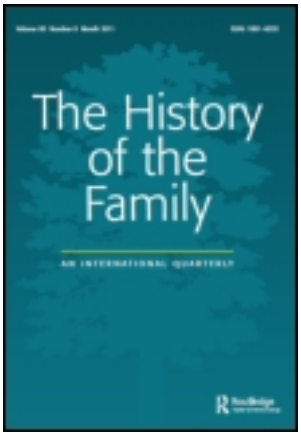


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# From *Ahogado* to *Zorrillo*: external causes of mortality in the California missions

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In recent decades, the literature on virgin soil epidemics has dominated scholarly discussions of Indian population decline in colonial America. Illness and disease – and the high mortality and low fertility that accompanied them – go a long way towards explaining the dramatic decline of the Indian population in Alta California after Spanish colonization began in 1769. But, there are myriad other factors that contributed to Indian depopulation in Spanish and Mexican California, and these have largely escaped the study of historians. Death cause information listed in the burial registers of the California missions and now available through the Early California Population Project suggests that Indian population decline in California before 1850 was accelerated by external factors, such as acts of violence, natural disasters, dangers associated with animals and insects, as well as work- and transportation-related mishaps. These external factors do not in themselves explain Indian population decline, but they add considerably to our understanding of life and death in early California and by extension other corners of colonial America, and they give us a richer understanding of how Indians lived, worked, died, and even prayed in Spanish and Mexican California.

**Keywords:** California; mortality; external causes; Native Americans; sacramental registers; virgin soil epidemics; Franciscan missions; Early California Population Project



## 1. Introduction

From the onset of European exploration and colonization of the Americas, observers noted the rapid decline of indigenous populations, and soon thereafter began a debate about the origins and magnitude of this catastrophe. In our own time, no concept remains more central to our understanding of Europe's expansion into the New World than the 'virgin soil epidemic'. The term virgin soil epidemic describes the initial outbreak of a disease previously unknown or absent from a particular area for many generations. To scholars of colonial America, the story of the course of these epidemics is a familiar one, and it has shaped the understanding of the past five centuries of history in the Americas. Virgin soil epidemics, according to most histories of the colonization of the New World, were largely inevitable, wherever and whenever Europeans came into sustained contact with American Indians. Their enormous historical importance derives from the fact that they decimated Indians, causing sudden and dramatic depopulation, which in turn unleashed social, economic, and political chaos, all of which facilitated European conquest and settlement throughout much of the New World. As many scholars have told us, these epidemics resulted in extremely high rates of illness and mortality, and without them the history of the Americas over the last five centuries would have been quite different.[1]

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But virgin soil epidemics cannot explain the totality of Indian population decline in the Americas. Scholars would do well to remember that although these terrible epidemics were a major force driving Indian population decline they were just one among many causes, especially among Indians who became integrated into the colonists' modes of labor and production.[2] The writings of Mariano Payeras, a Spanish Franciscan working in California, dramatically illustrate that even contemporary observers noted that depopulation could occur in the absence of consistent epidemics. In 1820, when he was serving as Father President of the California missions, Payeras wrote a most thoughtful reflection on the legacy of a half century of Spanish and Franciscan rule in colonial California. Having served in Alta California since 1793, Payeras wrote from experience. He reported that after more than fifty years of missionary work in California, the Franciscans had baptized all the Indians between San Diego and an area just north of San Francisco. The missionaries had expected their efforts to lead to a 'beautiful and flourishing church and some beautiful towns which could be the joy of the sovereign majesties of heaven and earth.' Instead they found themselves 'with a people miserable and sick, with rapid depopulation of rancherías [villages], which with profound horror fills the cemeteries' (Payeras 1995b, p. 225). Payeras lamented that previously healthy Indians, once baptized and resident at the missions, became feeble, lost weight, sickened and died.

As an example of this unfolding tragedy, Payeras pointed to Mission San Carlos Borromeo, also known as Mission Carmel. Mission San Carlos was established in 1770 by Father Junípero Serra in the heart of the territory of the Rumsen Costanoan Indians. By 1796 the mission population had grown to 835 Indians, but this total was reduced to 390 souls in 1818, despite the fact that the Indians in Payeras's words had suffered '*but two epidemics in 24 years*.' Payeras also pointed to neighboring Mission Soledad, where he had worked in the early 1800s. By 1820 the mission had been reduced to 'a skeleton' with 'an unbalanced society made up of a group of 200 (or close to it) of either widowers or single men without one woman to marry them, nor even the hope of doing it' (Payeras, 1995b).[3] Payeras was at pains to point out that something in addition to epidemics was destroying the population at the missions. This great frustration he was unable to explain – or arrest – this consistent population decline.

In 1821, a year after Payeras wrote his lament, Spanish rule in California gave way to Mexican independence. By then over 70,000 Indians had been baptized in the region's 21 Franciscan missions. As Payeras suggested, during the Spanish and Mexican periods the Indians of the coastal region saw their numbers fall dramatically. The region most intensively settled by Spain, the coast between San Diego and San Francisco, was most likely home to around 64,500 Indians in 1769, the year that Spain began to settle the region.[4] In 1821, after more than five decades of demographic disaster in California, mission Indians numbered only 21,750 and the population of the missions had only been maintained through the recruitment of Indians from the interior valleys (Gerhard, 1987, p. 309).[5] By 1855, after the California Gold Rush and the advent of American rule, the Indian population of the state had probably fallen to around 50,000, far below the more than 300,000 who lived in California in 1769 (Cook, 1976b).

In some of my earlier work I have documented that in the Franciscan missions of Alta California persistent endemic disease created crushingly high mortality among Indian infants, children, and adults as well as very low fertility and even sterility among a very high number of Indian couples. Infant mortality rates at three principal missions – San Carlos, San Diego and San Gabriel – were consistently between 350/1000 and 430/1000, and childhood mortality rates were between 380/1000 and 470/1000. Adult mortality rates were not as high but well over 100/1000 for men and over 200/1000 for women.

And fertility, because of venereal disease, was low and most Indian women produced fewer than two children during their reproductive lives (Hackel, 2005, pp. 65–123). Surely, illness and disease go a long way towards explaining these extremely high rates of mortality and the rapid decline of the Indian population of Alta California after 1769. But there are myriad other factors that contributed to Indian depopulation in Hispanic California, and many of these have largely escaped the study of historians.

In this essay I pick up where Father Payeras left off and discuss the share of Indian mortality in the California missions that was a result of factors other than epidemic disease. As I hope to illustrate, Indian population decline in California was brought on by illness and fertility and accelerated by external causes, such as acts of violence, natural disasters, dangers associated with animals and insects, as well as work- and transportation-related mishaps.[6] These external causes do not in themselves explain Indian population decline, but they add considerably to our understanding of life and death in early California, and they give us a richer understanding of how some Indians lived, worked, died, and even prayed in Spanish and Mexican California.



## 2. Mission burial records and death record entries: their production, biases, and utility as sources

To begin to understand the external causes of Indian mortality in Spanish California I studied thousands of death records at the California missions.[7] This analysis was facilitated by a major scholarly resource, the Early California Population Project (ECPP), a database for which I am the General Editor.[8] Missionaries in California were required to keep records for all Indians affiliated with the missions and for the region's Spanish and Mexican population, all of whom were at least nominally Catholic. Thus, whenever the missionaries in California baptized, married, or buried an individual, they recorded, to the best of their abilities, that individual's birthplace, age, parents, marital status, children, siblings, godparents, Spanish name, and any other information they deemed unique or relevant. They also assigned individual baptism, marriage, and burial records a unique number. Because the separate baptism, marriage, and burial registers for all of California's twenty-one missions are largely complete, consistently thorough, and in many ways cross-referenced, records from different missions and registers can be linked and sorted by individual.

