Self-Inflicted Injury & Suicide in Orange County

May 2009

Based on 2005-2007 Emergency Department, Hospitalization, & Death Records

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Excellence Integrity Service

June 2009

Dear Reader,

Every year in Orange County about 2,700 residents intentionally harm themselves and about 261 successfully end their lives by committing suicide. Such intentional self-harm is a serious public health problem that has a devastating impact on those affected, including family, friends, and the community. In addition to the social costs, the economic costs of medical/psychiatric treatment alone for self-inflicted injuries are well over $50 million dollars per year in Orange County.

To better identify those at risk and prevent such needless tragedies, our Planning and Research Unit has completed a study in collaboration with staff from the newly formed Prevention and Intervention Division in Behavioral Health Services. The results of this study highlight the problem of self-inflicted injury and suicide in Orange County from 2005-2007 and document its prevalence and demographics. For example, females account for 6 out of 10 people who intentionally harm themselves. In particular, young women between 10 and 24 years of age account for nearly half (42%) of all such cases treated in local emergency departments and hospitals.

While females were more likely to intentionally injure themselves, males in Orange County were almost three times more likely to successfully commit suicide. Consistent with previous research, OC males' greater ability to complete the suicide act is due to using more lethal means such as firearms and hanging/strangulation. Females are more likely to use poisoning/overdose. While older males (75+) had the highest rate of suicide death, middle-aged men 45 to 54 years have the highest number each year – an average of 42 of the 261 suicides each year in Orange County.

Importantly, the study also found that major risk factors of self-inflicted injury and suicidal behavior are mental illness (e.g., schizophrenia and mood disorders) and substance abuse. At least 75% of the victims treated in the emergency department had a known mental illness and/or substance abuse problem. Understanding how to address these risk factors and implementing preventive measures will help reduce intentional self-harm and suicide deaths in our county. One major goal of the Prevention and Early Intervention (P&I) effort funded through the Mental Health Services Act (MHSA or Prop 63) is to do just that.

MHSA P&I supports a broad spectrum of mental health services, including a project to address suicide prevention that is specifically aimed at improving early identification, intervention, and referral for at-risk suicidal behavior. In addition, other P&I programs are aimed at reducing multiple risk factors and promoting well-being in order to prevent the mental health problems that can lead to self-harm. Through these and other efforts it is our hope that we can eliminate such preventable deaths and suffering.

Thank you for your interest and we encourage you to read and share this special report with your colleagues. This report can be found at: <link>.

Sincerely,

David L. Riley
Interim Director

Mark A. Refowitz
Deputy Agency Director
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Self-Inflicted Injury and Suicide in Orange County

Introduction

Self-inflicted injury and suicide is a serious public health problem and continues to be one of the top eleven leading causes of mortality in the nation with over 33,000 lives lost in 2006 (Heron et al., 2009). Intentional self-harm and suicide have a profound social, emotional, and economic impact on those affected, including family, friends and the community. Economically, the total lifetime cost of self-inflicted injuries in the United States was approximately $33 billion in 2000. This included $1 billion for medical treatment and $32 billion for lost productivity (Corso et al., 2007).

Importantly, suicide deaths are only a part of a larger problem, namely the much more prevalent *non-fatal* self-inflicted or intentional injuries. In 2006, an estimated 594,000 emergency department visits across the country were the result of self-inflicted, intentional injuries (Pitts et al., 2006).

Previous research has shown that untreated mental illness (e.g., schizophrenia and mood disorders) and substance abuse disorders are leading causes of self-inflicted injury (Harris & Barraclough, 1997; Inskip et al, 1998; Tanney, 2000). Individuals left untreated or with insufficient care often see their mental illness worsen with time. Many of those who survive their suicide attempt often harm themselves seriously enough to require immediate medical care and hospitalization.

Public health prevention efforts that target those with a history of mental illness can be a key factor to decreasing the frequency of self-inflicted injury and suicide (National Strategy for Suicide Prevention, 2001). Indeed, this is one of the main objectives of the Mental Health Services Act (MHSA), approved by California voters in 2004 as Proposition 63. MHSA funding supports a broad spectrum of mental health services, including a project to address suicide prevention that is specifically aimed at improving early identification, early intervention, and referral for at-risk suicidal behavior. In addition, MHSA funding includes Prevention and Early Intervention (PEI) programs aimed at reducing multiple risk factors and promoting well-being in order to prevent the mental health problems that can lead to self-harm (See also: California Strategic Plan On Suicide Prevention, 2008).

In Orange County the incidence and characteristics of non-fatal self-inflicted injury are not well-understood. In the present study, at least three quarters (75%) of OC residents who were treated in the emergency department (ED) for a self-inflicted injury had a *known* mental illness and/or substance use/dependence diagnosis. Such cases of unsuccessful or “incomplete” suicide may provide an opportunity for intervention and prevention if we had a better understanding of the demographic and geographic characteristics of the victims.

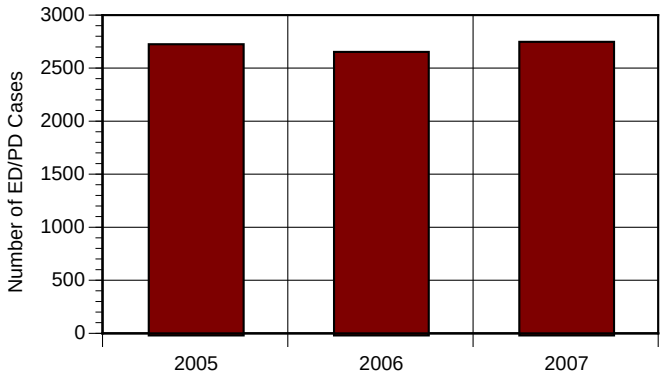
Thus, this study focused on both non-fatal and fatal self-inflicted injury of Orange County residents from 2005 through 2007. The frequency of self-inflicted injury cases was obtained from emergency department (ED) and hospital patient discharge (PD) records from the Office of Statewide Health Planning and Development. Cases were identified based on International Classification of Disease (ICD-9) *external causes of injury involving suicide and self-inflicted injury* (E950 – E959).

Information on suicide deaths for this same time period was obtained from the Orange County Master Death File utilizing ICD-10 codes for *purposely self-inflicted poisoning or injury suicide* (*including attempted*; Intentional Self-Harm: X60 – X84). The first section of this report presents self-inflicted injury and suicide deaths for Orange County residents who were treated in an emergency department and/or admitted to the hospital. As not all victims would be transported to the emergency department, the second section covers suicide deaths as reported in the Orange County death records.

Self-Inflicted Injury Resulting in Emergency Department Treatment & Hospitalization

From 2005-2007, **8,126** county residents were treated in the emergency department (ED) as a result of a self-inflicted injury. Approximately 3,278 (or 40%) were subsequently hospitalized. As shown in **Figure 1**, this equated to about 2,700 individuals per year who intentionally hurt themselves.[1]

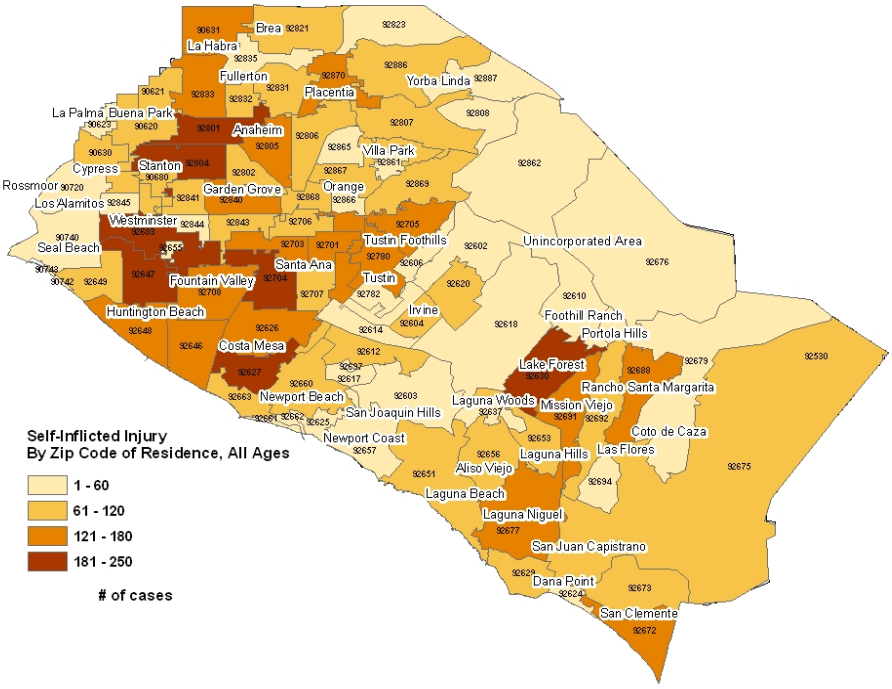
Figure 1. Self-Inflicted Injury ED/PD Cases by Year



Geography

Map 1a illustrates the frequency of self-inflicted injury in Orange County for all ages. Areas that had a higher frequency of self-inflicted injury included ZIP codes in: Anaheim, Westminster, Santa Ana, Costa Mesa, and Lake Forest.

Map 1a. Self-Inflicted Injury ED/PD Cases by ZIP code, 2005-2007



[1] Note: that cases resulting in a hospital admission from that same hospital's ED would not have an ED record. Thus, we obtained these data from the patient's hospitalization from the patient discharge (PD) record. All data presented here are from merged ED and PD datasets and should not contain duplicate records for the same incident.

Gender

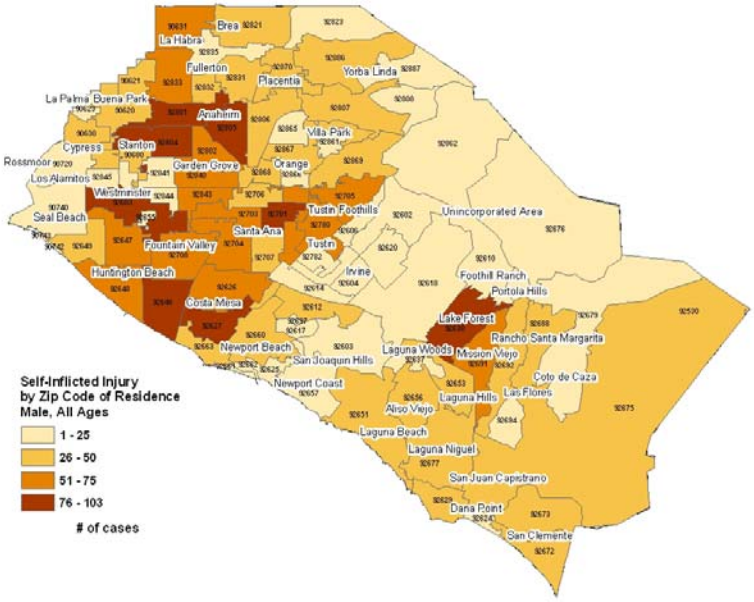
As shown in **Table 1**, females accounted for 6 out of every 10 cases of self-inflicted injury – at a rate (108 per 100,000 population) that was more than 1.5 times higher than males (67.8; *all rates reported throughout this report are per 100,000 population*).

Table 1. Gender of Self-Inflicted Injury ED/PD Cases, 2005-2007

Gender	Frequency	Percent	3-Year Average	2006 Population	Rate per 100,000
Male	3,110	38.3%	1,037	1,529,602	67.8
Female	5,016	61.7%	1,672	1,548,793	108.0
Total	8,126	100%	2,709	3,078,395	88.0

Gender and Geography

Map 1b. Self-Inflicted Injury ED/PD Cases for Males by ZIP code, 2005-2007



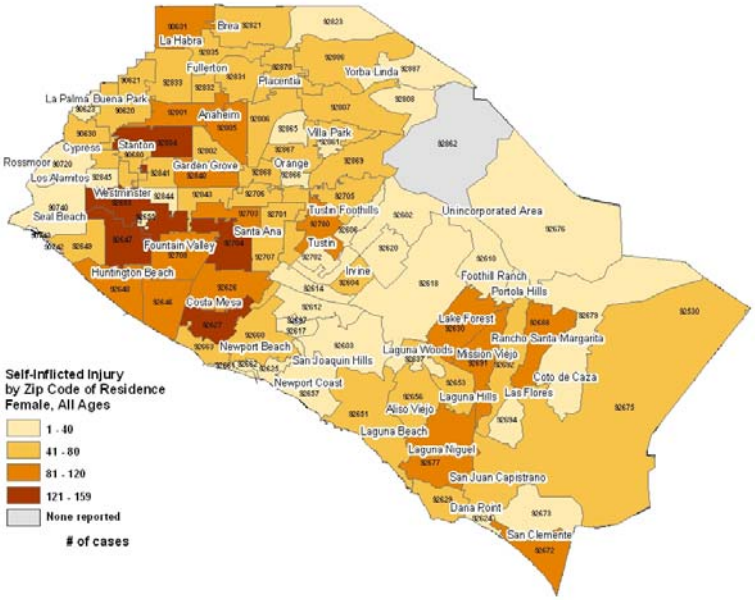
Males accounted for 38.3% of all self-inflicted injury cases reported between 2005 and 2007 (n=3,110 cases).

Certain ZIP codes in the cities of Westminster, Anaheim, Huntington Beach, Lake Forest, and Costa Mesa showed a higher frequency of male self-inflicted injury cases than other cities in Orange County.[2]

Please note that the frequencies of cases are presented in this section rather than rates to better document the magnitude or scale of the problem in each ZIP code. In some breakouts this may result in more populous ZIP codes having a higher frequency of cases and does not necessarily represent the relative risk in that geographic region.

[2] Note: Full page versions of all maps featured in this report can be found in Appendix I.

Map 1c. Self-Inflicted Injury ED/PD Cases for Females by ZIP code, 2005-2007



61.7% of all self-inflicted injury cases reported from 2005 to 2007 (n=5,026 cases) were female.

A cluster of ZIP codes in Costa Mesa, Anaheim, Westminster, and Santa Ana depicted a greater frequency of female self-inflicted injury cases than other areas in Orange County.

