003	2004	2005	2006
CALIFORNIA	2,966	2,905	3,205	3,134	2,929	2,874
Alameda	289	268	222	250	228	222
Alpine	—	—	—	—	—	—
Amador	—	—	—	—	—	—
Berkeley City	—	—	—	—	—	—
Butte	—	—	5	10	8	11
Calaveras	—	1	—	—	—	—
Colusa	—	—	—	—	—	—
Contra Costa	29	33	103	79	45	41
Del Norte	—	—	—	—	—	—
El Dorado	1	2	2	10	2	4
Fresno	93	93	96	88	102	106
Glenn	—	—	—	—	—	—
Humboldt	—	—	—	—	—	—
Imperial	—	—	—	—	—	—
Inyo	—	—	—	—	—	—
Kern	17	14	19	32	21	26
Kings	—	—	—	—	—	—
Lake	—	1	1	1	1	1
Lassen	—	—	—	—	—	—
Long Beach City	51	43	59	56	35	29
Los Angeles	801	742	803	863	841	896
Madera	—	—	—	—	1	—
Marin	—	4	4	8	3	2
Mariposa	—	—	—	—	—	—
Mendocino	—	—	—	—	—	—
Merced	17	25	25	13	20	21
Modoc	—	—	—	—	—	—
Mono	—	—	—	—	—	—
Monterey	1	8	16	14	3	5
Napa	—	—	2	2	1	—
Nevada	—	—	—	—	—	—
Orange	411	307	478	404	372	336
Placer	—	1	3	4	5	3
Plumas	—	—	—	—	—	—
Riverside	51	37	27	23	19	48
Sacramento	205	204	190	214	187	187
San Benito	—	—	—	—	—	—
San Bernadino	85	102	75	87	101	106
San Diego	225	230	204	194	202	208
San Francisco	132	210	204	178	185	157
San Joaquin	76	83	71	53	46	47
San Luis Obispo	—	—	—	—	—	—
San Mateo	—	16	23	28	15	31
Santa Barbara	5	7	6	17	11	6
Santa Clara	400	392	449	404	405	270
Santa Cruz	4	6	7	2	5	5
Shasta	—	—	—	2	—	—
Sierra	—	—	—	—	—	—
Siskiyou	—	—	1	—	1	—
Solano	8	14	26	12	—	18
Sonoma	8	9	16	11	5	6
Stanislaus	30	17	31	23	12	28
Sutter	—	—	—	6	2	4
Tehama	—	—	—	—	—	—
Trinity	—	—	—	—	—	—
Tulare	20	12	8	10	17	20
Tuolumne	—	—	—	—	—	—
Ventura	7	22	27	33	26	27
Yolo	—	2	2	3	2	2
Yuba	—	—	—	—	—	—

\*Reported as of June 2007

Prepared by the California Department of Public Health, Immunization Branch

**TABLE 2.6 Total number of infants enrolled by year of birth, by jurisdiction\* — California, 2001-06**

	2001	2002	2003	2004	2005	2006
CALIFORNIA	2,673	2,789	2,759	2,743	2,440	1,320
Alameda	252	262	231	207	172	97
Alpine	—	—	—	—	—	—
Amador	—	—	—	—	—	—
Berkeley City	—	—	—	—	—	—
Butte	—	—	4	8	3	5
Calaveras	—	—	1	—	—	—
Colusa	—	—	—	—	—	—
Contra Costa	21	46	69	43	38	8
Del Norte	—	—	—	—	—	—
El Dorado	—	2	1	5	3	1
Fresno	94	85	101	83	83	56
Glenn	—	—	—	—	—	—
Humboldt	—	—	—	—	—	—
Imperial	—	—	—	—	—	—
Inyo	—	—	—	—	—	—
Kern	19	17	17	25	18	5
Kings	—	—	—	—	—	—
Lake	—	1	1	1	1	—
Lassen	—	—	—	—	—	—
Long Beach City	34	52	44	38	30	13
Los Angeles	739	750	685	738	755	551
Madera	—	—	—	—	—	—
Marin	—	2	2	5	3	2
Mariposa	—	—	—	—	—	—
Mendocino	—	—	—	—	—	—
Merced	19	23	21	17	17	3
Modoc	—	—	—	—	—	—
Mono	—	—	—	—	—	—
Monterey	—	2	8	—	6	6
Napa	—	—	1	1	1	1
Nevada	—	—	—	—	—	—
Orange	360	342	384	375	317	136
Placer	—	1	1	6	4	1
Plumas	—	—	—	—	—	—
Riverside	40	43	23	23	12	17
Sacramento	167	172	177	196	198	169
San Benito	—	—	—	—	—	—
San Bernadino	76	97	65	84	38	8
San Diego	196	209	197	169	179	75
San Francisco	130	161	152	159	133	58
San Joaquin	64	75	59	59	38	14
San Luis Obispo	—	—	—	—	—	—
San Mateo	—	8	16	27	15	8
Santa Barbara	6	8	6	12	6	3
Santa Clara	377	341	402	390	303	40
Santa Cruz	2	5	5	4	1	2
Shasta	—	—	1	1	—	—
Sierra	—	—	—	—	—	—
Siskiyou	—	—	1	—	1	—
Solano	12	20	12	—	5	5
Sonoma	10	9	12	14	—	5
Stanislaus	19	23	20	23	16	6
Sutter	—	—	—	2	2	1
Tehama	—	—	—	—	—	—
Trinity	—	—	—	—	—	—
Tulare	20	11	13	6	14	5
Tuolumne	—	—	—	—	—	—
Ventura	16	21	25	20	28	18
Yolo	—	1	2	2	—	1
Yuba	—	—	—	—	—	—