All basic data entry for the ECPP was completed in June 2006, and the project went online soon thereafter.[9] The project has records on about 101,000 baptisms, 28,000 marriages, and 72,000 burials performed in California between 1769 and 1850. As Table 1 shows, the database encompasses records from all twenty-one of the California missions, in addition to the Los Angeles Plaza Church (1826–1848) and the Santa Barbara Presidio (1782–1848). One of the most valuable aspects of the database is the fact that records are linked: death records have been linked to the deceased's baptismal record; baptism records that list information on a Spanish-named mother have been linked to the mother's baptismal record; baptism records that list information on a Spanish-named father have been linked to the father's baptismal record; and for marriage records, we have cross-linked the bride to her baptism record and the groom to his baptism record.

The death cause records examined here come from 19 of the 21 California missions as well as the Pueblo of Los Angeles and the Presidio of Santa Barbara (Table 1). Missions San Carlos, San Francisco Dolores, and San José are numerically overrepresented in this data because Franciscans at these missions recorded the cause of death for Indians who died in particularly deadly epidemics that took the lives of hundreds of Indians in a short period of time. Some missions are underrepresented if their resident Franciscans only rarely

Table 1. Distribution of death cause records by site.

| | |
|---|---|
| Santa Barbara Presidio | 0.7% |
| Pueblo of Los Angeles | 0.1% |
| La Purísima | 3.8% |
| San Antonio | 2.4% |
| Santa Barbara | 3.1% |
| San Buenaventura | 5.1% |
| San Carlos | 11.7% |
| Santa Clara | 6.0% |
| Santa Cruz | 6.5% |
| San Diego | 4.6% |
| San Francisco Dolores | 16.4% |
| San Fernando | 2.6% |
| San Francisco Solano | 9.1% |
| San Gabriel | 3.0% |
| Santa Inés | 1.3% |
| San Juan Bautista | 5.5% |
| Soledad | 0.0% |
| San José | 6.9% |
| San Luis Obispo | 3.8% |
| San Luis Rey | 0.0% |
| San Miguel | 1.7% |
| San Rafael | 5.0% |
| San Juan Capistrano | 0.6% |
| Total | 100.00% |



recorded cause of death information. Lamentably, the burial records for Missions San Luis Rey and Soledad are lost, and there is a sixteen-year gap in the burial records for San Diego after 1831. Collectively, the records are the product of more than ninety missionaries at twenty-one sites. Of all the California missionaries, Father Ramón Abella recorded the most burials with a death cause. Of his 364 records examined here, 233 resulted from his record keeping at Mission San Francisco Dolores during the 1806 measles epidemic that swept Alta California. In July of that year Father Mariano Payeras observed that the epidemic had 'cleaned out the missions and filled the cemeteries.' From Mission La Purísima, where Payeras was posted, he wrote to a fellow Franciscan in Mexico that the measles had 'carried off 150 of our Indians' (Payeras, 1995a).

Mariano Payeras oversaw the burial of most of the Indians who died at La Purísima in the 1806 epidemic, and he recorded their burials in the mission's burial register, but he never once listed a cause of death for any of these Indians. In that regard he was typical, as missionaries in California more often than not did not record death cause information for those that they buried. Between 1769 and 1850, there were 72,213 deaths recorded in the mission burial registers. In 3911 of these burials, or just under 5.5%, the missionaries recorded a cause of death even if all they could do was state that the cause was uncertain. Indians accounted for 66,969 of these deaths, and in just under 5% (3312) of these 66,969 burial records, the missionaries recorded something about what they believed was the cause of death.[10]

During the first decades of colonization, they recorded very few causes of death for Indians even though Indian mortality was already quite dramatic. As Table 2 shows, in the 1780s and 1790s Franciscans recorded cause of death in less than 2% of burials. In later decades, they recorded death causes for an increasing percentage of burials, such that in the 1830s they recorded cause of death for 9% of burials and during the 1840s the percentage increased to 13%.

Table 2. Death cause records by decade.

| Decade | % of all burials | Death cause records |
|---|---|---|
| 1770s | 3.9% | 20 |
| 1780s | 1.7% | 53 |
| 1790s | 1.4% | 113 |
| 1800s | 4.3% | 608 |
| 1810s | 3.3% | 451 |
| 1820s | 5.0% | 671 |
| 1830s | 8.9% | 798 |
| 1840s | 12.7% | 554 |
| 1850s | 16.9% | 64 |



Even though all burial records for Indians in the California missions do not contain death cause data, the Franciscans' recording of death cause information was systematic and thus a solid foundation for an analysis of many of the external causes of mortality in the missions. In Alta California, missionaries and priests recorded death cause information primarily when they believed that the cause of death was itself very unusual (capital punishment carried out by the state, for example), particularly noteworthy (measles, plague, or smallpox), or, as was sometimes the case in accidental and violent deaths or illnesses that killed suddenly, when the manner in which an adult Indian died prevented the missionaries from administering last rites. Given that the death cause information recorded by the Franciscans leans toward the unusual, I make no argument that this death cause data is somehow representative of all Indians who died in the missions. Rather, I argue that this death cause data – because it points to previously unstudied external causes of mortality – opens up for study previously unseen aspects of Indian mortality in the California missions.[11]

In a similar study of death cause information created by Catholic missionaries in colonial America, Yves Landry and Rénald Lessard postulated that the missionaries of seventeenth- and eighteenth-century Québec recorded cause of death information when they were unable to administer last rites to those that they buried.[12] However, had this been the case in California, there would have been far more burial records for adult Indians that included a cause of death. In Alta California, 30% of adult Indians died without having received Penance or Extreme Unction, but only 16% of these burial records contain a cause of death. The figures are more dramatic for Final Communion: 92% of adult Indians died without having received Final Communion, but only 7% of these burial records contain a cause of death.

The weak link between a lack of administration of last rites and the presence of a death cause record in Alta California derives from the fact that at the onset of Spanish colonization in California most missionaries believed that most California Indians were too primitive to understand or merit last rites under any circumstances (Hackel, 2005, pp. 170–181). Thus, California missionaries often felt no need to justify in the burial records why they had not

Table 3. Adult burials with penance by decade.

| Decade | Adult burials | With penance | % with penance |
|---|---|---|---|
| 1780s | 1112 | 648 | 58% |
| 1790s | 3397 | 1533 | 45% |
| 1800s | 8262 | 5933 | 72% |
| 1810s | 8204 | 6989 | 85% |
| 1820s | 7943 | 6602 | 83% |
| 1830s | 5931 | 4424 | 75% |

Table 4. Adult burials without penance and with cause of death.

| Decade | Adult burials w/o penance | With death cause | % with death cause |
|---|---|---|---|
| 1790s | 1844 | 72 | 4% |
| 1800s | 2329 | 221 | 9% |
| 1810s | 1215 | 242 | 20% |
| 1820s | 1341 | 356 | 27% |
| 1830s | 1507 | 369 | 24% |

Table 5. Percentage of adult burials with cause of death by decade.

| Decade | Adult burials | With death cause | % with death cause |
|---|---|---|---|
| 1790s | 3397 | 80 | 2% |
| 1800s | 8262 | 446 | 5% |
| 1810s | 8204 | 341 | 4% |
| 1820s | 7943 | 510 | 6% |
| 1830s | 5931 | 604 | 10% |



given an Indian last rites.[13] Missionaries in Alta California, though, seem to have moderated their position as Indians become more acculturated, more fluent in the Spanish language, and more aware of the fundamental beliefs and practices of Catholicism. Thus, in the decades after the 1790s missionaries increasingly gave last rites to adult California Indians (see Table 3). And as the Franciscans administered last rites to more and more adult Indians in Alta California, they began to note in more burial records why they were unable to administer those sacraments (see Table 4). And this is largely what explains the overall increase in burial records of adult Indians with a death cause (see Table 5). Increasingly, the Franciscans in California were motivated to record the cause of death as a way to explain why they had not administered last rites. During the Mexican period (1821–1848), the increasing percentage of burials recorded with a death cause also probably reflected heightened risks associated with mission life and work as Indians took on more tasks involving large animals and heavy construction.