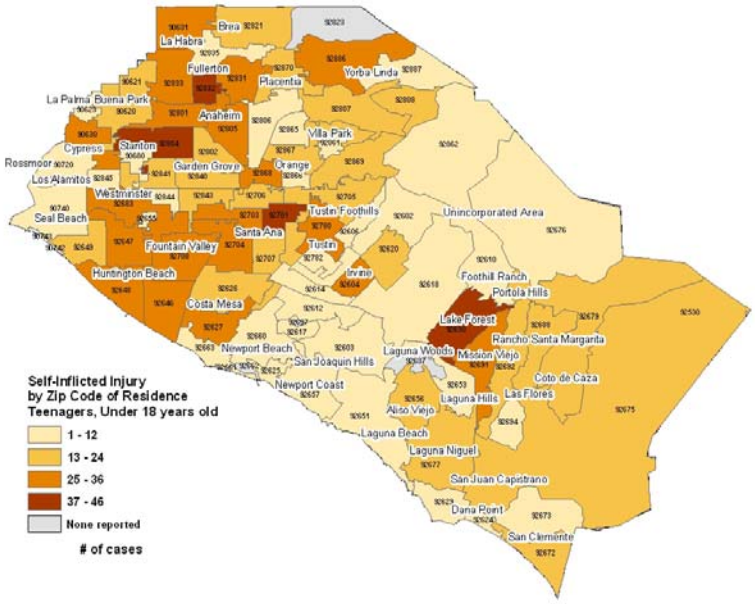
Age Groups and Geography

The age distribution of people who intentionally harmed themselves is presented in **Table 2**. At 2.5 times the countywide rate, young adults, 18 to 24 years old, had by far the highest rate (225.4) of self-inflicted injury cases that resulted in a trip to the ED. Children 10 to 17 years old had an attempt rate (131.9) notably higher than the countywide rate (88). The third highest age group was 25 to 35 year olds (121.4). From the peak of 225 for young adults 18 to 24 years old, the rate of intentional self-injury appeared to decrease with age and leveled off with seniors (e.g., 28.7 for 75+ year olds), well below the countywide rate.

Table 2. Frequency and Age-Specific Rates of Self-Inflicted Injury ED/PD Cases, 2005-2007

Age Category	Frequency	Percent	3-Year Average	2006 Population	Rate per 100,000
10-17	1,420	17.5%	473	358,645	131.9
18-24	1,980	24.4%	660	292,811	225.4
25-34	1,588	19.5%	529	435,899	121.4
35-44	1,414	17.4%	471	497,423	94.8
45-54	1,042	12.8%	347	433,387	80.1
55-64	423	5.2%	141	301,143	46.8
65-74	128	1.6%	43	167,153	25.5
75+	131	1.6%	44	152,028	28.7
Total	8,126	100%	2,709	3,078,395	88.0

Map 2a. Self-Inflicted Injury ED/PD Cases for Children (10-17 years), 2005-2007



Youth, 10-17 years old, comprised 17.5% of all self-inflicted injury from 2005 to 2007.

Tweens/teens had the second highest frequency of self-inflicted injury out of all the groups (n=1,420 and rate of 131.9).

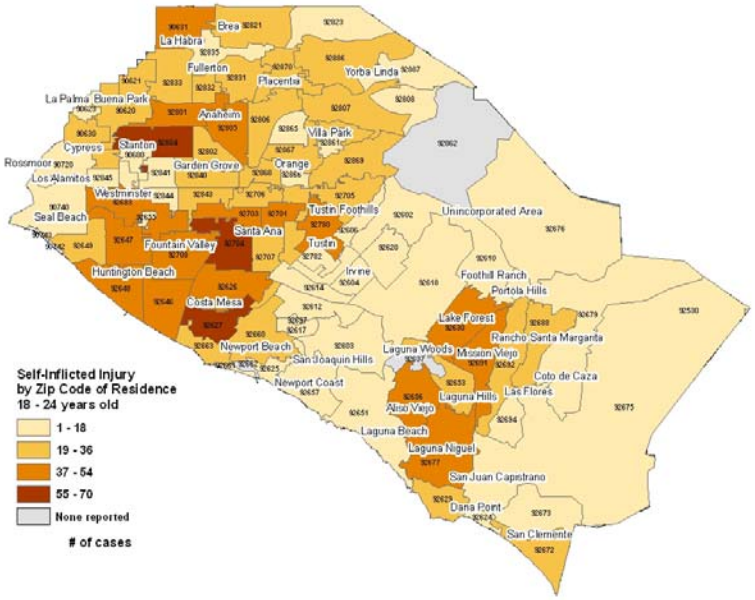
ZIP codes of high numbers of cases included Fullerton (92832), Anaheim (92804), Santa Ana (92701), and Lake Forest (92630).

Map 2b. Self-Inflicted Injury ED/PD Cases for 18-24 Year Olds, 2005-2007

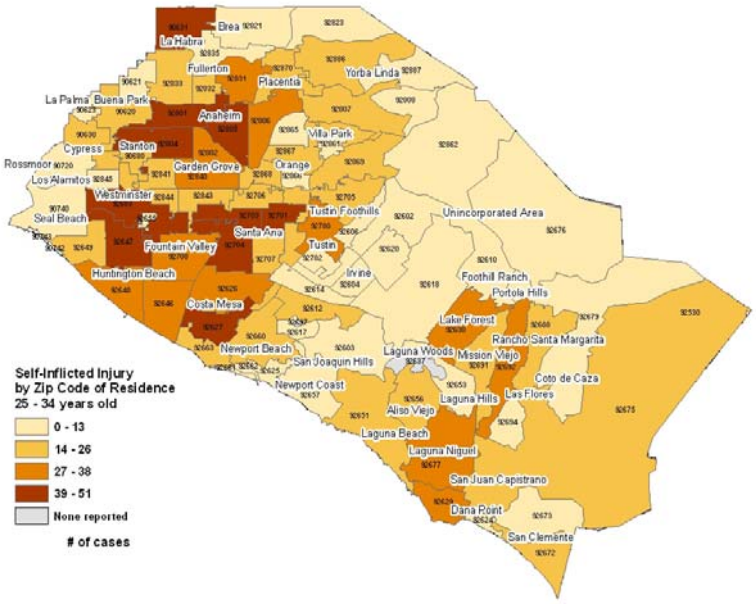
Young adults who were 18-24 years old had the highest number (n=1,980) and rate (225.4) of self-inflicted injury among all the other age demographics.

This age category made up 24.4% of all reported cases of self-inflicted injury in Orange County (n=1,980).

Three ZIP codes in particular were hot spots for self-inflicted injury cases. These included: 92804 (Anaheim), 92704 (Santa Ana), and 92627 (Costa Mesa).



Map 2c. Self-Inflicted Injury ED/PD Cases for 25-34 Year Olds, 2005-2007



25-34 year olds had the second highest frequency of self-inflicted injury at 19.5%.

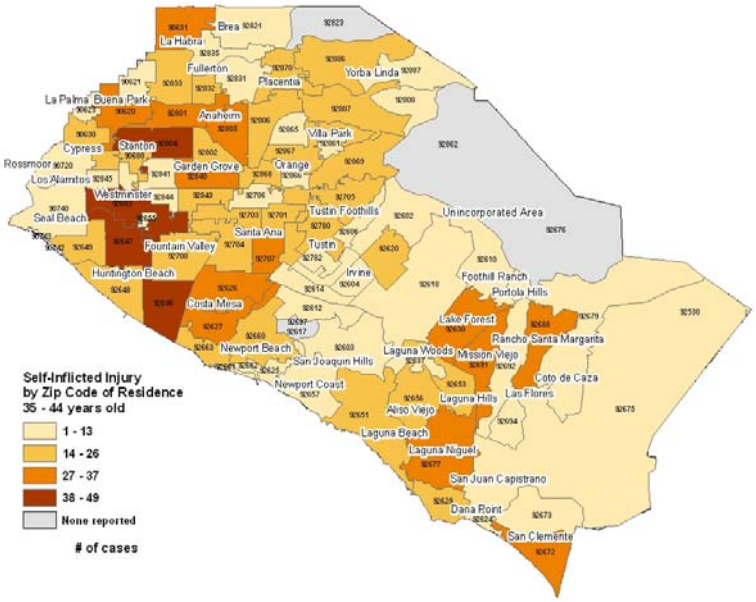
This age category amounted to 1,588 of all reported self-inflicted injury cases in Orange County.[3]

Map 2c displays the most cases of self-inflicted injury in a cluster of ZIP codes in the cities of Westminster (92683, 92647), Santa Ana (92701, 92703, 92704), Costa Mesa (92627), Anaheim (92801, 92804, 92805), and La Habra (90631).

Map 2d. Self-Inflicted Injury ED/PD Cases for 35-44 Year Olds, 2005-2007

Adults, 35-44 years old, accounted for 1,414 self-inflicted injury cases in Orange County for 2005-2007. This was 17.4% of all reported cases in the three year period.

ZIP codes that had the greatest number of self-inflicted injury cases for this age category were located in the cities of Huntington Beach (92646), Anaheim (92804), and Westminster (92647, 92683).



[3] Note: Maps featured in this report can be viewed in enlarged form in Appendix I.

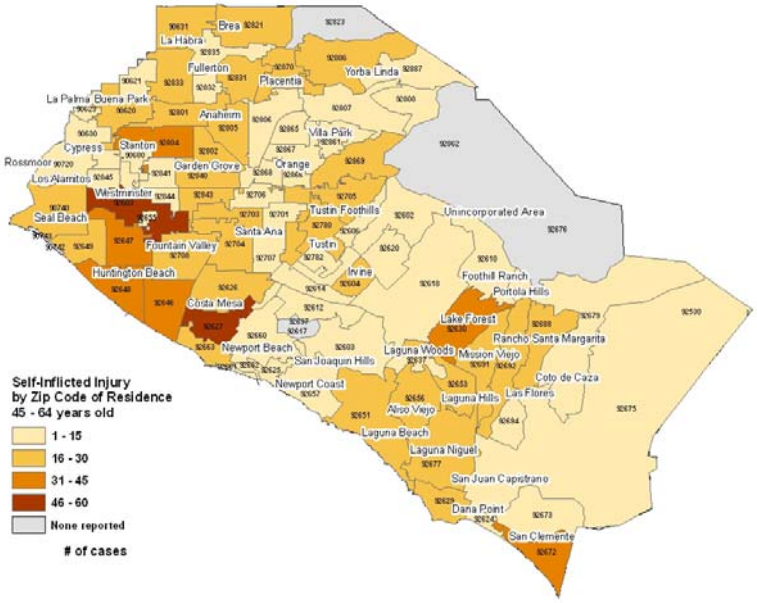
Map 2e. Self-Inflicted Injury ED/PD Cases for 45-64 Year Olds, 2005-2007

Adults, 45-64 years old, had 1,465 reported cases of self-inflicted injury. This amount was 18% of all reported self-inflicted injury cases in Orange County for 2005-2007.[4]

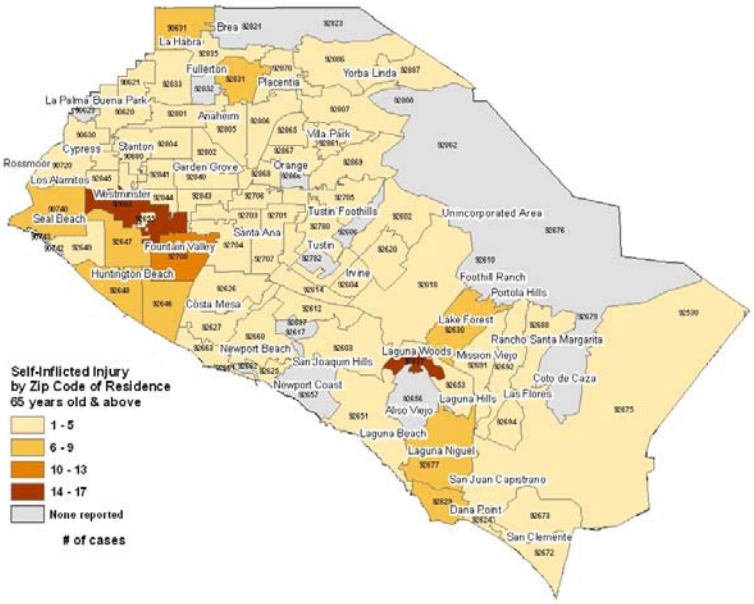
This age category can be broken up into two groups: 45-54 year olds and 55-64 year olds.

45-54 year olds comprised 12.8% of all reported cases, while those 55-64 years old made up 5.2% of all self-inflicted injury cases.

ZIP codes of high frequency for this age group were 92683 in Westminster and 92627 in Costa Mesa.



Map 2f. Self-Inflicted Injury ED/PD Cases for 65+ Year Olds, 2005-2007



3.2% of all reported self-inflicted injury cases in Orange County were for those 65 years old and above.

This age category accounted for 259 self-inflicted injury cases for 2005-2007.

Laguna Woods (92637) and Westminster (92683) showed the highest frequency of self-inflicted injury cases for this age group.[5]

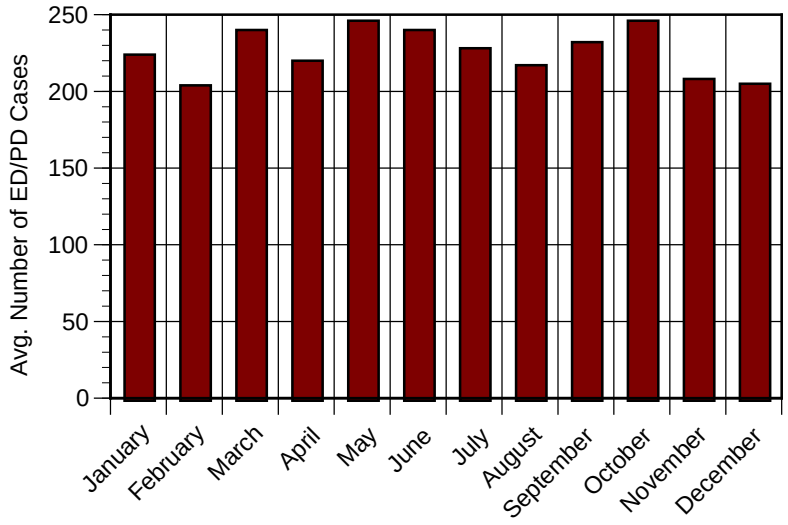
[4] Note: 45-64 year olds were combined together as a single age category to display a better representation in GIS (Geographic Information Systems) mapping. The two age groups that were combined were 45-54 year olds and 55-64 year olds shown in Table 2 on page 4.