\*Reported as of June 2007

Prepared by the California Department of Public Health, Immunization Branch

**TABLE 2.7 Number and percent of enrolled infants prophylaxed within 24 hours, by year of birth, by jurisdiction\* — California 2001-06**

	2001		2002		2003		2004		2005		2006	
	No.	%										
CALIFORNIA	2,590	96.9	2,712	97.2	2,691	97.5	2,614	95.3	2,286	93.7	1,233	93.4
Alameda	246	97.6	255	97.3	226	97.8	198	95.7	170	98.8	93	95.9
Alpine	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Amador	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Berkeley City	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Butte	—	0.0	—	0.0	4	100.0	6	75.0	2	66.7	5	100.0
Calaveras	—	0.0	—	0.0	1	100.0	—	0.0	—	0.0	—	0.0
Colusa	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Contra Costa	21	100.0	44	95.7	65	94.2	41	95.3	35	92.1	7	87.5
Del Norte	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
El Dorado	—	0.0	2	100.0	1	100.0	4	80.0	3	100.0	1	100.0
Fresno	93	98.9	84	98.8	97	96.0	81	97.6	83	100.0	56	100.0
Glenn	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Humboldt	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Imperial	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Inyo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Kern	16	84.2	17	100.0	16	94.1	24	96.0	18	100.0	5	100.0
Kings	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Lake	—	0.0	1	100.0	1	100.0	1	100.0	1	100.0	—	0.0
Lassen	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Long Beach City	28	82.4	48	92.3	40	90.9	36	94.7	30	100.0	10	76.9
Los Angeles	717	97.0	724	96.5	670	97.8	717	97.2	726	96.2	538	97.6
Madera	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Marin	—	0.0	2	100.0	2	100.0	5	100.0	1	33.3	—	0.0
Mariposa	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Mendocino	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Merced	19	100.0	22	95.7	19	90.5	15	88.2	16	94.1	2	66.7
Modoc	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Mono	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Monterey	—	0.0	2	100.0	7	87.5	—	0.0	—	0.0	1	16.7
Napa	—	0.0	—	0.0	1	100.0	1	100.0	1	100.0	—	0.0
Nevada	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Orange	354	98.3	338	98.8	376	97.9	370	98.7	310	97.8	129	94.9
Placer	—	0.0	1	100.0	1	100.0	6	100.0	1	25.0	—	0.0
Plumas	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Riverside	39	97.5	40	93.0	23	100.0	23	100.0	11	91.7	16	94.1
Sacramento	164	98.2	165	95.9	171	96.6	190	96.9	191	96.5	158	93.5
San Benito	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Bernadino	71	93.4	92	94.8	59	90.8	55	65.5	19	50.0	3	37.5
San Diego	185	94.4	205	98.1	196	99.5	160	94.7	175	97.8	75	100.0
San Francisco	125	96.2	159	98.8	150	98.7	152	95.6	128	96.2	56	96.6
San Joaquin	64	100.0	74	98.7	58	98.3	48	81.4	3	7.9	—	0.0
San Luis Obispo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Mateo	—	0.0	8	100.0	16	100.0	24	88.9	4	26.7	—	0.0
Santa Barbara	5	83.3	8	100.0	6	100.0	7	58.3	5	83.3	3	100.0
Santa Clara	369	97.9	333	—	397	98.8	383	98.2	292	96.4	35	87.5
Santa Cruz	1	50.0	5	100.0	5	100.0	4	100.0	1	100.0	2	100.0
Shasta	—	0.0	—	0.0	1	100.0	—	0.0	—	0.0	—	0.0
Sierra	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Siskiyou	—	0.0	—	0.0	—	0.0	—	0.0	1	100.0	—	0.0
Solano	12	100.0	20	100.0	12	100.0	—	0.0	3	60.0	3	60.0
Sonoma	10	100.0	9	100.0	12	100.0	14	100.0	—	0.0	5	100.0
Stanislaus	19	100.0	23	100.0	20	100.0	23	100.0	16	100.0	6	100.0
Sutter	—	0.0	—	0.0	—	0.0	2	100.0	2	100.0	1	100.0
Tehama	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Trinity	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Tulare	19	95.0	11	100.0	11	84.6	3	50.0	12	85.7	5	100.0
Tuolumne	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Ventura	13	81.3	19	90.5	25	100.0	20	100.0	26	92.9	18	100.0
Yolo	—	0.0	1	100.0	2	100.0	1	50.0	—	0.0	—	0.0
Yuba	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0