Missionary practices created at least three biases in the death cause record data. First, there is a bias towards adults (those above the age of 10) in cause of death, as children with but few exceptions received none of the last rites. In adult burial records, there is death cause information for about 7% of all burial entries; for children's records the figure falls to 1.4%. It is noteworthy and ironic, therefore, that newborns and children – those who suffered the greatest mortality in Alta California – are only rarely represented in death cause records. Of the nearly 25,000 Indian children who died in the missions before age ten, the padres recorded a cause of death for only 338. The majority of these 338 Indian children died in epidemics of measles or smallpox or from some sort of violent cough or severe fever. Sadly, it would seem that to the Franciscans, at least according to their own records, the deaths of the remaining 24,496 Indian children were in a sense 'normal' and not worthy of comment in the burial records. As I have argued extensively elsewhere, the infant and childhood mortality of Indians in the missions, while very high and probably the result of water-borne diseases, at its worst was not unlike that suffered by many of the communities in Spain and Mexico where the Franciscans lived and worked before they came to Alta California (Hackel, 2005, pp. 104–108; Reher, 1990, p. 111, Table 3.20; Reher, Pérez-Moreda, & Bernabeu-Mestre, 1997, p. 39, Table 2.1). Thus, even though this high mortality

troubled the Franciscans, in their eyes it warranted no commentary in the burial records, especially since California Indian children did not receive last rites.

Second, the death cause records also reveal a bias towards odd, violent, abrupt, and unanticipated deaths. For example, Father Buenaventura Fortuny noted in September of 1821 that Ysaac Yacalacce, an Indian at Mission San José, had died 'from an extraordinary disease that filled his head with worms that came out so regularly that he drowned' (Mission San José, November 5, 1808, September 29, 1821). Finally, the records are biased in favor of men: 59% of the burial records with a death cause document the burials of men. This bias is related to the fact that men were more likely than women to die suddenly or violently or from workplace accidents, as I will discuss below.

Information on Indian mortality in the California missions that can be gleaned from these death records is not a sufficient means to quantify the number of Indians who died from various factors. Clearly, these records do not reflect an accurate count of the Indians who died from the causes of death noted by the padres. If Ysaac Yacalacce had died *after* receiving last rites, the missionaries might not have recorded his unusual cause of death. Despite their inherent biases and limitations, death cause data recorded by the missionaries illustrates that the California missions, the California countryside, and Spanish colonial society in general presented Indians with an enormous range of dangerous challenges, all too many of which proved fatal.



## 3. ICD classifications: sudden death, disease, and illness

To categorize the 3312 Indian burial records that have death cause information, I used the World Health Organization's *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, Version 10-2010 (ICD)*.[14] (See Appendix 1 for the full tabulations of this study. See Appendix 2 for a numerical ranking of the death causes and examples of the missionaries' language from the original records used to make these classifications.) A classification of the causes of death according to the ICD general categories suggests that general illness brought on by non-infectious disease was the major cause of death among adults in the California missions (see Table 6). But this classification

Table 6. Death cause ranked by ICD general category.

| | | | | |
|---|---|---|---|---|
| 18 | R00–R99 | Symptoms, signs, and ill-defined conditions | 1385 | 41.82% |
| 20 | V01–Y98 | External causes of mortality and morbidity | 862 | 26.08% |
| 1 | A00–B99 | Certain infectious and parasitic diseases | 810 | 24.46% |
| 19 | S00–T98 | Injury, poisoning, and other consequences of external causes | 62 | 1.87% |
| 11 | K00–K93 | Diseases of the digestive system | 55 | 1.66% |
| 10 | J00–J99 | Diseases of the respiratory system | 28 | 0.85% |
| 5 | F00–F99 | Mental and behavioral disorders | 15 | 0.45% |
| 9 | I00–I99 | Diseases of the circulatory system | 12 | 0.36% |
| 14 | N00–N99 | Diseases of the genitourinary system | 10 | 0.30% |
| 6 | G00–G99 | Diseases of the nervous system | 5 | 0.15% |
| 16 | P00–P96 | Complications originating in the perinatal period | 1 | 0.03% |
| 2 | C00–D48 | Neoplasms | 2 | 0.06% |
| 4 | E00–E90 | Endocrine, nutritional and metabolic diseases | 1 | 0.03% |
| | | | 3312 | 100.00% |

also shows that external causes of mortality are the next most common; they occur in 26% of those records with a death cause compared to 24% of those records stating an infectious disease as the cause of death, the third-most likely classification.

Moving beyond the general ICD categories to a more specific discussion, in 3312 Indian burial records that have a cause of death, the missionaries indicated that some 681 Indians had died for unknown reasons. Most of these Indians, some 538, died suddenly, and the Franciscans would typically just state in the burial records that the man or woman had died 'suddenly,' 'quickly,' or 'immediately.' One minute these people were at work, the next they were dead. One minute they were walking across the mission quadrangle, the next they were dead. Typical of this set of records is the burial record of fifty-two year-old Casto Saquenela of Mission San Francisco. On June 9, 1823, Casto was 'working in the fields' and 'suddenly he fell dead' (San Francisco Dolores, April 9, 1795, June 9, 1823). Similarly, Leta Pisisaye was recorded as 'grinding seeds' when she suddenly died on June 1, 1825 (Mission San José, August 19, 1824, June 1, 1825). Ysaura Ouocmayen of Mission San José, age fifteen, died suddenly in January 1824 when she was returning from having taken some *atole* from the mission kitchen (Mission San José, December 21, 1823, January 21, 1824). Mauricio Toquilme died at Mission Santa Cruz in March 1822 at age forty-four 'suddenly without showing any signs of illness' (Mission Santa Cruz, August 16, 1800, March 21, 1822). The percentage of Indians who died suddenly is twice that of non-Indians. This could be related to work and residential patterns that placed Indians at greater distance from the padres than the soldiers, as might have been the case with Casto.

Sudden death might also mask a certain Indian ambivalence with Catholicism or life in the missions, for it is easy to imagine that an Indian who was not keen about a missionary or Catholicism might have not alerted the missionaries of his or her physical condition if he or she did not want to be anointed with Holy Oils, make a final confession, or receive Final Communion. One might also see a similar resistance to Catholicism in the deaths of 28 Indians who the padres noted died away from the mission and whose corpses were then cremated by the gentiles or devoured by 'wild animals'. For example, in the death record of Pasqual Palui from Mission Santa Clara, the Franciscan noted that the missionaries had heard that Pasqual had been 'eaten by animals, when he had fled the mission' (Mission Santa Clara, August 29, 1798, January 1802). Indians who died away from the mission could have been fugitives like Pasqual Palui or people who simply wanted to die outside the mission, perhaps in their native village. For example, an Ensen man, Antelmo José Lalcasolom of Mission San Carlos, died in January 1796, and his body was 'burned in the hills as was the [Indians'] custom,' according to the Franciscan who recorded his death after hearing about it from others (Mission San Carlos, April 14, 1777, January 7, 1806). The Franciscans recorded another 115 Indians as having died for reasons that were not known to the padres and in an unknown place. If we take the 538 Indians who died suddenly at the mission, and those 28 who died for unknown reasons away from the missions, and the 115 who died for reasons unknown to the padres at a place they did not specify, we are left with 2,631 Indians whose cause of death can be categorized based upon information the missionaries left in the records.

Only 83 Indians in all, or 3% of all Indians in this study, died from old age or what the padres termed 'natural causes.' Mission burial records clearly affirm that disease was the greatest killer of Indians in Spanish and Mexican California. All told, 62%, or 1634 of the 2631 Indians whose cause of death is known, died from some form of illness. In 30% or 492 of the 1634 cases where illness was stated as the cause of death, the exact illness was not specified. However, 810 or 50% of those who died from an illness succumbed to an infectious disease. For Indians, the most lethal infectious diseases were measles (41%), smallpox (34%), plague (13%), and syphilis (5%). A roughly equal number of men and

women are recorded as having died from these infectious diseases. However, most of the Indians whose death record lists smallpox as the cause of death were men. Measles and plague appear more commonly as a cause of death among women than men. Why the Franciscans' records of these infectious diseases would be skewed towards women is not exactly clear but it might have been related to some aspect of housing, health care, or disease transmission in the California missions. (For tabulations of the leading causes of death recorded in burial records of Indian men and women in the California missions, see Appendix 3 and Appendix 4.)