[5] Adults, 65-74 years old and 75+ years old, were combined as a single age category (65+ years old) to provide a better representation in GIS (Geographic Information Systems) mapping.

Seasonal Pattern

The monthly average number of cases of self-inflicted injury that resulted in an ED visit and/or hospital admission did not show a discernable pattern, averaging 225 cases per month (**Figure 2**) for the time period of interest, 2005-2007.

Figure 2. Average Number of ED/PD Cases per Month for Self-Inflicted Injury



Race/Ethnicity

The race/ethnicity of individuals who intentionally injured themselves is shown in **Table 3**. Among identifiable individuals and groups, African Americans had the highest rate of self-inflicted injury cases at 131, albeit a relatively low number of cases (n=172), followed closely by non-Hispanic whites at 123.8. Hispanics and Asian/Pacific Islanders had notably lower rates at 48.9 and 40.6, respectively. Victims of unknown or other race/ethnicities had a high number of cases (and concomitant rate), but this may be an artifact of the cases not being accurately coded and not having as precise a population estimate in the denominator.

Table 3. Frequency and Race/Ethnicity Specific Rates of Self-Inflicted Injury ED/PD Cases, 2005-2007

Race/Ethnicity	Frequency	Percent	3-Year Average	2006 Population	Rate per 100,000
Non-Hispanic White	5,365	66.0%	1,788	1,444,413	123.8
Hispanic	1,526	18.8%	509	1,040,486	48.9
Asian/ Pacific Islander	584	7.2%	195	479,118	40.6
African American	172	2.1%	57	43,759	131.0
Native American/ Alaskan Eskimo	8	0.1%	3	11,238	23.7
Other/Unknown	471	5.8%	157	59,381	264.4
Total	8,126	100%	2,709	3,078,395	88.0

External Cause of Injury – Intentional Self-Harm by Mechanism

The means or mechanism by which individuals hurt themselves is presented in **Table 4**. These data are based on the ICD-9 codes that defined their principal external cause of injury (E Codes: E950 – E959). By far, poisoning by solid/liquid substance (i.e., overdose) was the most common mechanism of self-inflicted injury – with two-thirds of all cases (n=5,408 of 8,216 over the 3-year period). Analgesics and tranquillizers were the two most common types of drugs utilized. The second most common way to hurt oneself was by using a cutting or piercing instrument. This method was used in approximately 22% of all cases (n=1,810). In this category, most frequent injuries were to the wrist, forearm, neck, and abdomen.

Other and unspecified means accounted for about 7% of cases (n=561) which included crashing of a motor vehicle or jumping or lying before a moving object. These means of self-injury were followed by hanging/strangulation (1.7%; n=142) and jumping from a high place (0.8%; n=65). The use of firearms was relatively rare at only 0.7% of all cases (n=54), largely due to their lethality. Firearms accounted for a third of all actual suicide deaths – most of which did not indicate ED treatment (as discussed in the Suicide Death section on page 14).

Table 4. Mechanism of Self-Inflicted Injury ED/PD Cases, 2005-2007

ICD-9 Principal External Cause of Injury	Frequency	Percent of all ED/PD Cases
Poisoning by solid or liquid substance (E950)	**5,408**	**66.6%**
Analgesics, antipyretics, & antiheumatics (E950.0)	1,872	23.0%
Tranquillizers & other psychotropic agents (E950.3)	1,809	22.3%
Other specified drugs & medicinal substances (E950.4)	1,038	12.8%
Other sedatives & hypnotics (E950.2)	254	3.1%
Barbiturates (E950.1)	32	0.4%
All others	403	5.0%
Poisoning by gas/vapors (E951/E952)	**54**	**0.7%**
Motor vehicle exhaust gas (E952.0)	30	0.4%
Other gas/vapors (E952.8)	14	0.2%
All others	10	0.1%
Hanging, strangulation & suffocation (E953)	**142**	**1.7%**
Hanging (E953.0)	123	1.5%
Suffocation by plastic bag (E953.1)	3	0.0%
All others	16	0.2%
Submersion/drowning (E954)	**7**	**0.1%**
Firearms, air guns & explosives (E955)	**54**	**0.7%**
Handgun (E955.0)	26	0.3%
Shotgun (E955.1)	3	0.0%
Firearms, air guns & explosives - unspecified (E955.9)	10	0.1%
All others	15	0.2%
Cutting & piercing instrument (E956)	**1,810**	**22.3%**
Jumping from a high place (E957)	**65**	**0.8%**
Other man-made structure (E957.1)	43	0.5%
Residential premises (E957.0)	16	0.2%
All others	6	0.1%
Other & unspecified means (E958)	**561**	**6.9%**
Other (E958.8) or Unspecified means (E958.9)	484	6.0%
Crashing of motor vehicle (E958.5)	38	0.5%
Jumping or lying before moving object (E958.0)	29	0.4%
Burns or fire (E958.1)	8	0.1%
All others	2	0.0%
Late effects of self-inflicted injury (E959)	**25**	**0.3%**
Total	**8,126**	**100%**

Mechanism of Intentional Injury by Age and Gender

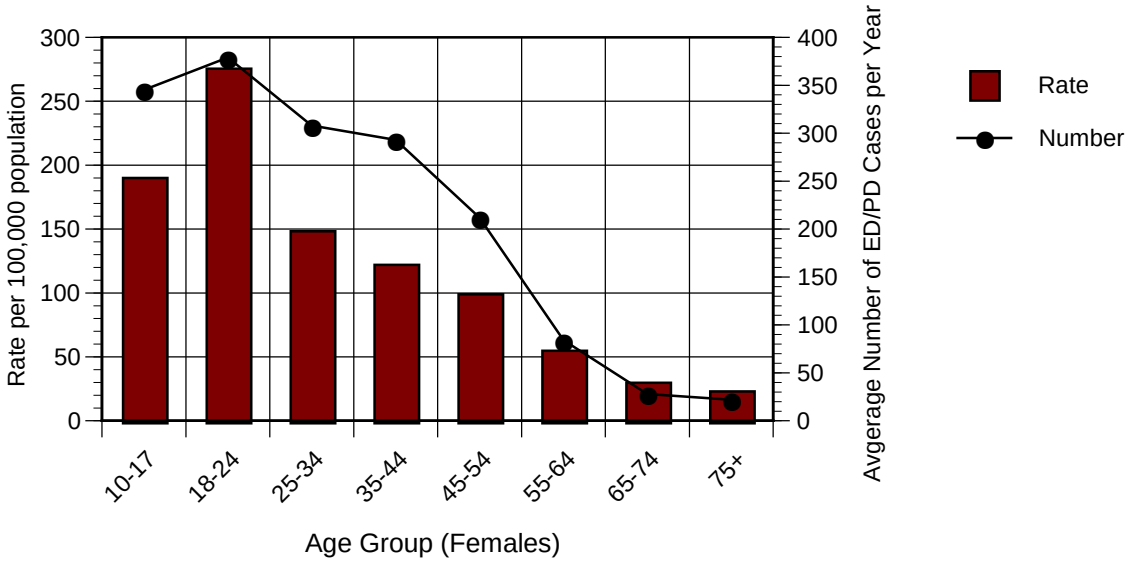
Table 5 presents the mechanism of self-inflicted injury for the 5,016 cases involving females by age category. Across all ages, the most common mechanism was poisoning (i.e., overdose), followed by cutting/piercing one's skin. Females did not use hanging/strangulation, jumping from a high place, gas vapors, and firearms as often compared to males (see Table 6).

Table 5: Females – Mechanism of Self-Inflicted Injury ED/PD Cases by Age Category, 2005-2007

Females	10-17	18-24	25-34	35-44	45-54	55-64	65-74	75+	Total
Poisoning by solid or liquid substance (E950)	719	801	677	683	509	215	70	52	3,726
Cutting & piercing instrument (E956)	240	272	198	142	81	28	6	6	973
Other & unspecified means (E958)	57	46	28	36	28	3	5	6	209
Hanging, strangulation & suffocation (E953)	9	10	6	13	5	2	0	0	45
Jumping from a high place (E957)	6	3	9	4	2	0	2	0	26
Poisoning by gas/vapors (E951/E952)	4	3	4	1	9	2	0	0	23
Firearms, air guns & explosives (E955)	1	0	2	0	0	2	0	0	5
Late effects of self-inflicted injury (E959)	0	2	1	0	0	1	0	1	5
Submersion/drowning (E954)	0	0	0	1	3	0	0	0	4
Total	1,036	1,137	925	880	637	253	83	65	5,016
Average Number Cases Per Year	345	379	308	293	212	84	28	22	1,672
Rate per 100,000 female population	190.1	275.6	148.3	122.1	99.0	54.9	29.9	23.0	108.0

As shown in **Figure 3**, young adult females, 18-24 years old, had the highest rate (275.6) and number (n=1,137) of self-inflicted injury ED/PD cases followed by teenagers (10-17 years old; rate of 190.1 and n=1,036). The rate and number of cases of self-harm decreased systematically with age for females.

Figure 3. Number and Rate of Self-Inflicted Injury ED/PD Cases for Females by Age, 2005-2007

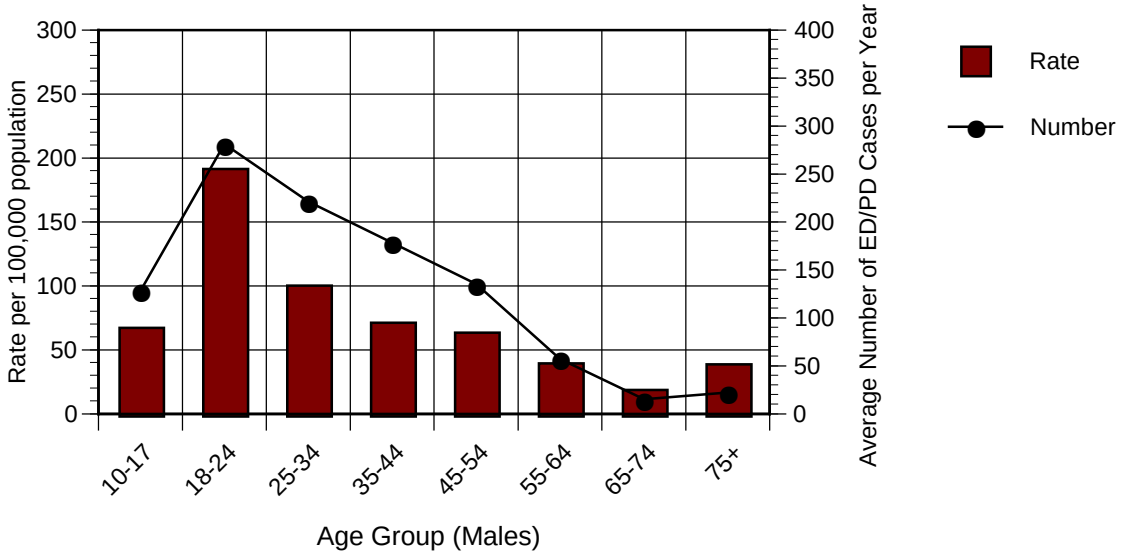


Males accounted for a much smaller number of cases (n=3,110, **Table 6**) compared to the 5,016 cases for females (Table 5, above). Similar to females, most males used poisoning by solid/liquid substance to injure themselves, followed by the use of a cutting/piercing instrument. Notably, males appeared to be more willing to use violent means to inflict bodily injury; these include the following: hanging, jumping from a high place, or shooting themselves.

Table 6: Males – Mechanism of Self-Inflicted Injury ED/PD Cases by Age Category

Males	10-17	18-24	25-34	35-44	45-54	55-64	65-74	75+	Total
Poisoning by solid or liquid substance (E950)	208	402	324	306	260	115	27	40	1,682
Cutting & piercing instrument (E956)	93	275	206	130	80	31	7	15	837
Other & unspecified means (E958)	55	121	76	51	30	7	4	8	352
Hanging, strangulation & suffocation (E953)	15	22	26	20	9	5	0	0	97
Firearms, air guns & explosives (E955)	0	10	7	7	12	6	4	3	49
Jumping from a high place (E957)	6	3	14	8	5	2	1	0	39
Poisoning by gas/vapors (E951/E952)	5	3	8	5	7	3	0	0	31
Late effects of self-inflicted injury (E959)	2	7	2	5	1	1	2	0	20
Submersion/drowning (E954)	0	0	0	2	1	0	0	0	3
Total	384	843	663	534	405	170	45	66	3,110
Average Number Cases Per Year	128	281	221	178	135	57	15	22	1,037
Rate per 100,000 male population	67.0	191.4	100.1	71.2	63.3	39.4	18.7	38.7	67.9

Figure 4. Number and Rate of Self-Inflicted Injury ED/PD Cases for Males by Age, 2005-2007



For both genders, the age group with the highest incidence rate were young adults 18 to 24 years of age (albeit females had higher rates overall). From this peak, the number and rate systematically declined with age for both genders. The one important difference was that the oldest males (75+ years) had a higher rate than their female counterparts (38.7 for males vs. 23.0 for females). Female preteens/teenagers (10-17 yrs) had a much higher rate (and number) of self-inflicted injury cases (190.1, n=1,036) compared to male teenagers (67.0, n=384) – almost three times as high.

Patient Disposition

The disposition of the individuals treated in local emergency departments and/or hospitals as a result of their self-inflicted injury is presented in **Table 7**. While 30% were transferred to a psychiatric hospital, almost half (47.5%) of all patients had a routine discharge home. Male victims were more likely to leave against medical advice, be transferred to a skilled nursing (SNF) or an intermediate care (IC) facility compared to females.

Table 7: Disposition of Self-Inflicted Injury ED/PD Patients by Gender, 2005-2007

Disposition from ED/PD	Male	%Male	Female	%Female	Total	%Total
Routine discharge home	1,419	45.6%	2,444	48.7%	3,863	47.5%
Psychiatric hospitalization	917	29.5%	1,553	31.0%	2,470	30.4%
Acute care hospital	404	13.0%	724	14.4%	1,128	13.9%
Other/Unknown	126	4.1%	150	3.0%	276	3.4%
Left against medical advise	95	3.1%	81	1.6%	176	2.2%
Expired/Died	72	2.3%	28	0.6%	100	1.2%
SNF/IC/Residential/Rehab	44	1.4%	33	0.7%	77	0.9%
Jail/Prison	33	1.1%	3	0.1%	36	0.4%
Total	3,110	100%	5,016	100%	8,126	100%

The most striking difference between genders in the ED/PD data was that the percentage of males (2.3%) who mortally injured themselves was almost 4 times higher compared to females (0.6%). It is important to note here that the majority of successful suicide attempts did not result in a visit to the emergency department as will be covered in the following section of the report.