\*Reported as of June 2007

Prepared by the California Department of Public Health, Immunization Branch

**TABLE 2.8 Number and percent of enrolled infants given HBIG and at least 3 doses of vaccine, by year of birth, by jurisdiction\* — California 2000-06**

	2001		2002		2003		2004		2005		2006	
	No.	%										
CALIFORNIA	2,460	92.0	2,566	92.0	2,537	91.9	2,515	80.2	2,238	76.4	1,168	40.64
Alameda	243	96.4	251	95.8	226	97.8	197	78.8	162	71.1	82	36.937
Alpine	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Amador	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Berkeley City	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Butte	—	0.0	—	0.0	4	100.0	6	60.0	3	37.5	5	45.455
Calaveras	—	0.0	—	0.0	1	100.0	—	0.0	—	0.0	—	0.0
Colusa	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Contra Costa	20	95.2	42	91.3	63	91.3	37	46.8	31	68.9	5	12.195
Del Norte	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
El Dorado	—	0.0	2	100.0	1	100.0	5	50.0	3	150.0	1	25
Fresno	85	90.4	81	95.3	95	94.1	79	89.8	79	77.5	54	50.943
Glenn	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Humboldt	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Imperial	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Inyo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Kern	13	68.4	15	88.2	15	88.2	21	65.6	15	71.4	1	3.8462
Kings	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Lake	—	0.0	1	100.0	1	100.0	1	100.0	1	100.0	—	0.0
Lassen	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Long Beach	31	91.2	41	78.8	33	75.0	33	58.9	22	62.9	11	37.931
Los Angeles	681	92.2	696	92.8	642	93.7	684	79.3	708	84.2	518	57.813
Madera	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Marin	—	0.0	2	100.0	2	100.0	4	50.0	2	66.7	2	100
Mariposa	—	0.0	—	—	—	0.0	—	0.0	—	0.0	—	0.0
Mendocino	—	0.0	—	—	—	0.0	—	0.0	—	0.0	—	0.0
Merced	18	94.7	22	95.7	17	81.0	15	115.4	16	80.0	3	14.286
Modoc	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Mono	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Monterey	—	0.0	2	100.0	6	75.0	—	0.0	5	166.7	4	80
Napa	—	0.0	—	0.0	1	100.0	1	50.0	1	100.0	—	0.0
Nevada	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Orange	330	91.7	321	93.9	352	91.7	358	88.6	291	78.2	108	32.143
Placer	—	0.0	1	100.0	1	100.0	6	150.0	4	80.0	1	33.333
Plumas	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Riverside	35	87.5	34	79.1	21	91.3	21	91.3	9	47.4	12	25
Sacramento	163	97.6	165	95.9	173	97.7	193	90.2	194	103.7	156	83.422
San Benito	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Bernadino	64	84.2	85	87.6	53	81.5	65	74.7	32	31.7	6	5.6604
San Diego	181	92.3	185	88.5	167	84.8	149	76.8	155	76.7	61	29.327
San Francisco	114	87.7	145	90.1	144	94.7	134	75.3	125	67.6	53	33.758
San Joaquin	63	98.4	69	92.0	55	93.2	51	96.2	38	82.6	12	25.532
San Luis Obispo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Mateo	—	0.0	8	100.0	13	81.3	24	85.7	14	93.3	8	25.806
Santa Barbara	5	83.3	7	87.5	6	100.0	12	70.6	5	45.5	3	50
Santa Clara	343	91.0	309	90.9	362	—	352	87.1	264	65.2	29	10.741
Santa Cruz	2	100.0	5	100.0	5	100.0	4	200.0	—	0.0	2	40
Shasta	—	0.0	—	0.0	1	100.0	1	50.0	—	0.0	—	0.0
Sierra	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Siskiyou	—	0.0	—	0.0	1	100.0	—	0.0	1	100.0	—	0.0
Solano	11	91.7	18	90.0	9	75.0	—	0.0	5	0.0	2	11.111
Sonoma	8	80.0	8	88.9	12	100.0	14	127.3	—	0.0	5	83.333
Stanislaus	19	100.0	22	95.7	18	90.0	23	100.0	15	125.0	6	21.429
Sutter	—	0.0	—	0.0	—	0.0	1	16.7	1	50.0	—	0.0
Tehama	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Trinity	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Tulare	18	90.0	10	90.9	11	84.6	5	50.0	12	70.6	3	15
Tuolumne	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Ventura	13	81.3	18	85.7	24	96.0	17	51.5	25	96.2	14	51.852
Yolo	—	0.0	1	100.0	2	100.0	2	66.7	—	0.0	1	50
Yuba	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0