For non-Indians, the most lethal infectious diseases were smallpox (61%), cholera (14%), and then measles (7%). Whereas smallpox and measles are listed as having killed hundreds and hundreds of Indians, according to the records only 43 non-Indians died from smallpox and only five from measles. It is likely that some soldiers and settlers and their children had been exposed to measles or even smallpox in Mexico before they came to California, and thus they might have acquired some immunity to these diseases and therefore been less vulnerable to them than previously unexposed Indians. But no soldiers or settlers would have been immune to cholera, as immunity conferred by previous exposure seems to be temporary. Surely, therefore, more non-Indians in California died from smallpox, measles, and cholera than death cause data suggests. But if non-Indians with these diseases died with last rites the Franciscans would have had little incentive to record a cause of death and these individuals would not appear in the dataset. In another surprise that is probably an artifact of the data, water-borne infectious diseases like cholera and dysentery seem to have hardly affected Indians – only 11 died from cholera and eight from dysentery, if the records are to be believed. Given the poor sanitary conditions of the missions, and their close living quarters, one would expect higher numbers of Indian deaths attributed to cholera and dysentery but again there is almost certainly a bias away from these records. Indians who contracted water-borne diseases at the missions would have died there under the care of the padres and possibly received last rites.

Missionaries recorded a vast array of unspecified illnesses that they considered to be fatal to Indians. Of all Indians stated as having died of an illness, 1% died of respiratory ailments, 2% of intestinal infections, and 5% from what the padres believed was syphilis. Another 172 Indians, or 11% of the total who died with illness as a cause, died from ailments whose symptoms were variously described as fever, bloody vomit, coughs, ulcers, skin infections, generalized pain, and more specifically, head pain, or chest pain.

Another 46 Indian women died in childbirth or soon after delivery. At least ten pregnant Indian women who died before going into labor had their unborn fetuses removed by caesarian section. In Spanish California a caesarian operation was only performed after the death of the pregnant mother. Franciscans performed this operation to allow baptism of the unborn child before it died rather than to save the mother during a difficult and complicated delivery. The expectation was that the infant would die soon after it was removed from the deceased mother, and this was nearly always the case (Cook, 1937). One woman, Quiteria of Mission Santa Inés, had twins removed from her body after her death; one of the infants lived 12 days before dying (Mission Santa Inés, January 7, 1808, January 18, 1808). More typical was the infant Ramón Nonato, who lived only 90 minutes after he was extracted from his mother, Facunda (Mission San Antonio, February 19, 1802). Five women died from what the padres described as 'an inflamed uterus.' Only seven Indian infants are listed as having been born '*abortada*' or having been miscarriages, intended or otherwise. This is curious given some of the padres' laments that Indians used all sorts of abortifacients, the risks inherent to mother and child during pregnancy and childbirth, and what are generally

Table 7. Deaths by acts of violence, excluding acts of war.

| | Total | Men | % Men | Women | % Women |
|---|---|---|---|---|---|
| Assault by unspecified means (homicide, murder) | 125 | 95 | 76.00% | 30 | 24.00% |
| Legal execution | 26 | 23 | 88.46% | 3 | 11.54% |
| Assault by bodily force (*golpe*) | 11 | 11 | 100.00% | 0 | 0.00% |
| Assault by sharp object (knife) | 10 | 10 | 100.00% | 0 | 0.00% |
| Hanging, strangulation and suffocation, undetermined intent | 9 | 9 | 100.00% | 0 | 0.00% |
| Gunfire | 5 | 3 | 60.00% | 2 | 40.00% |
| Assault by sharp object (*degollada, achazo*) | 5 | 4 | 80.00% | 1 | 20.00% |
| Homicidal poisoning | 4 | 2 | 50.00% | 2 | 50.00% |
| Assault by sharp object (arrow) | 3 | 3 | 100.00% | 0 | 0.00% |
| Assault by spouse | 3 | 0 | 0.00% | 3 | 100.00% |
| Other and unspecified firearm discharge, undetermined intent | 3 | 3 | 100.00% | 0 | 0.00% |
| Witchcraft | 3 | 3 | 100.00% | 0 | 0.00% |
| Neglect and abandonment by parent | 1 | 0 | 0.00% | 1 | 100.00% |
| | 208 | 166 | 79.81% | 42 | 20.19% |

believed to be high rates of syphilis at the missions. But again, since the padres did not give last rites to infants, there is a bias against these sorts of records in the data.

## 4. External causes of mortality

Disease was not the only killer in colonial California, as Indians at the missions died from a host of external causes (see Table 7). As a leading cause of death, after illness in its many varieties, came violence in its many varieties. The missionaries recorded that some 375 Indians died of various forms of violence. At the missions where living conditions were often awful and discipline severe, conflicts between individuals could grow violent. Some 173 baptized Indians died from some form of what the padres called 'assault,' or assassination. Some assaults were knife wounds, some were brutal beatings, some were strangling, and some were believed to have been witchcraft. Five died from gunfire, and four more from poisoning. Nearly all the victims of these assaults were men. Capital punishment in Spanish California was relatively rare. Nonetheless, the Spanish state took the lives of at least 26 Indians accused of crimes ranging from robbery to rebellion.

Spaniards in California insisted that by colonizing the region they were bringing peace to warring Indians (Fages, 1937), but organized military clashes between Indians and Spaniards took their toll on Indians (see Table 8). At least 21 Indians died at the hands of Spanish soldiers during battle. Another 146 baptized Indians died in battles with villages of unbaptized Indians. This high figure suggests the degree to which Spanish colonization

Table 8. Deaths by operations of war.

| | Total | Men | % Men | Women | % Women |
|---|---|---|---|---|---|
| Indians killed by gentiles | 146 | 126 | 86.30% | 10 | 6.85% |
| Indians killed by soldiers | 21 | 20 | 95.24% | 1 | 4.76% |
| Indians killed by Americanos | 1 | 1 | 100.00% | 0 | 0.00% |
| | 168 | 147 | 87.50% | 11 | 6.55% |

Table 9. Deaths caused by agricultural work animals.

| | Total | Men | % Men | Women | % Women |
|---|---|---|---|---|---|
| Fall from horse | 32 | 30 | 93.75% | 2 | 6.25% |
| Horses (trampled by) | 16 | 14 | 87.50% | 2 | 12.50% |
| Bulls (trampled/gored by) | 16 | 12 | 75.00% | 4 | 25.00% |
| Oxen (trampled by) | 1 | 1 | 100.00% | 0 | 0.00% |
| | 65 | 57 | 87.69% | 8 | 12.31% |

divided Indians and at times accentuated village rivalries and animosities. The bodies of many more who were killed in these confrontations were probably never recovered, and if the Indians had not been baptized their deaths would not have been recorded in a mission burial register. Again, nearly all of the fatalities in these acts of war were men.

Scholars have documented in great detail the work regimes at the missions and the role that labor played in the Franciscans' attempts to, in their words, 'denaturalize' Indians (Hackel, 2005, pp. 130–132, 280–287). And while much of this scholarship has pointed to Indian resistance to Franciscan notions of time and labor, none has alluded to the danger that the actual work of the missions posed to Indians, who at least in the first years of the missions had little or no experience with large farm animals (see Table 9). Horses quickly became indispensable to the missions' agricultural and pastoral economies, and Indian vaqueros became quite skilled at rounding up cattle and livestock that often ranged far and wide from the missions. But this was dangerous work even for Indians skilled in working with horses, and at least 32 Indians died after falling from a horse. Sixteen were killed when they became tangled in the reins and were trampled or dragged to death. Sixteen more were killed by bulls, and another was killed by an ox, the animal that Indians used to plow mission fields. These casualties were just one more effect of the padres' crusade to get Indians to work in plowed fields, an endeavor the Franciscans believed was crucial if they were ever to get Indians to abandon hunting and gathering for a sedentary existence at the missions. Other work at and around the mission could be dangerous: eighteen-year old Cayetano José Cheqemeyta died at the nearby Santa Barbara Presidio, when he tumbled into the well that he had been sent to clean (Mission Santa Barbara, July 21, 1787, August 23, 1788). Others died when they fell from mission roofs they had been sent to repair. Some were crushed by trees when they were sent to cut wood for the missions' construction.