Treatment Costs

Costs and length of stay associated with hospitalization are captured in the patient discharge (PD) data and available for 3,278 resident cases (similar data are not available from the ED data). On average, charges totaled $32,585 per hospitalization with 3.5 days of inpatient care. For those individuals (n=61) who died from their self-inflicted injuries in the hospital the average length of stay was 4.6 days and resulted, on average, in charges of $111,366.

The sum total of all hospitalization charges for OC residents was a staggering $106,816,870 from 2005 to 2007. If one includes the 324 non-OC resident hospitalization cases the total rises to $120,573,392. This total equates to over $36-40 million per year in OC.

The estimated cost of treating suicide/self-inflicted injuries in the ED can be estimated at over $8 million dollars ($2.7 million/year) based on an average cost of care of $1,000 per incident (Machlin, 2003).

Data for the cost of psychiatric hospitalization are not available from these datasets. However, in OC, psychiatric hospitalizations for attempted suicide typically result in about 8.5 days of inpatient care that cost about $629 per day (this is public insurance rate which is much lower than private). With 2,470 patients treated in a psychiatric hospital (823 per year) one can conservatively estimate the costs are at least $4.4 million per year.

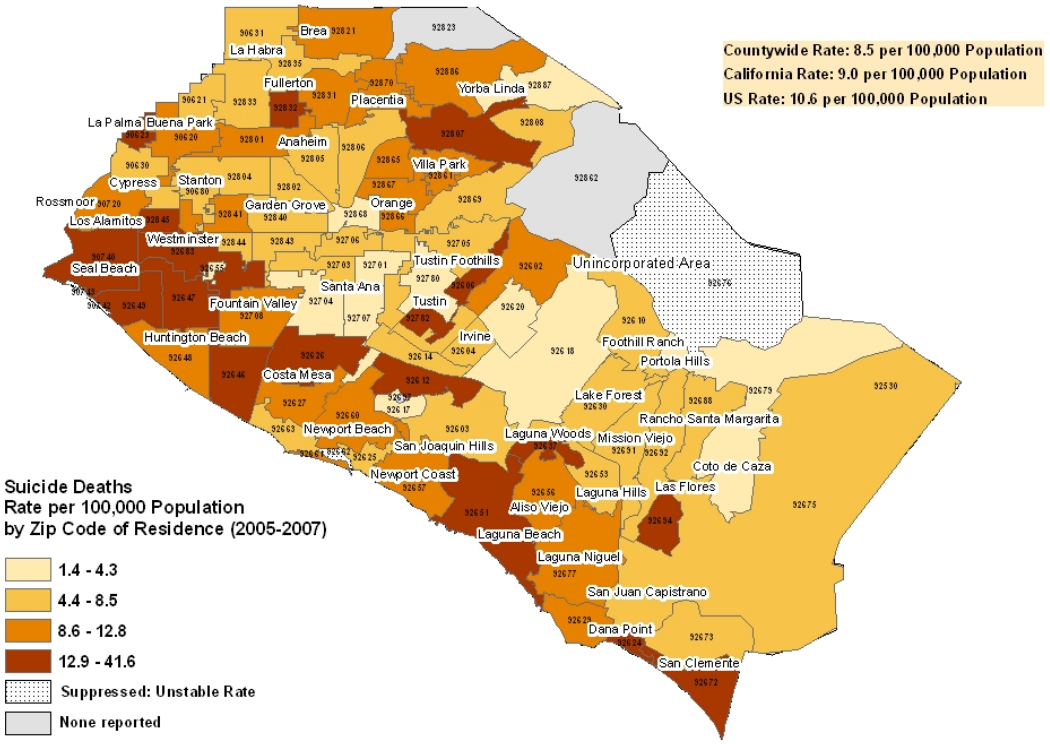
Suicide Deaths

The rate of suicide deaths in Orange County for the 3-year period, 2005-2007, was 8.5 per 100,000. Controlling for the age of the population resulted in an age-adjusted rate of 8.4 per 100,000, which facilitates comparison to the state and nation. Orange County's suicide death rate remains below that of the state of California (9.0) and the nation (10.6). However, OC's rate is well above the Healthy People 2010 Objective of 4.8 per 100,000.

Geography

The geographic distribution of suicide deaths is presented in the map below based on a three-year average rate per 100,000 population in each ZIP code (**Map 3a**). The actual number of cases per ZIP code are presented in **Map 3b**.

Map 3a. Rate per 100,000 of All Suicide Deaths by ZIP Code of Residence, 2005-2007



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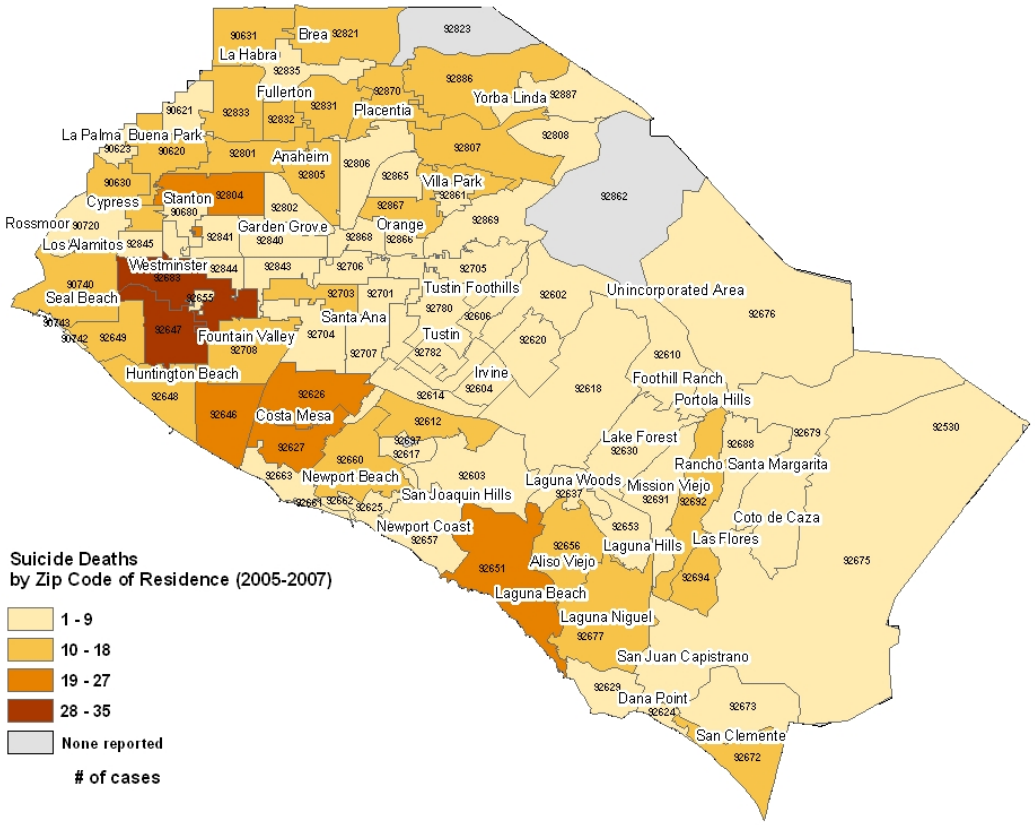
Map 3a illustrates the rate per 100,000 ZIP code population for all suicide deaths in Orange County between 2005-2007. Coastal cities such as San Clemente, Laguna Beach, Newport Beach, Huntington Beach, and Seal Beach showed higher rates for suicide deaths. The rates observed in three ZIP codes (90742 - Sunset Beach, 92662 - Balboa Island, and 92676 - Silverado) are unreliable due to the very low number of deaths, small populations and are therefore suppressed.

The number of suicide deaths are presented in **Map 3b** for the three year period of 2005-2007 by the descendant's ZIP code of residence. The highest number or frequency of deaths during this time period occurred in two ZIP codes in parts of Westminster (92683) and Huntington Beach (92647). In general, higher numbers of suicides occurred for residents of many coastal ZIP codes as well as for residents in the northern region of the county. Notable is the relatively low numbers of cases in some of the more populous ZIP codes in central Orange County such as Santa Ana, Garden Grove, and Tustin.

Map 3b. Number of Suicide Deaths by ZIP Code of Residence, 2005-2007



Gender

As was observed in the emergency department (ED) and hospital patient discharge (PD) data, males were more effective at ending their lives compared to females. At 12.5 (per 100,000 population), males had a suicide rate almost three times higher than females (4.4; **Table 8**). Nonetheless, on average, about 69 OC women end their lives each year, as do about 192 OC males.

Table 8. Gender of Suicide Victims, 2005-2007

Gender	2005	2006	2007	Total	3-Year Average	2006 Population	Rate per 100,000
Male	179	189	207	575	191.7	1,529,602	12.5
Female	58	78	70	206	68.7	1,548,793	4.4
Total	237	267	277	781	260.3	3,078,395	8.5

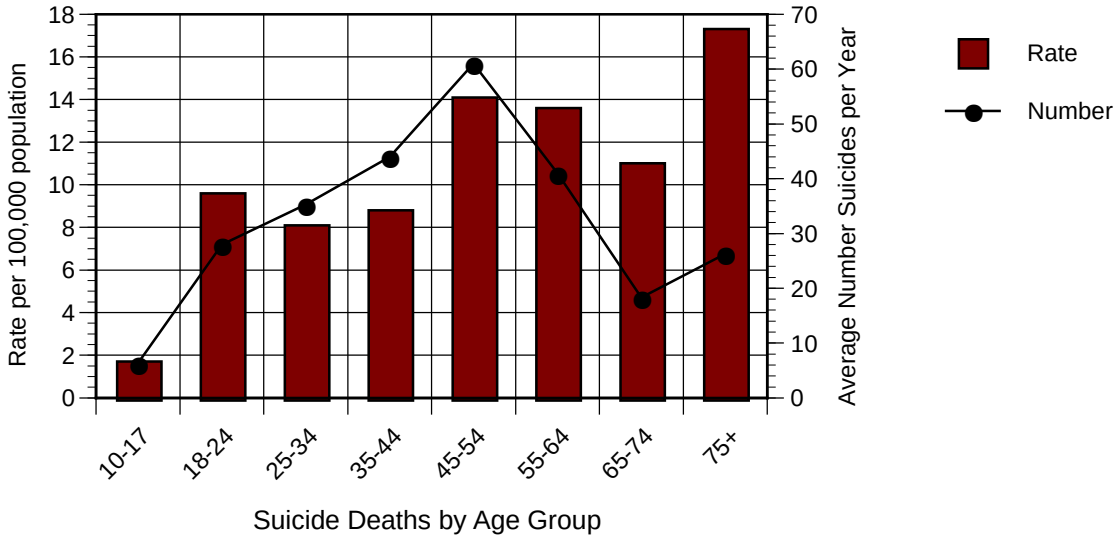
Age Groups

Consistent with past trends, seniors 75+ years of age had the highest rate of suicide death (17.3; **Table 9** and **Figure 5**). The second highest age group was 45 to 54 year olds at 14.1, who actually had the highest number of cases (n=183 or average of 61 suicides/year; **Table 9**).

Table 9. Frequency and Age-Specific Rates of Suicide, 2005-2007

Age Group	2005	2006	2007	Total	3-Year Average	Population	Rate per 100,000
10-17	9	5	5	19	6.3	372,479	1.7
18-24	31	31	22	84	28.0	292,811	9.6
25-34	25	44	37	106	35.3	435,899	8.1
35-44	37	51	44	132	44.0	497,423	8.8
45-54	49	61	73	183	61.0	433,387	14.1
55-64	37	37	49	123	41.0	301,143	13.6
65-74	22	14	19	55	18.3	167,153	11.0
75+	27	24	28	79	26.3	152,028	17.3
Total	237	267	277	781	260.3	3,078,395	8.5

Figure 5. Number and Rate of Suicides by Age Group, 2005-2007



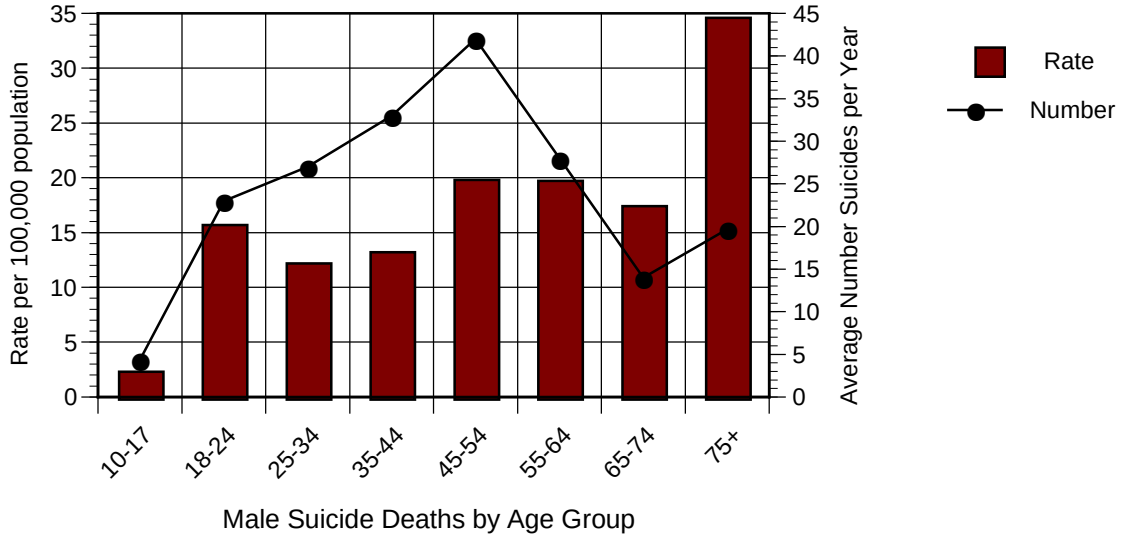
While young adults, 18 to 24 years had the highest rate of *attempted suicide* as seen in the in the ED/PD data (**Tables 5** and **6**), they had the fourth lowest rate of actual suicide deaths (9.6; **Table 9**).