\*Reported as of June 2007

Prepared by the California Department of Public Health, Immunization Branch

**TABLE 2.9 Number and percent of enrolled infants postvaccination serology tested for either HBsAg or Anti-HBs, by year of birth, by county\* — California 2001-05**

	2001		2002		2003		2004		2005	
	No.	%	No.	%	No.	%	No.	%	No.	%
CALIFORNIA	1,546	57.8	1,621	58.1	1,787	64.8	1,678	61.2	1,181	48.4
Alameda	149	59.1	47	17.9	125	54.1	94	45.4	70	40.7
Alpine	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Amador	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Berkeley City	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Butte	—	0.0	—	0.0	4	100.0	6	75.0	3	100.0
Calaveras	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Colusa	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Contra Costa	15	71.4	31	67.4	50	72.5	30	69.8	19	50.0
Del Norte	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
El Dorado	—	0.0	—	0.0	1	100.0	4	80.0	1	33.3
Fresno	49	52.1	43	50.6	39	38.6	34	41.0	30	36.1
Glenn	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Humboldt	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Imperial	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Inyo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Kern	12	63.2	14	82.4	13	76.5	19	76.0	10	55.6
Kings	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Lake	—	0.0	1	100.0	1	100.0	1	100.0	—	0.0
Lassen	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Long Beach	15	44.1	28	53.8	21	47.7	12	31.6	10	33.3
Los Angeles	372	50.3	414	55.2	409	59.7	358	48.5	149	19.7
Madera	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Marin	—	0.0	—	0.0	2	100.0	4	80.0	2	66.7
Mariposa	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Mendocino	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Merced	15	78.9	18	78.3	17	81.0	13	76.5	8	47.1
Modoc	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Mono	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Monterey	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Napa	—	0.0	—	0.0	—	0.0	1	100.0	1	100.0
Nevada	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Orange	284	78.9	268	78.4	319	83.1	298	79.5	254	80.1
Placer	—	0.0	—	0.0	—	0.0	3	50.0	1	25.0
Plumas	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Riverside	12	30.0	20	46.5	16	69.6	19	82.6	6	50.0
Sacramento	142	85.0	146	84.9	165	93.2	167	85.2	138	69.7
San Benito	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Bernadino	51	67.1	73	75.3	39	60.0	37	44.0	11	28.9
San Diego	94	48.0	96	45.9	84	42.6	74	43.8	82	45.8
San Francisco	72	55.4	96	59.6	101	66.4	107	67.3	54	40.6
San Joaquin	7	10.9	52	69.3	38	64.4	26	44.1	35	92.1
San Luis Obispo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Mateo	—	0.0	—	0.0	7	43.8	16	59.3	6	40.0
Santa Barbara	3	50.0	4	50.0	4	66.7	11	91.7	4	66.7
Santa Clara	207	54.9	212	62.2	270	67.2	288	73.8	245	80.9
Santa Cruz	—	0.0	2	40.0	2	40.0	4	100.0	—	0.0
Shasta	—	0.0	—	0.0	—	0.0	1	100.0	—	0.0
Sierra	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Siskiyou	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Solano	7	58.3	11	55.0	6	50.0	—	0.0	3	60.0
Sonoma	5	50.0	5	55.6	10	83.3	12	85.7	—	0.0
Stanislaus	16	84.2	15	65.2	16	80.0	17	73.9	14	87.5
Sutter	—	0.0	—	0.0	—	0.0	1	50.0	1	50.0
Tehama	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Trinity	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Tulare	10	50.0	8	72.7	7	53.8	4	66.7	9	64.3
Tuolumne	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Ventura	9	56.3	17	81.0	21	84.0	15	75.0	15	53.6
Yolo	—	0.0	—	0.0	—	0.0	2	100.0	—	0.0
Yuba	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0