The food Indians grew and harvested at the missions had to be prepared and cooked, and these activities posed additional dangers. Two Indians were burned to death when they fell into one of the large cooking vats at the missions. Pedro, a four-year old orphan boy, only recently baptized, died at Mission San Francisco when he 'fell into a cauldron of hot *atole*' (Mission San Francisco, August 27, 1777, October 20, 1777). And Abundancio, a nine-year old orphan boy, also at Mission San Francisco, died when he fell into the *posole* cauldron and 'was burned up to his neck' (Mission San Francisco, October 24, 1790, November 3, 1798). It is no coincidence that both of these victims were orphan boys. The Franciscans often gave special attention to orphan boys in the hopes that in the absence of any other parental authority the Franciscans could win their loyalty and mold them into leaders of the missions. Pedro and Abundancio must have been put to work by the Franciscans in the mission kitchen, and obviously they were unprepared for the dangers of this type of work.

If the missions' agricultural and pastoral economy and regular maintenance posed numerous dangers for Indians, so too did the countryside. Death cause records illustrate that the missions remained relatively porous despite the Franciscans' and soldiers' attempts to keep baptized Indians within the missions the majority of the time. Despite the padres'

wishes, Indians continued to gather much of their food from the countryside and coastal waters long into the Spanish period. Thus, it is no surprise that at least eight Indians died from the toxic effects of shellfish, three from wild mushrooms, and another nine from acorn gruel that the padres believed had been improperly prepared. Another four died after having consumed what the padres believed was improperly cooked meat. Another nine perished after having ventured from the missions in the winter, become lost, and frozen to death. When Indians left the missions to visit family and friends in remote villages, or when they ventured into the countryside to gather seeds or to hunt for themselves, they were vulnerable to bear attack. Roaming throughout Alta California during the colonial period, bears feasted on mission cattle, horses, and an occasional Indian. At least 69 Indians – nearly all of whom were men – were killed by bears in lands not far from the missions. Other animal dangers lurked in and around the missions. Insect bites could prove fatal, and at least one Indian died from a spider bite. Mountain lions killed four Indians, and curiously one Indian, Tomás Usar of Mission San Fernando, died after having been attacked by a *zorrillo*, or a skunk (Mission San Fernando, March 30, 1803, May 2, 1816). Most likely Tomás died from rabies, as did at least three other California Indians. Another 22 died from snake bites.

As we know, California is a land where accidents happen and where natural disasters occur. Dry arroyos could be transformed quickly into raging torrents during fall and winter rains, and coastal waters could turn dangerous. At least 109 Indians accidentally drowned in rivers or in coastal waters, and nearly all of these fatalities were men. Ramón Guatapiyilol of Mission Santa Barbara was simply found '*ahogado*' in the summer of 1838 (Mission Santa Barbara, September 7, 1801, July 28, 1838). Felipe Benicio of Mission San Juan Bautista was found 'drowned while fishing' in 1833 (Mission San Juan Bautista, November 10, 1817, October 17, 1833). And Cleto Chichcanquitpix, Fulgencio Putalgeyum, Juan de Parma, Pio Lupite, and Simpliciano Unitia, all adult men from Mission San Francisco, drowned when they were 'conducting a little cargo boat with provisions for the Padre at [Mission] San Rafael' (Mission San Francisco, [ca. August 26–September 12, 1819]). These Indians' deaths by drowning reveal – just like the 69 deaths from bear attacks – that life in Alta California was dangerous, not just for Indians in the missions but for those who ventured beyond and between them in search of food or on errands for the Franciscans.

In the colonial period earthquakes rattled and damaged all the missions, sometimes with devastating effects. On December 8, 1812, a severe quake leveled the recently completed stone church at Mission San Juan Capistrano killing some 41 Indians who had gathered inside for prayers (Mission San Juan Capistrano, December 9 and 11, 1812, February 26, 1813. Thirty-three of these 41 fatalities were women, and four of the males were children (ages 0, 7, 9, and 13). Women and children worshipped apart from men in the missions of Spanish California, and when the church at San Juan Capistrano collapsed, these women and children were trapped in the church and unable to escape. While 41 individuals may seem like a small number of deaths given the devastating nature of the quake, the 1812 earthquake seems to have been the deadliest recorded natural disaster in Alta California during the mission period.

California Indians were skilled managers of fire, and none seem to have died in wildfires (Lightfoot & Parrish, 2009). But some 35 Indians died when their homes adjacent to the missions caught fire. Most of these fatalities were women, a fact that is probably related to women shouldering much of the cooking in the missions. Most interestingly, four Indian men died after having become overcome by smoke and flames in a *temescal*, a native sweat lodge, a vestige of pre-contact Indian culture that survived at most missions. Two of these men died at Mission Santa Inés, one at San Buenaventura, and another at San Carlos. Lucas, an adult man, died at San Carlos after he apparently fell and was burnt to death in the sweat lodge. This calamity did not seem to surprise the Franciscans. Father

Ramón Abella noted in Lucas's burial record that the man spent a lot of time in the *temescal*. Abella also believed that Lucas suffered from seizures and hence was prone to accidents (Mission San Carlos, October 30, 1828).

## 5. Conclusion

Collectively, all of these Indian fatalities and their myriad external causes, which ranged from '*ahogado*' in the ocean or a river to bitten by a rabid '*zorillo*,' reveal just how many ways there were for Indians to die in Alta California and by extension much of the rest of colonial America during the period of European expansion. The details of the transformation of places like the Franciscan Missions of California from growing centers of Indian congregation to skeleton communities, as lamented by the Franciscan Mariano Payeras, are especially important because of the sheer magnitude of the decline of Indians in America during the era of European expansion and the enormous number of Indians who were in one way or another incorporated into Catholic missions. But as I have argued here, and as Father Payeras suggested, we should not assume that all of this mortality was caused by disease or more specifically by virgin soil epidemics. Clearly, external causes of mortality added significantly to the already high mortality of Indians in the California missions. But it is noteworthy that measles and smallpox, the two most deadly infectious diseases in the California missions, according to death cause information gleaned from mission burial records, did not devastate the missions until 1806 and 1833, respectively. By 1806, when the first terrible measles epidemic hit the missions and measles begins to appear as a cause of death in burial records, the population of the missions was in freefall; and by 1833, when smallpox appears, many of the missions had been reduced to the 'skeleton' communities so lamented by Payeras in 1820.

In North America north of present-day Mexico, there were at least 420 Catholic missions, and the total number of Indians affiliated with these missions may have reached 1,000,000 individuals.[15] Not all of these Indians lived in conditions like those in Alta California. But the external factors – the deaths by violence, workplace mishaps, or natural disasters that occurred throughout Alta California and claimed so many Indian lives – took place not because colonial California was unusually dangerous, or because California Indians were weak or clumsy, or because Spaniards were unusually cruel. Rather, life in a colonial, pre-modern, pre-industrial, pre-antibiotic society was dangerous for Indians and non-Indians alike. It is important to underscore that the death cause data discussed here is just the tip of an iceberg of mortality and suffering. For every Indian whose death was recorded as having been caused by an agricultural accident, an assault, an act of war, or a natural disaster, it is almost certain that there were many others in the missions who met a similar fate but whose deaths went unrecorded or whose burial record had no cause of death. Moreover, for every Indian killed by an external cause, countless others escaped similar mishaps with their lives but sustained grave or debilitating injuries. For every Indian who died in an agricultural accident, it seems likely that there were others who merely suffered broken bones. Similarly, for every Indian orphan burned to death in a mishap in a mission kitchen there were likely others who suffered terrible injuries as they sought to assist the Franciscan fathers in feeding those gathered at the mission. Thus, the external factors that contributed to Indian population decline in colonial California are suggestive of the fatal circumstances and the complex and dangerous labor regimes that were initiated in many places when and where Europeans attempted to colonize the native peoples of the Americas. While external factors of mortality do not in themselves explain Indian population decline, they need to be examined alongside disease and virgin soil epidemics if

we are to fully understand the calamities that befell Indians in California and elsewhere after the European invasion.