Age Groups and Gender

The two figures below (**Figures 6** and **7**) present the number and rate of suicide for females (**Figure 6**) and for males (**Figure 7**) by age group. Middle-aged persons 45 to 54 years for each gender had the highest annual number of suicide cases. However, males overall had a much higher number and rate of suicides compared to females. Importantly, the oldest males (75+) had the highest rate (34.6) of suicide of any age or gender group (**Figure 7**).

Figure 6. Number and Rate of Female Suicides by Age Group, 2005-2007

Figure 7. Number and Rate of Male Suicides by Age Group, 2005-2007



Race/Ethnicity

Non-Hispanic white OC residents had the highest number and rate of suicide deaths during the three-year period of 2005-2007. At 13.5, non-Hispanic whites had a rate that was almost twice as high as the next highest group, Asian/Pacific Islanders (6.8). African Americans had the third highest rate, albeit a very small number of cases (n=8 total suicide deaths between 2005 and 2007). As one of the largest demographic groups in OC, Hispanics experienced a relatively low suicide rate of 2.9, well below the countywide rate of 8.4.

Table 10. Number and Race/Ethnicity Specific Rates of Suicide, 2005-2007

Race/Ethnicity	2005	2006	2007	Total	3-Year Average	2006 Population	Rate per 100,000
White	177	198	208	583	194.3	1,444,413	13.5
Hispanic	25	35	29	89	29.7	1,040,486	2.9
Asian/Pacific Islander	29	31	38	98	32.7	479,118	6.8
African American	4	3	1	8	2.7	43,759	6.1
Nat Amer/Alaskan	0	0	1	1	0.3	11,238	3.0
Other/Unknown	2	0	0	2	0.7	59,381	1.1
Total	237	267	277	781	2	3,078,395	8.4

Contributing Factors

For 56 of the 781 suicides during this time period (7.2%), a terminal illness such as cancer or lung disease was indicated as a contributing factor. Moreover, for 91% of these cases, the victims were 45+ years of age, 70% were male, and 77% non-Hispanic white. Another major contributing factor to suicide was mental illness. As described in the previous section, over 6,000 of the 8,126 ED/PD cases (75%) had a known mental illness and/or substance use diagnosis (i.e., primary, secondary, or tertiary diagnosis).

External Cause of Death – Intentional Self-Harm by Mechanism

As shown in **Table 11**, the external cause (or mechanism) of self-inflicted injury resulting in death was most often through the use of firearms (n=265 of 781 suicides; 33.9%). As noted previously in the ED/PD analysis, males were more likely to use such violent methods. Similarly, the second most commonly used mechanism was by hanging, strangulation or suffocation (25.6% of all suicides). Again, males accounted for three-quarters of such incidents.

By comparison, females preferred less violent means; they were more likely to end their life through the use of poisoning by solid/liquid substance (i.e., overdose). Overdose was the third most common mechanism overall (20.4%) and more females (n=85) than males (n=74) utilized this method.

The fourth most common mechanism of suicide was by “Other and Unspecified Means,” such as jumping from a high place (5.1% of all cases) or lying before a moving object (2.7% of all suicides). Importantly, while cutting/piercing injuries were the second most common self-inflicted injury resulting in treatment in the emergency department (22.3% of all ED/PD cases) they were much less lethal – resulting in only 3.6% of all suicide deaths.

Table 11. Mechanism of Suicide by ICD-10 Codes by Gender, 2005-2007

External Cause of Death (ICD-10 Codes)	Male	Female	Total	Percent
Poisoning by Solid or Liquid Substance (X60-X62, X64-X66, X69)	**74**	**85**	**159**	**20.4%**
Other unspecified drugs, medicaments and biological substances (X64)	46	53	99	12.7%
Antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs, not elsewhere classified (X61)	14	17	31	4.0%
Narcotics and psychodysleptics [hallucinogens] not elsewhere classified (X62)	9	7	16	2.0%
Non-opioid analgesics, antipyretics and antirheumatics (X60)	0	5	5	0.6%
Other and unspecified chemicals and noxious substances (X69)	2	3	5	0.6%
Organic solvents and halogenated hydrocarbons and their vapors (X66)	2	0	2	0.3%
Intentional self-poisoning by and exposure to alcohol (X65)	1	0	1	0.1%
Poisoning by Gas/Vapors (X67)	**21**	**4**	**25**	**3.2%**
Hanging, Strangulation, and Suffocation (X70)	**146**	**46**	**192**	**24.6%**
Submersion/Drowning (X71)	**11**	**5**	**16**	**2.0%**
Firearms, Airguns, and Explosives (X72-X74)	**233**	**32**	**265**	**33.9%**
Intentional self-harm by handgun discharge (X72)	160	24	184	23.6%
Intentional self-harm by other and unspecified firearm discharge (X74)	33	8	41	5.2%
Intentional self-harm by rifle, shotgun and larger firearm discharge (X73)	40	0	40	5.1%
Other and Unspecified Means	**88**	**32**	**120**	**15.4%**
Jumping from a high place (X80)	34	6	40	5.1%
Cutting and Piercing Instrument (X78)	21	7	28	3.6%
Jumping or lying before moving object (X81)	12	9	21	2.7%
Crashing of motor vehicle (X82)	8	4	12	1.5%
By smoke, fire, and flames (X76)	4	4	8	1.0%
By other specified means (caustic substances, crash plane, electrocution; X78)	6	1	7	0.9%
By unspecified means (X84)	3	1	4	0.5%
Late Effects of Self-Inflicted Injury (Y87.0)*	**2**	**2**	**4**	**0.5%**
Total	**575**	**206**	**781**	**100.0%**

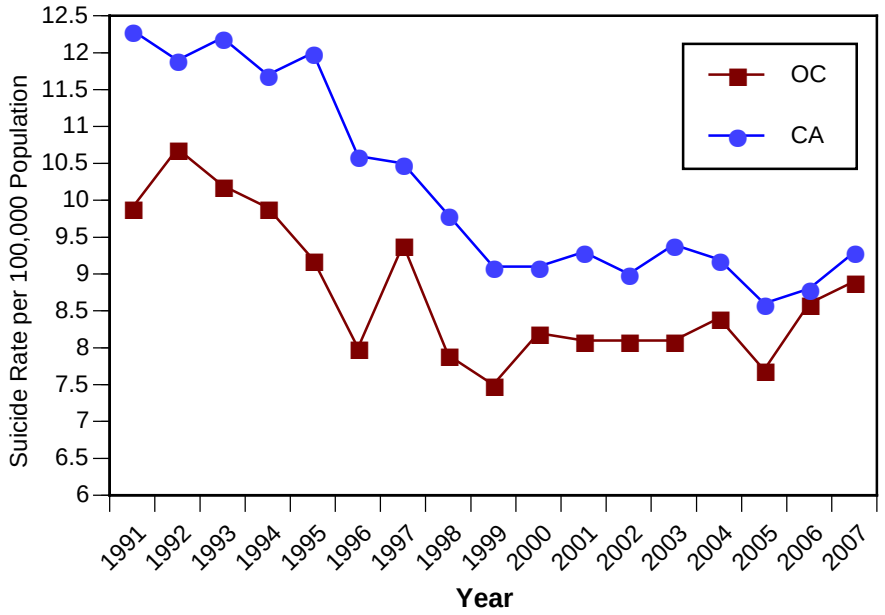
*Categories Y87 are to be used to indicate circumstances as the cause of death, impairment or disability from sequelae or "late effects", which are themselves classified elsewhere. The sequelae include conditions reported as such, or occurring as "late effects" one year or more after the originating event. (Y87.0) late effects of intentional self-harm.

Suicide Trends

Suicide death trends are presented in **Figure 8** for both California and Orange County from 1991 through the most recent year available, 2007. Over the past decade and a half, the statewide rate of suicide has systematically declined from a high of 12.3 per 100,000 population in 1991 to 9.3 in 2007. During this same time period, Orange County had a lower rate than the state and experienced a similar, proportional decline from a high of 10.7 in 1992 to the current rate of 8.9 in 2007.

Importantly, while the suicide rate has declined over the years in OC, there appears to be a 16% increase in the past two years (2006-2007) from the low of 7.7 observed in 2005. It remains to be seen if this is a real increase, perhaps in response to the unprecedented economic crisis or due to normal variation. Data for 2008 will hopefully clarify this question.

Figure 8. Suicide Rates in California & Orange County, 1991 – 2007



Summary and Next Steps

Suicide remains the number one cause of injury deaths in Orange County as it was ten years ago (Kraft et al., 2000). Because self-inflicted injury and suicide is a public health problem that is preventable, increased awareness about the behavior and circumstances associated with self-harm may help direct more effective prevention/intervention efforts (Davidson et al, 1999).

Every year about 2,700 Orange County residents intentionally injure themselves. Six out of ten non-fatal self-harm ED/PD injury cases were committed by females. In particular, young females less than 24 years of age had the highest rate of self-inflicted injuries, corresponding to about 724 cases per year. Females who intentionally hurt themselves typically used poisoning by a solid or liquid substance (i.e., overdose). The second most common means used was by cutting/piercing their skin. Female residents from certain ZIP codes in Costa Mesa, Anaheim, Westminster, and Santa Ana tended to have higher numbers of cases (see **Map 1c**).

In contrast, males were much more likely to end their life. Seven out of ten suicide deaths were to males – corresponding to about 192 deaths per year in Orange County. While older males 75+ years

had the highest rate of suicide death, middle-aged males 45 to 54 years had the highest number of suicide deaths (average of 42 suicides per year).

Orange County's overall suicide death rate of 8.4 per 100,000 age-adjusted population is well below state and national rates. However, 781 residents committed suicide between 2005 and 2007, corresponding to about 261 people ending their life per year. Geographically, the highest rates of suicide tended to occur in coastal ZIP codes in cities such as San Clemente, Laguna Beach, Newport Beach, Huntington Beach, and Seal Beach (see **Map 3**). Relatively high rates were also observed in specific ZIP codes in Fullerton, Tustin, and east Anaheim. The highest numbers of suicides were noted in two ZIP codes in parts of Westminster (92683) and Huntington Beach (92647; **Map 3b**).

Firearms were most often used to commit suicide followed by hanging/strangulation and then overdose. Violent mechanisms such as firearms were more often employed by males, while most females successfully used poisoning/overdose to end their life.

Non-Hispanic whites had the highest number/rate of both self-inflicted injury (**Table 3**) and suicide death (**Table 10**) in Orange County. African Americans actually had a slightly higher rate of self-inflicted injury ED/PD cases, albeit the actual number of cases was quite low. Hispanics and Asian/Pacific Islander demographic groups in the county had rates of self-inflicted injury and suicide death well below the respective countywide rates for each measure.

It is highly probable that there are even more unreported cases of self-inflicted injury, as studies examining nonfatal suicidal behavior have found that over 70 percent of persons attempting suicide never seek health services (Crosby et al, 1999). Risk factors that can place persons at increased risk for suicide include: mental illness, substance abuse disorders, physical abuse, recent losses, and painful physical illnesses (Harris & Barraclough, 1997; WHO, 2000a, 2000b; *California Strategic Plan On Suicide Prevention: Every Californian Is Part of the Solution*, 2008). Indeed, in the present study we found that a large majority of intentional injury victims treated in the ED had a known mental health and/or substance use problem.

Public mental health prevention efforts that target those with a history of mental illness can be a key factor to decreasing the incidence of self-inflicted injury and suicide in the county. Indeed, this is one of the main objectives of the Mental Health Services Act (MHSA). MHSA funding supports a broad spectrum of mental health services, including a state-administered project to address suicide prevention. In addition, MHSA funding began to cover Prevention and Early Intervention (PEI) programs in 2009, with the goals of reducing multiple risk factors and promoting well-being in order to prevent the initial onset of, worsening of, or suffering associated with mental health problems. For an extensive description of planned statewide prevention effort please see *California Strategic Plan On Suicide Prevention: Every Californian Is Part of the Solution* (2008).

MHSA's suicide prevention activities aim specifically to improve early identification, early intervention, and referral for at-risk suicidal behavior. Many of the characteristics of the PEI priority populations designated by the California Department of Mental Health (trauma exposed individuals, stressed families, youth at risk of school failure, etc.) are associated with greater suicide risk. Therefore, many of the PEI programs will inherently address suicide prevention, and some PEI programs will more directly address suicide prevention. For example, crisis and referral services will be implemented to help reduce suicide risk factors and suicidal behavior, as well as provide support for suicide survivors.

The findings of this study will hopefully help target prevention and intervention efforts for those most at risk of intentional injury and suicide in Orange County.