\*Reported as of June 2007

Prepared by the California Department of Public Health, Immunization Branch

**TABLE 2.10 Number of enrolled infants, number of infants postvaccination serology tested for HBsAg, number of infants infected (tested HBsAg-positive), by year of birth, by jurisdiction\* — California, 2001-05**

	2001			2002			2003			2004			2005		
	Total†	Tested§	HBsAg-positive												
CALIFORNIA	2,673	1,442	43	2,789	1,503	36	2,759	1,653	25	2,743	1,544	24	2,440	1,116	25
Alameda	252	136	2	262	45	2	231	122	3	207	92	1	172	68	2
Alpine	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Amador	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Berkeley City	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Butte	—	—	—	—	—	—	4	4	—	8	6	—	3	3	—
Calaveras	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Colusa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Contra Costa	21	14	—	46	28	—	69	48	—	43	26	—	38	18	—
Del Norte	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
El Dorado	—	—	—	2	—	—	1	1	—	5	4	—	3	1	—
Fresno	94	49	4	85	41	1	101	39	3	83	34	3	83	30	1
Glenn	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Humboldt	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Imperial	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Inyo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kern	19	10	—	17	13	—	17	11	—	25	14	—	18	9	1
Kings	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lake	—	—	—	1	1	—	1	1	—	1	1	—	1	—	—
Lassen	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Long Beach	34	15	—	52	27	—	44	21	—	38	10	—	30	9	—
Los Angeles	739	355	9	750	388	7	685	384	4	738	338	4	755	143	6
Madera	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Marin	—	—	—	2	—	—	2	2	—	5	4	—	3	2	—
Mariposa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mendocino	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Merced	19	15	—	23	16	—	21	17	—	17	12	1	17	7	—
Modoc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mono	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Monterey	—	—	—	2	—	—	8	—	—	—	—	—	6	—	—
Napa	—	—	—	—	—	—	1	—	—	1	—	—	1	1	—
Nevada	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Orange	360	271	8	342	257	2	384	300	3	375	279	3	317	237	3
Placer	—	—	—	1	—	—	1	—	—	6	3	—	4	1	—
Plumas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Riverside	40	12	—	43	20	2	23	15	—	23	18	—	12	6	—
Sacramento	167	136	8	172	141	5	177	162	4	196	163	—	198	136	4
San Benito	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
San Bernardino	76	47	1	97	70	2	65	36	—	84	36	—	38	11	—
San Diego	196	77	—	209	80	3	197	60	2	169	62	4	179	73	1
San Francisco	130	62	3	161	93	1	152	100	2	159	102	1	133	52	—
San Joaquin	64	7	—	75	52	2	59	37	—	59	26	3	38	33	—
San Luis Obispo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
San Mateo	—	—	—	8	—	—	16	6	—	27	15	—	15	6	—
Santa Barbara	6	3	—	8	4	—	6	4	—	12	10	1	6	4	—
Santa Clara	377	194	8	341	174	6	402	224	3	390	236	2	303	224	5
Santa Cruz	2	—	—	5	1	—	5	2	—	4	3	—	1	—	—
Shasta	—	—	—	—	—	—	1	—	—	1	1	1	—	—	—
Sierra	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Siskiyou	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—
Solano	12	7	—	20	10	—	12	4	—	—	—	—	5	3	—
Sonoma	10	5	—	9	4	—	12	10	1	14	11	—	—	—	—
Stanislaus	19	13	—	23	15	1	20	15	—	23	16	—	16	14	—
Sutter	—	—	—	—	—	—	—	—	—	2	1	—	2	1	1
Tehama	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Trinity	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tulare	20	7	—	11	7	1	13	7	—	6	4	—	14	9	1
Tuolumne	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ventura	16	7	—	21	16	—	25	21	—	20	15	—	28	15	—
Yolo	—	—	—	1	—	—	2	—	—	2	2	—	—	—	—
Yuba	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