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**Notes**

1. Scholarship that invokes the concept of the virgin soil epidemic is immense and growing. For the seminal article, see Crosby (1976); for a recent restatement of the argument see, for example, the synthesis of Calloway (1997, pp. 33–41). Among the earliest and most enthusiastic proponents of the concept is Dobyns (1983).
2. Few if any scholars doubt the occurrence of virgin soil epidemics – there are no virgin soil epidemic deniers – but an increasing number of historians has sought to refine our understanding of the concept. Some scholars have suggested that 'indirect episodes' associated with virgin soil epidemics are in fact more important to population decline than the epidemics themselves. See, for example, Thornton (2002). James Rice (2009) and Paul Kelton (2007) have forced us to rethink the timing of virgin soil epidemics and their methods of introduction and transmission in the New World. Robert McCaa (1995) has helped us to understand both the intensity and chronology of the epidemics that hit colonial Mexico in the sixteenth century. Suzanne Austin Alchon (2003) has placed in a larger context the epidemics that affected Native Americans after Europeans arrived in the New World. She makes a convincing case that virgin soil epidemics were not unique to the New World but were particularly virulent because Indians often experienced multiple epidemics at the same time or within a few years. David S. Jones (2003, 2004) – an M.D. and Ph.D. – has criticized what he sees as scholars' casual and unthinking references to Indians as immunologically defenseless in the face of European diseases and virgin soil epidemics. He has urged us to remember that Indians were without adaptive immunity to only some diseases, such as smallpox and measles, and that Indians had 'deficient immunity' to these maladies only when compared to Europeans, who might have contracted them as children. But defenseless, Indians were not. According to Jones, virgin soil epidemics were exceptionally lethal in the New World because of 'disease synergy' – the outbreak of many diseases at once – and because epidemics were often intensified by other blows Indians absorbed during the colonial period, namely, malnutrition, poverty, dispossession, and mental stress. In his work, Jones has urged us to understand Indians' susceptibility to disease within the context of Indians' subjugation, rather than vice versa. Along similar lines, scholars have also begun to reassess the degree to which Indians were susceptible to tuberculosis; see McMillen (2008).
3. Emphasis here is mine.
4. Estimating the Indian population of California is difficult and speculative. While scholars debate the size of the pre-contact population, most agree that more than 300,000 Indians lived in what is now the state of California in 1769. Sherburne F. Cook's (1976a, 1976b) work is still considered by many to be the most reliable. Cook estimated the precontact population of California in 1769 at 304,000. The population began to decline after 1769, and by 1845 the Indian population had fallen by half, to about 150,000.
5. Population estimates are for 1820. There is an extensive literature on Indian population decline in California. Among the most important works are Hackel (2005, pp. 65–123), Cook (1976a, 1976b), Jackson (1994), and Cook and Borah (1979, pp. 177–192). Cook (1976a, pp. 1–251) and Jackson and Castillo (1995, pp. 41–72) concentrate on disease, nutrition, sanitation, overcrowding, overwork, and psychological dislocation as factors that contributed to Indian depopulation in California. In his recent work, James A. Sandos (2004, pp. 111–127) emphasizes syphilis and infertility as important factors of Indian population decline in California.
6. According to the World Health Organization's International Classification of Diseases (ICD), the External Causes of Morbidity and Mortality are typically used as supplementary

classifications that are to be paired with classifications found in earlier chapters of the ICD. But California missionaries did not provide enough information to allow this sort of classification. For example, they might state that a man died when he was struck by a falling tree branch, but they would not state where the branch had hit him or the type of injuries sustained.

7. I examined the burial records of the California missions held at several institutions. The Santa Barbara Mission Archive-Library has photocopies of all of the mission registers. The Henry E. Huntington Library has microfilm copies of the majority of the burial registers. And microfilm copies of most of the burial registers are available through the Church of Jesus Christ of Latter-Day Saints' Family History Centers. Furthermore, in my capacity as General Editor of the Huntington Library's Early California Population Project (ECPP) – an online database of all of these records – not only have I examined copies of all of the original records but I have worked extensively with the database that now encompasses them.
8. My research was not confined to the online database. See note 7 above. The ECPP is intended as a source for a range of researchers, many of whom will certainly ask questions that cannot now be anticipated. Thus, the database includes a wide range of fields designed to allow for the capturing of all of the information contained in the mission registers. The result is a wide and flexible range of fields designed to allow data entry to expand in relation to the amount of information contained in a given record. In its current form the ECPP database has more than eighty-two fields related to individual baptism records, ninety-two covering the marriages of individuals, and forty-seven concerning burial information. An electronic *Guide to Users* aids researchers in searching. Information has been transferred directly from the original registers as it appears in the original records. For more information on the ECPP, see Hackel (2006) and Hackel and Reid (2007).
9. The ECPP is available through the website of the Huntington Library, its host and sponsoring institution. See: http://www.huntington.org/Information/ECPPmain.htm
10. For a similar study of death causes in mission records, see Landry and Lessard (1996). Landry and Lessard examine causes of death in 4,587 certificates between 1625 and 1799 as drawn from the Programme de Recherche en Démographie Historique (PRDH). This represents 2.2% of the total 208,876 death records in the PRDH during that period. Despite the tremendous differences between Québec and Alta California, death cause records in the two regions are remarkably similar with a few notable exceptions.
11. These records have gone unexamined not because they are not of interest but because before the ECPP, there was simply no way to efficiently review them in aggregate or to classify them in any meaningful manner. To wade through all the death records for the California missions in search of death cause information would have required years of work. Furthermore, without the linking of records that is at the heart of the Early California Population Project, it would have been nearly impossible to interpret and contextualize information gleaned from the records.
12. See note 10.
13. Perhaps, in New France, Jesuit missionaries granted more Indians last rites and thus the link found by Landry and Lessard between a death cause record and the absence of last rites.
14. For this study I consulted the online version of the ICD-10, Version 2010. See http://apps.who.int/classifications/icd10/browse/2010/en. See Appendix 2 for a guide to how I mapped the death causes recorded by the missionaries onto the modern ICD taxonomy. Since various forms of 'unknown' are part of the ICD system of categorization, I have kept the 681 'unknown' records in this tabulation. There are methodological challenges inherent in a study that tries to use archaic and colloquial terms to classify causes of death according to a modern taxonomy. And there is, of course, the problem that in the past deaths were often attributed to what we now see as symptoms, not disease. For example, missionaries often wrote 'fever' or 'pain' as the cause of death. On this point, see Alter and Carmichael (1996). Despite the methodological challenges, there is a great deal we can learn about life and death in Alta California from these records, especially since they supplement what we can learn through other sources and other methodologies. The ICD has thousands of classifications for disease, representing twenty-one broad categories, not all of which were relevant to Alta California. In this study I divided the death cause records into more than 100 causes that the ICD placed into sixteen broad categories. When the figures for Indians and non-Indians are combined, the figures are close to those of Québec as shown in the work of Landry and Lessard (1996). Infectious disease, Alta California = 24.5%, Québec = 6.0%; Pregnancy, Alta California = 1.93%, Québec = 2.2%; Symptoms, Signs, and Ill-defined Conditions, Alta California = 41.9, Québec = 43.7; Injury and External Causes, Alta California = 28.9, Québec = 45.8. The differences between the figures for

infectious diseases in the two provinces have to do with the fact that in Québec only 202 deaths were attributed to smallpox and measles, whereas in Alta California those diseases were blamed for the deaths of 658 people. And the figure for injuries and external causes is much higher for Québec because in Québec some 1,302 individuals drowned in Québec's waterways; there was no comparably dangerous activity in Alta California.

15. While evidence suggests that nearly all missions in North America were lethal to Indian populations over time, missions in colonial Paraguay may have actually allowed Indian populations to recover and survive (Jackson, 2008; Livi-Bacci & Maeder, 2004).