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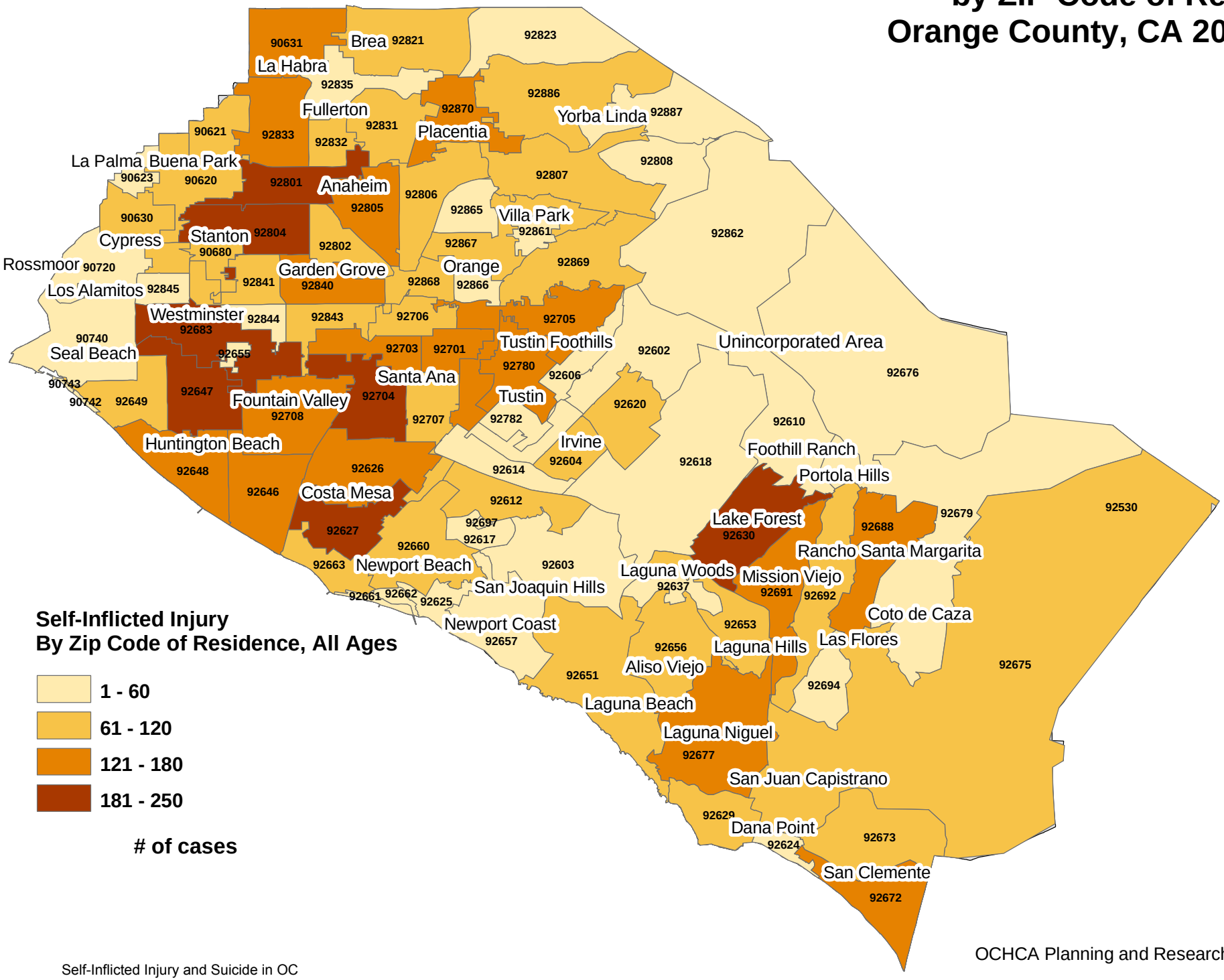
Map 1a

Self-Inflicted Injury ED/PD Cases, All Ages by ZIP Code of Residence Orange County, CA 2005-2007



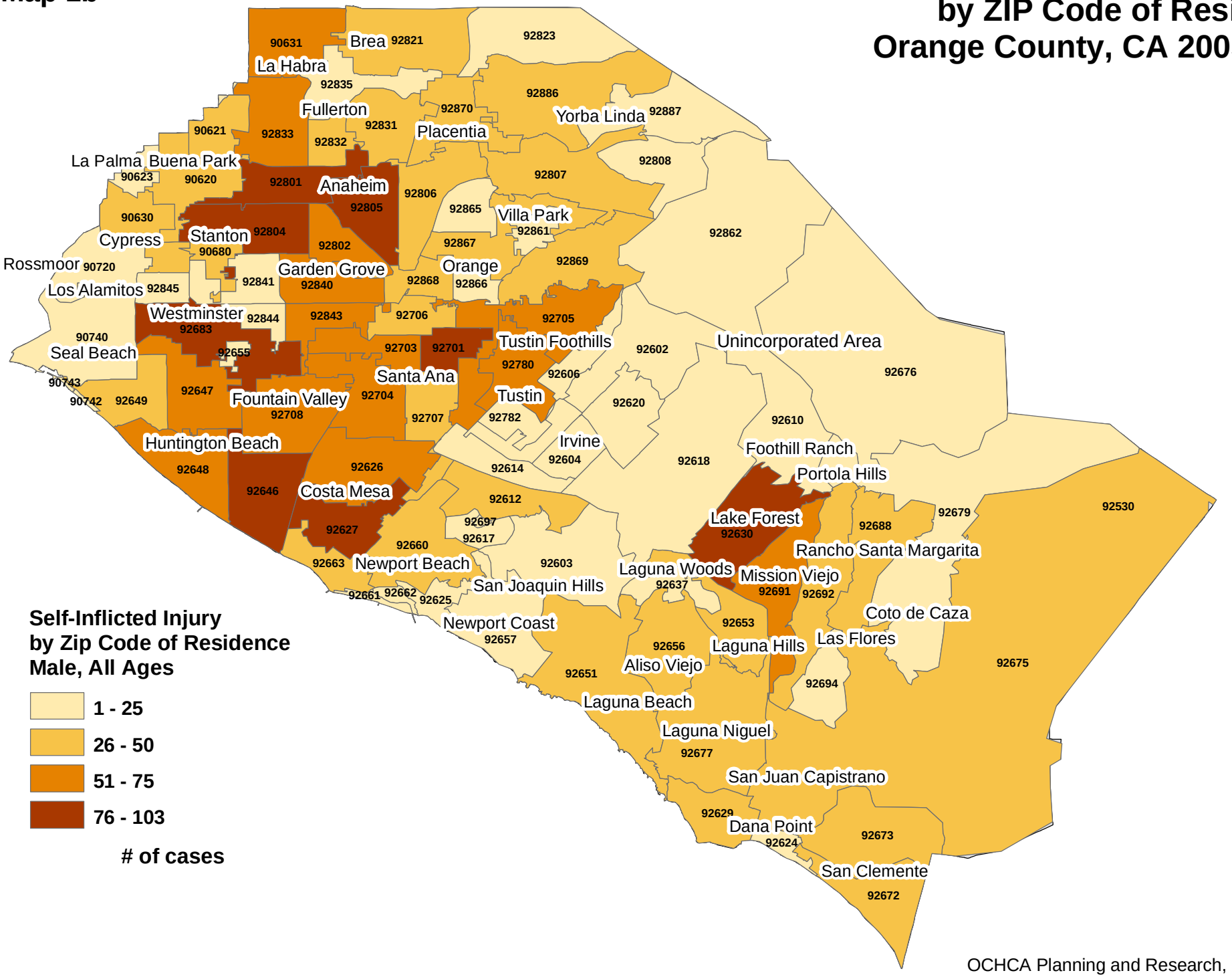
Self-Inflicted Injury
By Zip Code of Residence, All Ages

- 1 - 60
- 61 - 120
- 121 - 180
- 181 - 250

# of cases

Map 1b

Self-Inflicted Injury ED/PD Cases, Male by ZIP Code of Residence Orange County, CA 2005-2007



Self-Inflicted Injury by Zip Code of Residence Male, All Ages

- 1 - 25
- 26 - 50
- 51 - 75
- 76 - 103

# of cases

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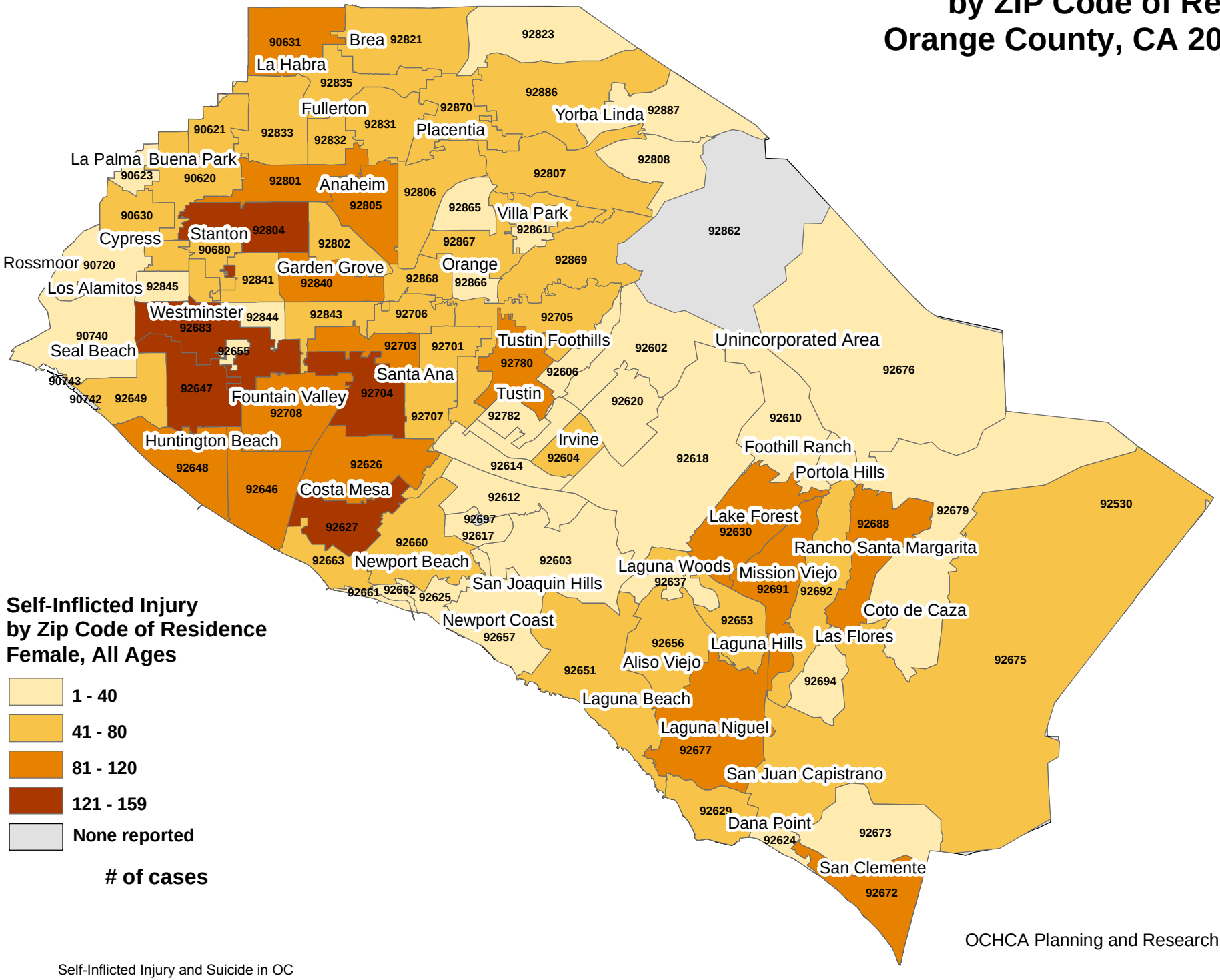
Map 1c

Self-Inflicted Injury ED/PD Cases, Female by ZIP Code of Residence Orange County, CA 2005-2007



Self-Inflicted Injury by Zip Code of Residence Female, All Ages

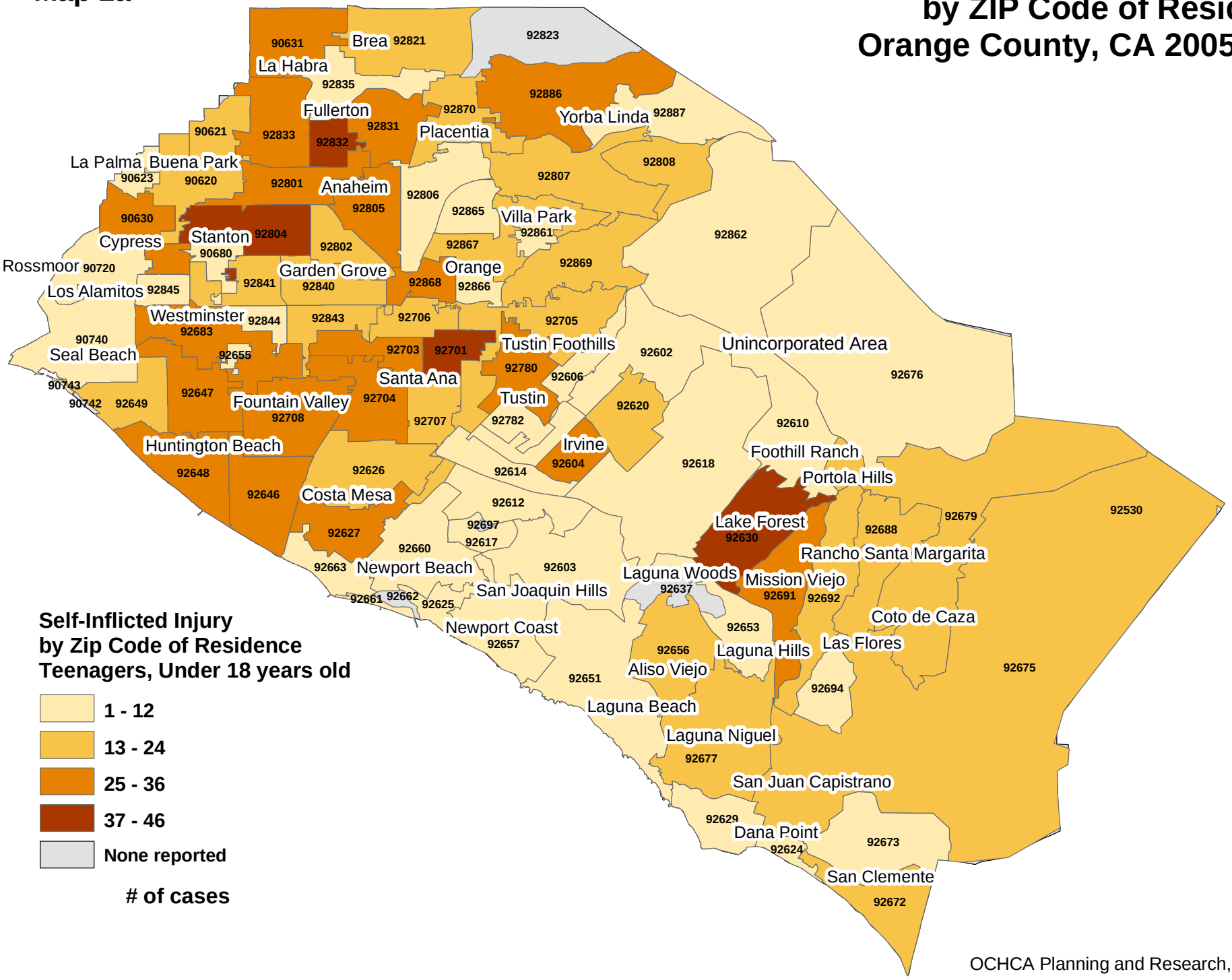
- 1 - 40
- 41 - 80
- 81 - 120
- 121 - 159
- None reported