\*Reported as of June 2007

† Total number of infants enrolled, by year of birth

§ Infants tested for hepatitis B surface antigen (HBsAg) after completion of hepatitis B vaccine series

Prepared by the California Department of Public Health, Immunization Branch

**TABLE 2.11 Number and percent of tested infants that were anti-HBs positive, by year of birth, by jurisdiction\* — California, 2001-05**

	2001		2002		2003		2004		2005	
	No.	%								
CALIFORNIA	1,335	89.1	1,440	91.1	1,651	92.4	1,562	93.1	1,077	91.2
Alameda	134	90.5	38	92.7	112	89.6	91	96.8	67	95.7
Alpine	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Amador	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Berkeley City	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Butte	—	0.0	—	0.0	3	75.0	5	83.3	3	100.0
Calaveras	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Colusa	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Contra Costa	12	80.0	29	96.7	50	100.0	27	90.0	17	89.5
Del Norte	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
El Dorado	—	0.0	—	0.0	1	100.0	3	75.0	1	100.0
Fresno	41	85.4	37	88.1	33	84.6	30	88.2	29	96.7
Glenn	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Humboldt	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Imperial	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Inyo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Kern	9	75.0	11	84.6	13	100.0	18	94.7	9	90.0
Kings	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Lake	—	0.0	—	0.0	1	100.0	1	100.0	—	0.0
Lassen	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Long Beach	14	93.3	26	96.3	20	95.2	10	83.3	9	90.0
Los Angeles	320	87.2	374	90.6	388	94.9	343	95.8	141	94.6
Madera	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Marin	—	0.0	—	0.0	2	100.0	4	100.0	2	100.0
Mariposa	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Mendocino	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Merced	14	100.0	12	85.7	12	70.6	13	100.0	7	87.5
Modoc	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Mono	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Monterey	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Napa	—	0.0	—	0.0	—	0.0	1	100.0	1	100.0
Nevada	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Orange	261	96.0	244	93.5	296	92.8	266	89.3	206	81.1
Placer	—	0.0	—	0.0	—	0.0	3	100.0	1	100.0
Plumas	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Riverside	9	75.0	15	78.9	16	100.0	17	89.5	6	100.0
Sacramento	122	88.4	133	91.1	151	91.5	164	98.2	129	93.5
San Benito	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Bernadino	43	86.0	64	90.1	35	89.7	35	94.6	11	100.0
San Diego	75	89.3	81	88.0	71	84.5	64	86.5	72	87.8
San Francisco	49	73.1	83	91.2	89	88.1	100	93.5	52	96.3
San Joaquin	7	100.0	52	100.0	37	97.4	22	84.6	35	100.0
San Luis Obispo	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
San Mateo	—	0.0	—	0.0	7	100.0	16	100.0	6	100.0
Santa Barbara	2	66.7	4	100.0	3	75.0	9	81.8	3	75.0
Santa Clara	184	91.1	189	91.3	256	94.8	274	95.1	232	94.7
Santa Cruz	—	0.0	2	100.0	1	50.0	2	50.0	—	0.0
Shasta	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Sierra	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Siskiyou	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Solano	6	100.0	10	90.9	5	83.3	—	0.0	3	100.0
Sonoma	4	80.0	4	80.0	10	100.0	11	91.7	—	0.0
Stanislaus	15	93.8	11	73.3	14	87.5	13	76.5	11	78.6
Sutter	—	0.0	—	0.0	—	0.0	1	100.0	—	0.0
Tehama	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Trinity	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Tulare	6	60.0	5	71.4	5	71.4	3	75.0	9	100.0
Tuolumne	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
Ventura	8	100.0	16	94.1	19	90.5	14	93.3	15	100.0
Yolo	—	0.0	—	0.0	—	0.0	2	100.0	—	0.0
Yuba	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0

\*Reported as of June 2007

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