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**Appendix 1: Tabulation of Alta California Indian mission death causes according to ICD-10 categories**

| | | | Total | % | Male | % Male |
|---|---|---|---|---|---|---|
| | | | **3312** | **100.0%** | 1958 | 59% |
| **1** | **Certain infectious and parasitic diseases** | | **810** | **24.5%** | 402 | 50% |
| | Intestinal infectious disease | | | | | |
| | A00 | Cholera | 11 | 1.4% | 10 | 91% |
| | A03 | Dysentery | 8 | 1.0% | 4 | 50% |
| | Tuberculosis | | | | | |
| | A16.9 | Respiratory TB, unspecified | 28 | 3.5% | 12 | 43% |
| | Certain zoonotic bacterial diseases | | | | | |
| | A20 | Plague | 105 | 13.0% | 49 | 47% |
| | Infections with a predominantly sexual mode of transmission | | | | | |
| | A53.9 | Syphilis, unspecified | 42 | 5.2% | 21 | 50% |
| | Viral infections of the central nervous system | | | | | |
| | A82 | Rabies | 4 | 0.5% | 3 | 75% |
| | Viral infections characterized by skin and mucous membrane lesions | | | | | |
| | B03 | Smallpox | 278 | 34.3% | 170 | 61% |
| | B05 | Measles | 329 | 40.6% | 131 | 40% |
| | Helminthases | | | | | |
| | B74 | Elephantiasis | 1 | 0.1% | 0 | 0% |
| | Pediculosis, acariasis and other infestations | | | | | |
| | B86 | Scabies | 4 | 0.5% | 2 | 50% |
| **2** | **Neoplasms** | | **2** | **0.1%** | 0 | 0% |
| | Neoplasms of uncertain or unknown behavior | | | | | |
| | D48.9 | Cancer | 2 | 100.0% | 0 | 0% |
| **4** | **Endocrine, nutritional and metabolic diseases** | | **1** | **0.0%** | 0 | 0% |
| | Other nutritional deficiencies | | | | | |
| | E54 | Scurvy | 1 | 100.0% | 0 | 0% |
| **5** | **Mental and behavioral disorders** | | **15** | **0.5%** | 7 | 47% |
| | Organic, including symptomatic, mental disorders | | | | | |
| | F03 | Unspecified dementia | 8 | 53.3% | 6 | 75% |
| | F05 | Delirium | 4 | 26.7% | 1 | 25% |
| | F43.2 | Adjustment disorders (death of parent, child, relative) | 3 | 20.0% | 0 | 0% |
| **6** | **Diseases of the nervous system** | | **5** | **0.2%** | 5 | 100% |
| | Episodic and paroxysmal disorders | | | | | |
| | G40 | Epilepsy | 1 | 20.0% | 1 | 100% |
| | Cerebral palsy and other paralytic syndromes | | | | | |
| | G83 | Other paralytic syndromes | 4 | 80.0% | 4 | 100% |
| **9** | **Diseases of the circulatory system** | | **12** | **0.4%** | 9 | 75% |
| | Ischaemic heart disease | | | | | |
| | I20 | Angina | 1 | 8.3% | 1 | 100% |
| | Cerebrovascular Diseases | | | | | |
| | I64 | Stroke | 11 | 91.7% | 8 | 73% |
| **10** | **Diseases of the respiratory system** | | **28** | **0.8%** | 17 | 61% |
| | Acute upper respiratory infections | | | | | |
| | J00 | Common cold | 13 | 46.4% | 8 | 62% |
| | Influenza and Pneumonia | | | | | |
| | J18 | Pneumonia, organic unspecified | 4 | 14.3% | 2 | 50% |
| | Chronic lower respiratory diseases | | | | | |
| | J45 | Asthma | 1 | 3.6% | 1 | 100% |

(*continued*)

Appendix 1 – *continued*

| | | | Total | % | Male | % Male |
|---|---|---|---|---|---|---|
| | Other specified respiratory diseases | | | | | |
| | J98.8 | Other respiratory disorders | 10 | 35.7% | 6 | 60% |
| **11** | **Diseases of the digestive system** | | **55** | **1.7%** | 32 | 58% |
| | Diseases of the esophagus, stomach, and duodenum | | | | | |
| | K30 | Indigestion | 9 | 16.4% | 7 | 78% |
| | K31 | Diseases of the stomach | 17 | 30.9% | 7 | 41% |
| | Other diseases of the intestines | | | | | |
| | K59 | Constipation | 1 | 1.8% | 1 | 100% |
| | Other diseases of the digestive system | | | | | |
| | K92 | Hemorrhage | 28 | 50.9% | 17 | 61% |
| **14** | **Diseases of the genitourinary system** | | **10** | **0.3%** | 3 | 30% |
| | Other diseases of the urinary system | | | | | |
| | N39 | Disorder of the urinary system | 5 | 50.0% | 3 | 60% |
| | Inflammatory diseases of female pelvic organs | | | | | |
| | N71.9 | Inflammatory disease of the uterus | 5 | 50.0% | 0 | 0% |
| **15** | **Pregnancy, childbirth, & puerperium** | | **53** | **1.6%** | 5 | 9% |
| | Pregnancy with abortive outcome | | | | | |
| | O03 | Miscarriage | 3 | 5.7% | 3 | 100% |
| | O06 | Unspecified abortion | 4 | 7.5% | 2 | 50% |
| | Complications of labor and delivery | | | | | |
| | O75 | Other complications of labor and delivery | 46 | 86.8% | 0 | 0% |
| **16** | **Certain conditions originating in the perinatal period** | | **6** | **0.2%** | 3 | 50% |
| | Fetus and newborn affected by maternal factors and by complications of pregnancy, labor, and delivery | | | | | |
| | P01.6 | Fetus and newborn affected by maternal death | 5 | 83.3% | 4 | 80% |
| | Hemorrhagic and hematological disorders of fetus and newborn | | | | | |
| | P50.1 | Fetal blood loss from ruptured cord | 1 | 16.7% | 1 | 100% |
| **18** | **Symptoms, signs, and abnormal laboratory findings, not elsewhere classified** | | **1395** | **42.1%** | 781 | 56% |
| | Symptoms and signs involving circulatory and respiratory systems | | | | | |
| | R02 | Gangrene | 2 | 0.1% | 2 | 100% |
| | R05 | Cough | 15 | 1.1% | 10 | 67% |
| | R07.0 | Pain in throat | 6 | 0.4% | 4 | 67% |
| | R07.4 | Pain in chest, unspecified | 16 | 1.1% | 10 | 63% |
| | R09.1 | Pleurisy | 6 | 0.4% | 3 | 50% |
| | Symptoms and signs involving cognition, perception | | | | | |
| | R40.2 | Coma, unspecified | 17 | 1.2% | 10 | 59% |
| | General signs and symptoms | | | | | |
| | R50 | Fever of unknown origin | 52 | 3.7% | 28 | 54% |
| | R50.8 | Fever with chills | 7 | 0.5% | 4 | 57% |
| | R51 | Headache | 4 | 0.3% | 2 | 50% |
| | R52 | Acute pain | 13 | 0.9% | 7 | 54% |
| | R53 | Malaise & fatigue | 1 | 0.1% | 0 | 0% |
| | R54 | Old age, senility | 83 | 5.9% | 54 | 65% |
| | R69 | Unknown or unspecified cause of morbidity | 492 | 35.3% | 240 | 49% |

(*continued*)