# of cases

OCHCA Planning and Research, May 2009

Map 2a

Self-Inflicted Injury ED/PD Cases, <18 years old by ZIP Code of Residence Orange County, CA 2005-2007



Self-Inflicted Injury by Zip Code of Residence Teenagers, Under 18 years old

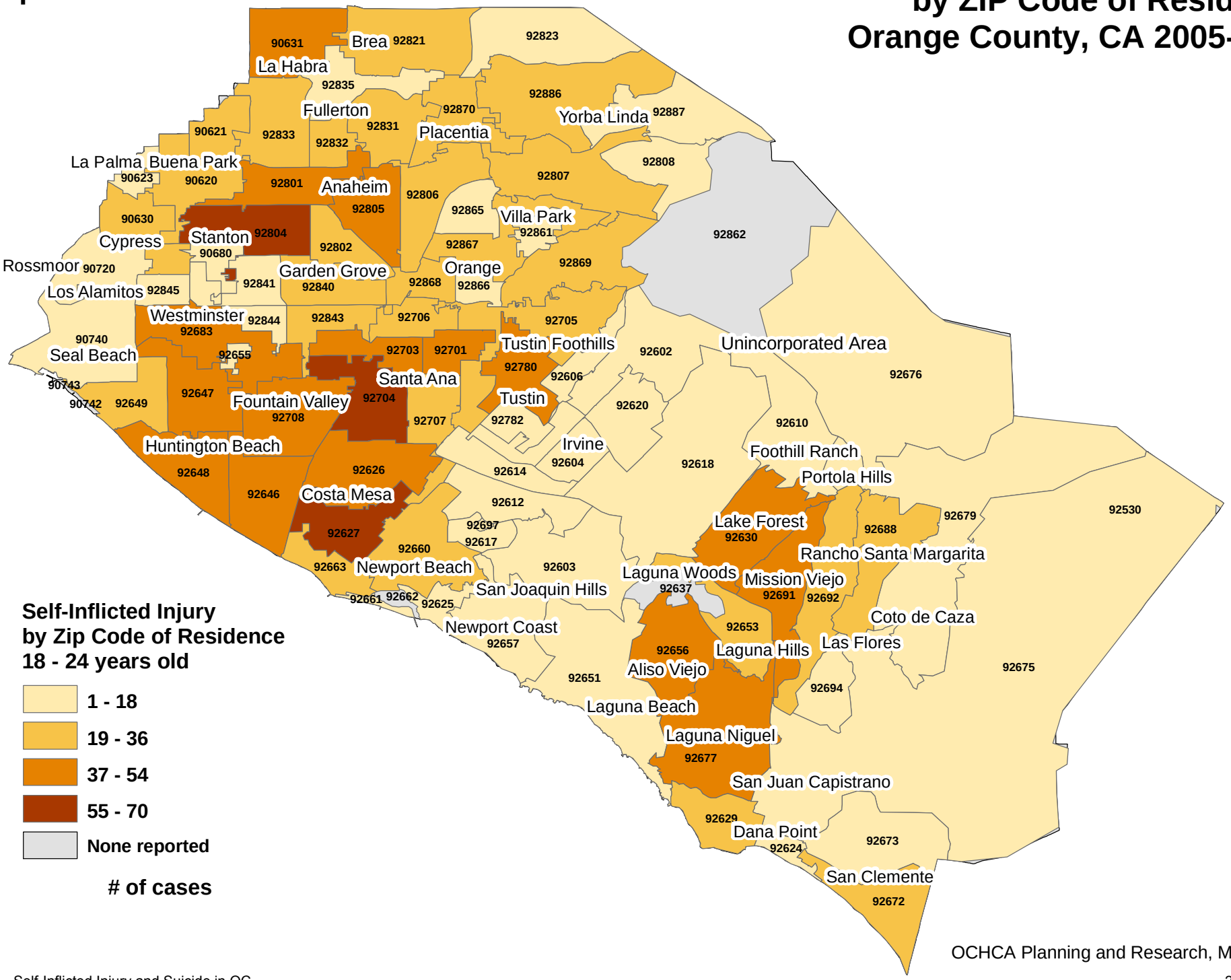
- 1 - 12
- 13 - 24
- 25 - 36
- 37 - 46
- None reported

# of cases

OCHCA Planning and Research, May 2009

Map 2b

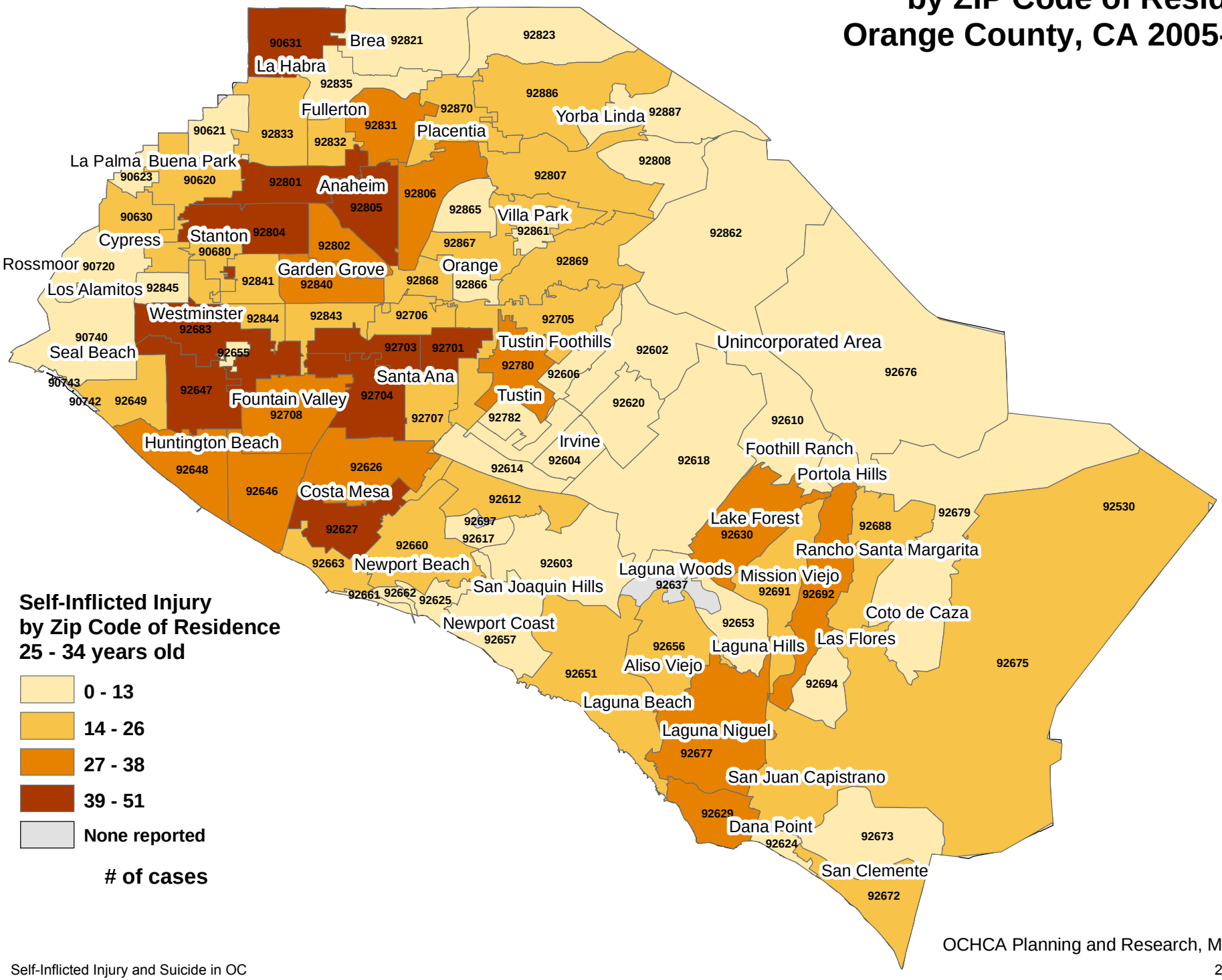
Self-Inflicted Injury ED/PD Cases, 18-24 years old by ZIP Code of Residence Orange County, CA 2005-2007



OCHCA Planning and Research, May 2009

Map 2c

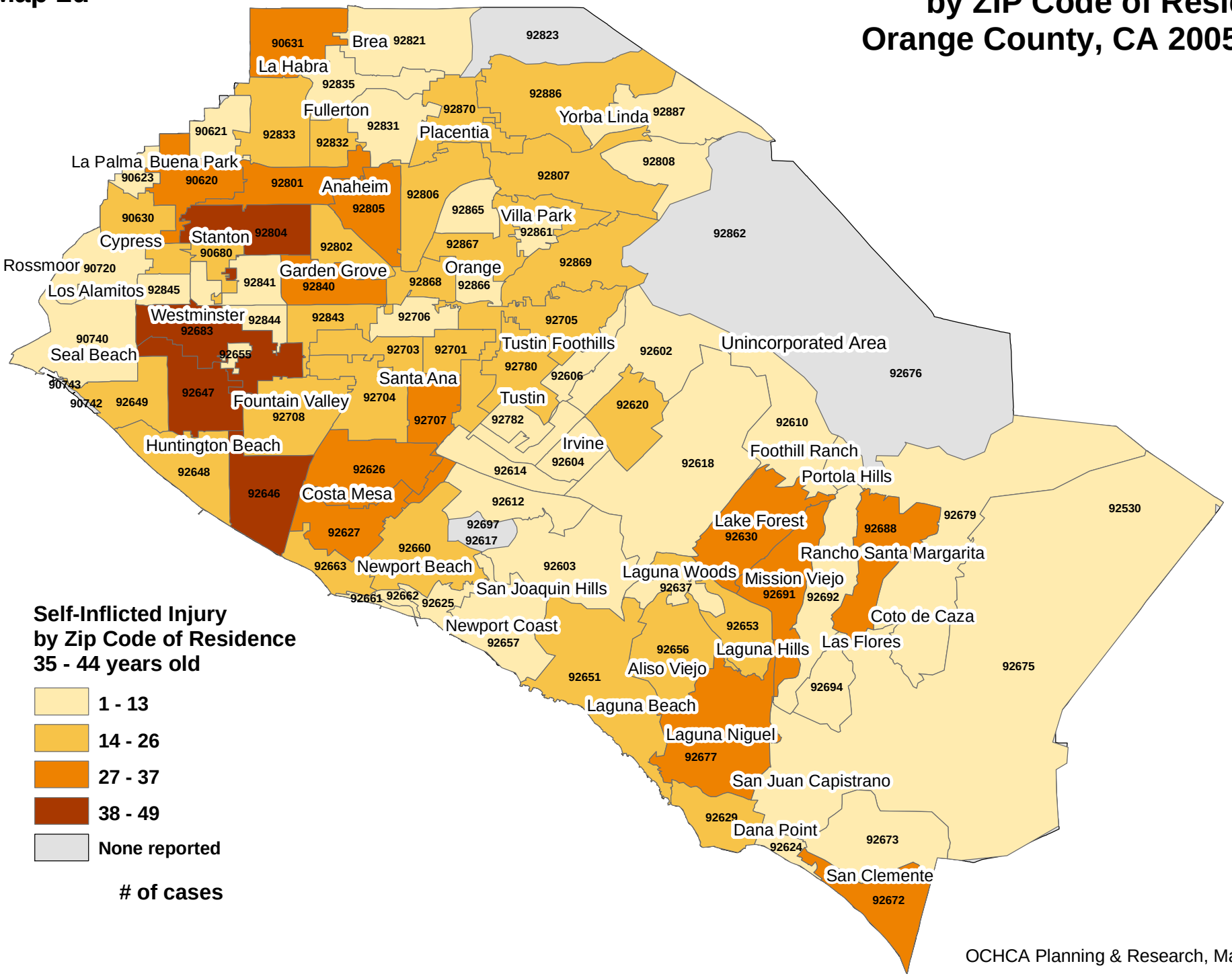
Self-Inflicted Injury ED/PD Cases, 25-34 years old by ZIP Code of Residence Orange County, CA 2005-2007



OCHCA Planning and Research, May 2009

Map 2d

Self-Inflicted Injury ED/PD Cases, 35-44 years old by ZIP Code of Residence Orange County, CA 2005-2007



Self-Inflicted Injury by Zip Code of Residence 35 - 44 years old

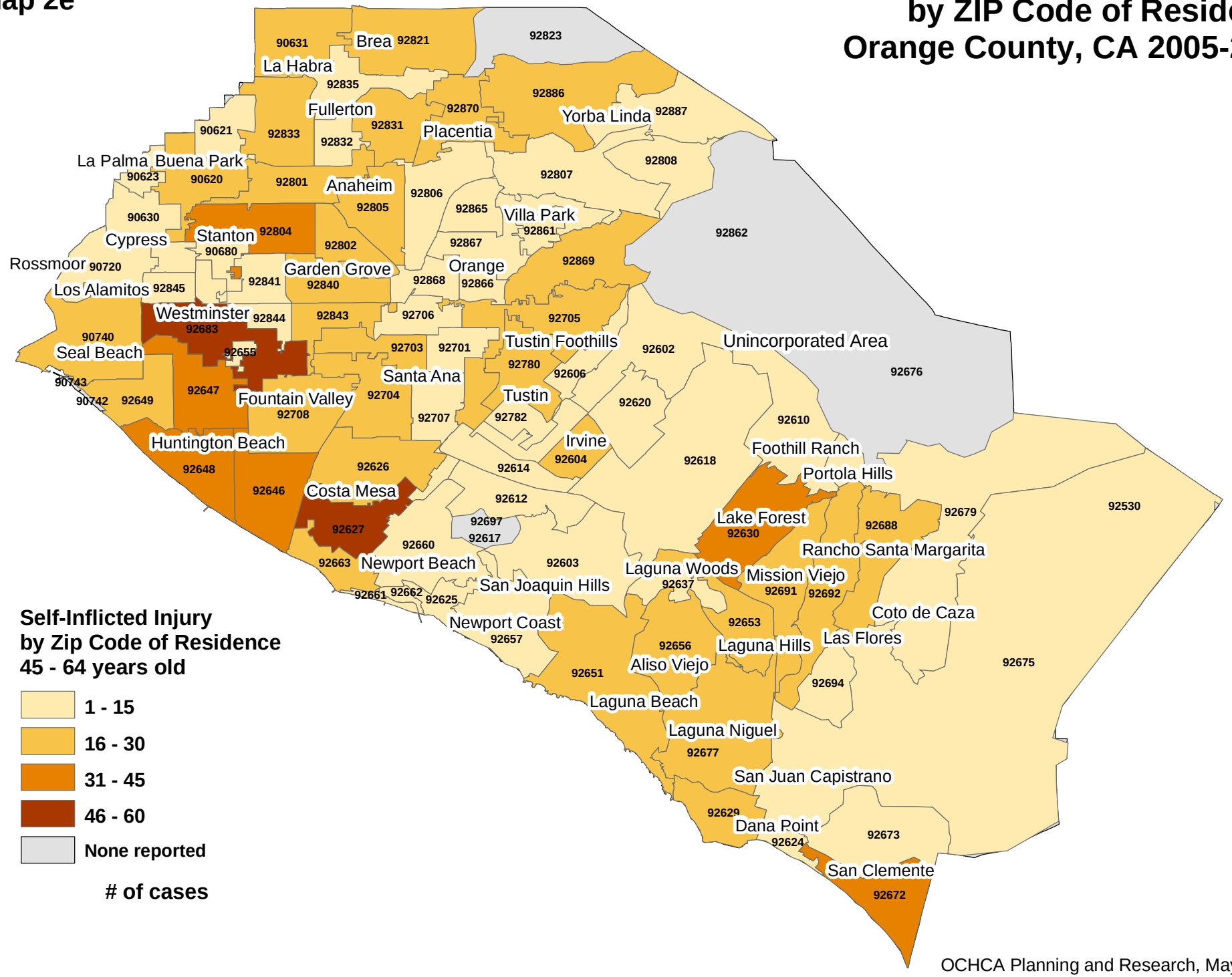
- 1 - 13
- 14 - 26
- 27 - 37
- 38 - 49
- None reported

# of cases

OCHCA Planning & Research, May 2009

Map 2e

Self-Inflicted Injury ED/PD Cases, 45-64 years old by ZIP Code of Residence Orange County, CA 2005-2007



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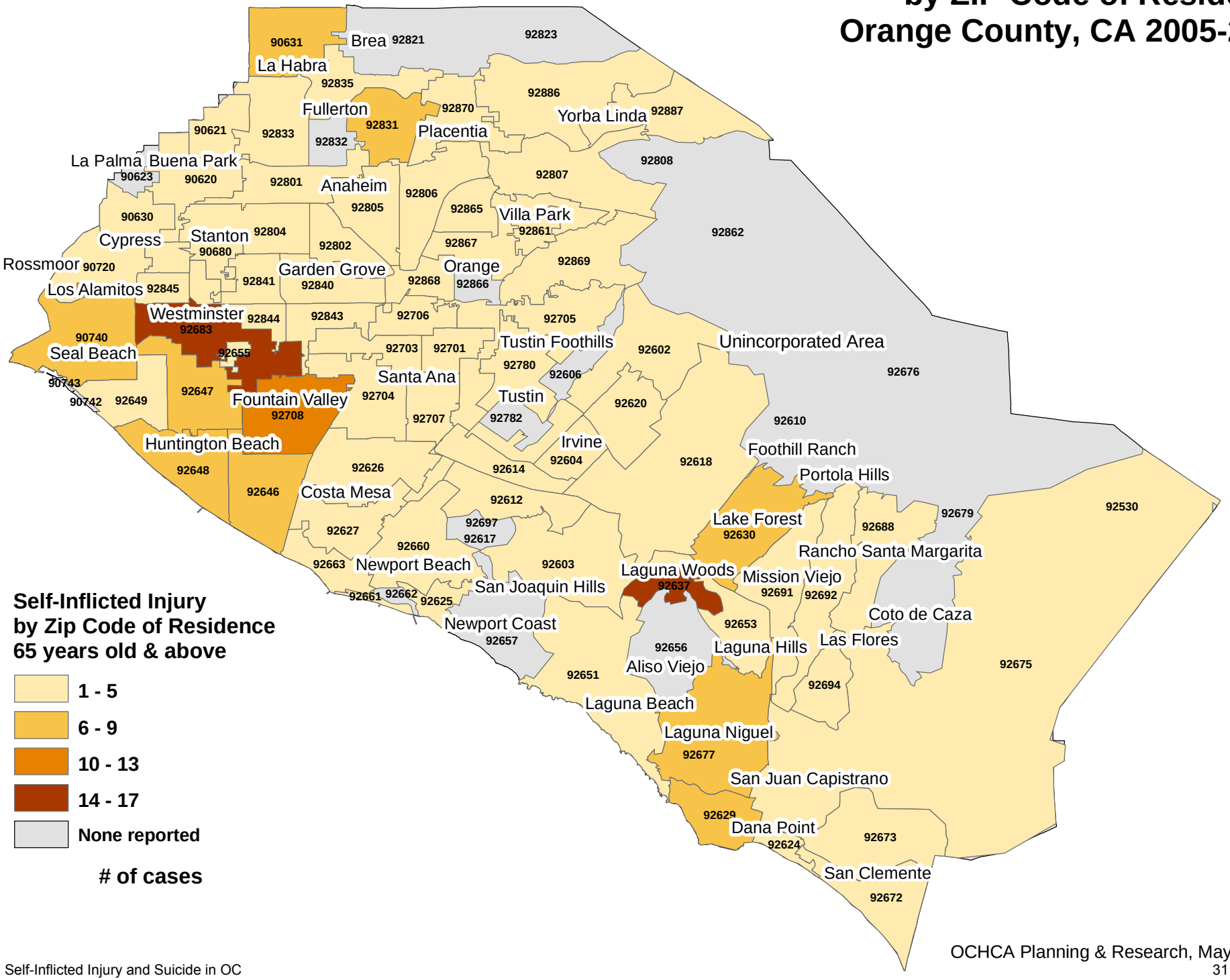
Map 2f

Self-Inflicted Injury ED/PD Cases, 65+ years old by ZIP Code of Residence Orange County, CA 2005-2007



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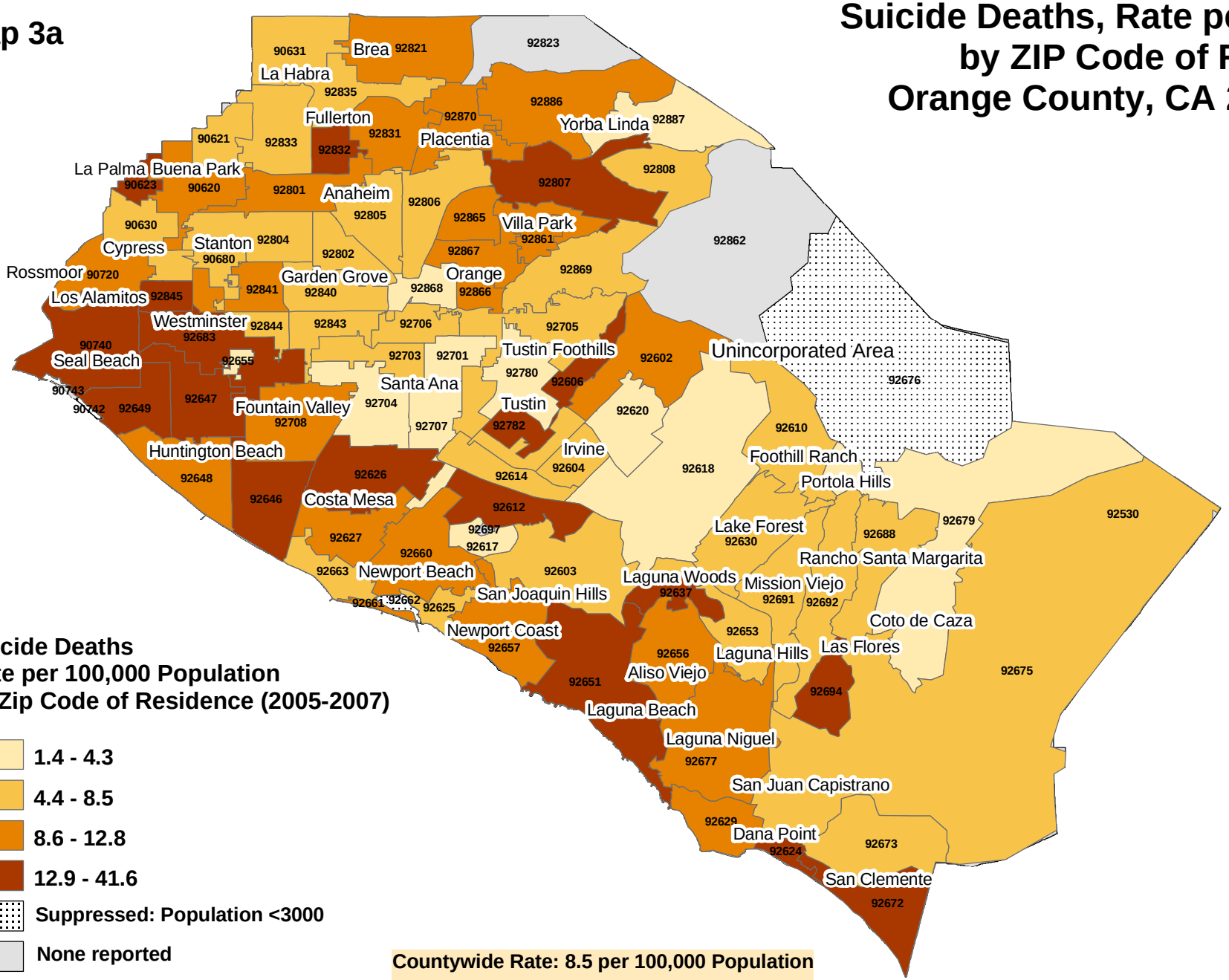
Map 3a

Suicide Deaths, Rate per 100,000 by ZIP Code of Residence Orange County, CA 2005-2007



Suicide Deaths
Rate per 100,000 Population
by Zip Code of Residence (2005-2007)

- 1.4 - 4.3
- 4.4 - 8.5
- 8.6 - 12.8
- 12.9 - 41.6
- Suppressed: Population <3000
- None reported

Countywide Rate: 8.5 per 100,000 Population
California Rate: 9.0 per 100,000 Population
US Rate: 10.6 per 100,000 Population

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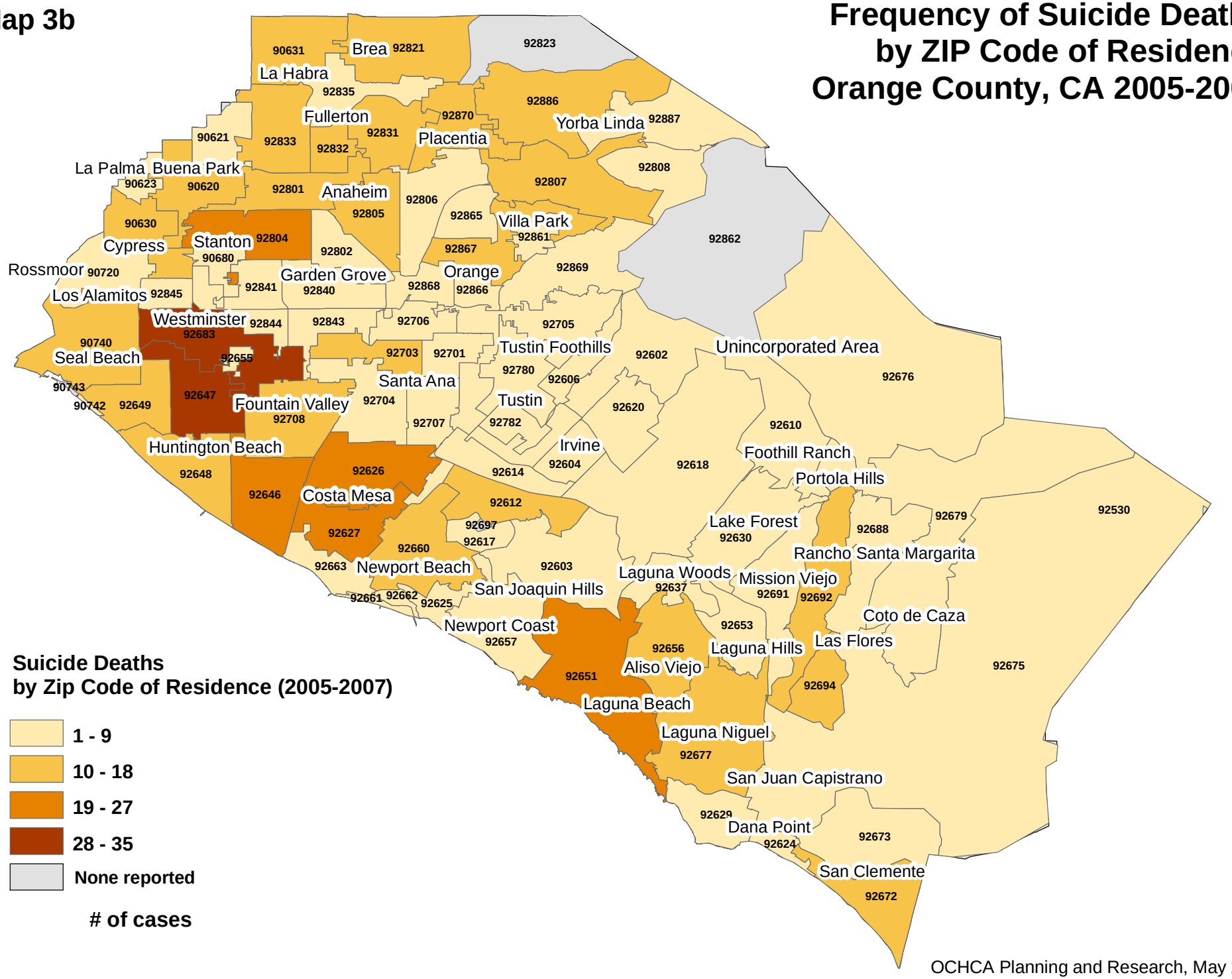
Map 3b

Frequency of Suicide Deaths by ZIP Code of Residence Orange County, CA 2005-2007



Suicide Deaths by Zip Code of Residence (2005-2007)

- 1 - 9
- 10 - 18
- 19 - 27
- 28 - 35
- None reported

# of cases

OCHCA Planning and Research, May 2009