Appendix 1 – *continued*

| | | | Total | % | Male | % Male |
|---|---|---|---|---|---|---|
| | Ill-defined and unknown causes of mortality | | | | | |
| | R96 | Sudden death, cause unknown | 538 | 38.6% | 310 | 58% |
| | R98 | Unattended death | 28 | 2.0% | 21 | 75% |
| | R99 | Other ill-defined and unspecified cause | 115 | 8.2% | 76 | 66% |
| **19** | **Injury, poisoning, and certain other consequences of external causes** | | **62** | **1.9%** | 41 | 66% |
| | S01 | Open wound to the head | 2 | 3.2% | 1 | 50% |
| | S12 | Fracture of neck | 2 | 3.2% | 1 | 50% |
| | S18 | Decapitation | 2 | 3.2% | 2 | 100% |
| | Injuries to unspecified part of trunk, limb or body region | | | | | |
| | T14.1 | Open wound, unspecified | 23 | 37.1% | 15 | 65% |
| | T14.9 | Injury, unspecified | 6 | 9.7% | 6 | 100% |
| | Toxic effects of substances chiefly nonmedicinal as to source | | | | | |
| | T51 | Toxic effect of alcohol | 3 | 4.8% | 3 | 100% |
| | T61.2 | Other fish and shellfish poisoning | 8 | 12.9% | 5 | 63% |
| | T62 | Ingested mushrooms | 3 | 4.8% | 2 | 67% |
| | T62.8 | Other specified noxious substances eaten as food (meat) | 4 | 6.5% | 2 | 50% |
| | | Other specified noxious substances eaten as food (*atole*) | 9 | 14.5% | 4 | 44% |
| **20** | **External causes of morbidity and mortality** | | **857** | **25.9%** | 648 | 76% |
| | Accidents | | | | | |
| | Transport accidents | | | | | |
| | V06 | Pedestrian injured – hit by a cart | 4 | 0.5% | 4 | 100% |
| | V80 | Other land transport accidents – fall from a horse | 32 | 3.7% | 30 | 94% |
| | Other external causes of accidental injury | | | | | |
| | Falls | | | | | |
| | W14 | Fall from tree | 6 | 0.7% | 5 | 83% |
| | W19 | Unspecified fall | 11 | 1.3% | 9 | 82% |
| | Exposure to inanimate mechanical forces | | | | | |
| | W20 | Struck by thrown, projected or falling object | 9 | 1.1% | 9 | 100% |
| | W32 | Handgun discharge | 3 | 0.4% | 1 | 33% |
| | Exposure to animate mechanical forces | | | | | |
| | W55 | Bitten or struck by other mammals | | | | |
| | | Bear | 69 | 8.1% | 57 | 83% |
| | | Leopard | 4 | 0.5% | 3 | 75% |
| | | Bull | 16 | 1.9% | 12 | 75% |
| | | Oxen | 1 | 0.1% | 1 | 100% |
| | | Horse | 16 | 1.9% | 14 | 88% |
| | W57 | Bitten or stung by nonvenomous insect | 1 | 0.1% | 0 | 0% |
| | W69 | Drowning and submersion while in natural water | 44 | 5.1% | 37 | 84% |
| | W74 | Unspecified drowning | 65 | 7.6% | 56 | 86% |

(*continued*)

Appendix 1 – *continued*

| | | Total | % | Male | % Male |
|---|---|---|---|---|---|
| Other accidental threats to breathing | | | | | |
| W75 | Accidental suffocation and strangulation in bed | 3 | 0.4% | 3 | 100% |
| W84 | Unspecified threat to breathing | 10 | 1.2% | 6 | 60% |
| Exposure to smoke, fire, and flames | | | | | |
| X00 | Exposure to uncontrolled fire in building (*casa*) | 11 | 1.3% | 3 | 27% |
| X00 | Exposure to uncontrolled fire in building (*temescal*) | 4 | 0.5% | 4 | 100% |
| X09 | Unspecified smoke, fire, and flames | 24 | 2.8% | 8 | 33% |
| Contact with heat and hot substances | | | | | |
| X12 | Contact with other hot fluids | 2 | 0.2% | 2 | 100% |
| Contact with venomous animals and plants | | | | | |
| X20 | Contact with venomous snakes and lizards | 22 | 2.6% | 11 | 50% |
| X21 | Contact with venomous spiders | 1 | 0.1% | 1 | 100% |
| Exposure to forces of nature | | | | | |
| X31 | Exposure to excessive natural cold | 9 | 1.1% | 5 | 56% |
| X34 | Victim of earthquake (Mission San Juan Capistrano 1812) | 41 | 4.8% | 8 | 20% |
| Accidental poisoning by and exposure to noxious substances | | | | | |
| X41 | Tobacco | 1 | 0.1% | 1 | 100% |
| X42 | Hallucinogens | 2 | 0.2% | 2 | 100% |
| Overexertion, travel, and privation | | | | | |
| X53 | Lack of food | 3 | 0.4% | 3 | 100% |
| Accidental exposure to other and unspecified factors | | | | | |
| X58 | Exposure to unspecified factor | 67 | 7.8% | 38 | 57% |
| Assault | | | | | |
| X90 | Homicidal poisoning | 4 | 0.5% | 2 | 50% |
| X94 | Gunfire | 5 | 0.6% | 3 | 60% |
| X99 | Assault by sharp object (arrow) | 3 | 0.4% | 3 | 100% |
| X99 | Assault by sharp object (knife) | 10 | 1.2% | 10 | 100% |
| X99 | Assault by sharp object (*degollada, achazo*) | 5 | 0.6% | 4 | 80% |
| Y04 | Assault by bodily force | 11 | 1.3% | 11 | 100% |
| Y06.1 | Neglect and abandonment by parent | 1 | 0.1% | 0 | 0% |
| Y07.0 | Assault by spouse | 3 | 0.4% | 0 | 0% |
| Y09 | Assault by unspecified means (homicide, murder) | 125 | 14.6% | 95 | 76% |
| Y24 | Other and unspecified firearm discharge, undetermined intent | 3 | 0.4% | 3 | 100% |
| | Witchcraft | 3 | 0.4% | 3 | 100% |
| Event of undetermined intent | | | | | |
| Y20 | Hanging, strangulation and suffocation, undetermined intent | 9 | 1.1% | 9 | 100% |
| Legal intervention and operations of war | | | | | |
| Y35.5 | Legal execution | 26 | 3.0% | 23 | 88% |

(*continued*)

Appendix 1 – *continued*

| | | | Total | % | Male | % Male |
|---|---|---|---|---|---|---|
| | Y36 | Operations of war (Indians killed by soldiers) | 21 | 2.5% | 20 | 95% |
| | Y36 | Operations of war (Indians killed by *Americanos*) | 1 | 0.1% | 1 | 100% |
| | Y36 | Operations of war (Indians killed by gentiles) | 146 | 17.0% | 126 | 86% |
| **21** | **Factors influencing health status and contact with health services** | | **1** | **0.0%** | 1 | 100.0% |
| | Z65.1 | Imprisonment and other incarceration | 1 | 100% | 1 | 100% |

Note: The percentage column has two types of values. Percentages in bold are of all records in the study. Other percentages are of that subcategory within the main ICD category listed in bold above.

**Appendix 2: Ranking of cause of death among Indians in California missions, pertinent information from burial record, and corresponding ICD code**

| | Cause of death listed in burial records | Number | % of N (3312) | Cause stated in burial records | ICD Code |
|---|---|---|---|---|---|
| 1 | Sudden death, cause unknown | 538 | 16.24% | *Repente, repentinamente* | R96 |
| 2 | Unknown or unspecified cause of morbidity | 492 | 14.86% | *Enfermedad, enfermo* | R69 |
| 3 | Measles | 329 | 9.93% | *Serampion* | B05 |
| 4 | Smallpox | 278 | 8.39% | *Viruelas* | B03 |
| 5 | Operations of war | 168 | 5.07% | *Mataron los indios gentiles, mataron los soldados, mataron los Americanos* | Y36 |
| 6 | Assault by unspecified means (homicide, murder) | 125 | 3.77% | *Insulto, matado, arrebatado, violento* | Y09 |
| 7 | Other ill-defined and unspecified cause | 115 | 3.47% | *Inopinado, muerto, no supo de que murió, encontrado muerto* | R99 |
| 8 | Bitten or struck by other mammals | 106 | 3.20% | *Oso, toro, caballo, leopardo, buey* | W55 |
| 9 | Plague | 105 | 3.17% | *Peste* | A20 |
| 10 | Old age, senility | 83 | 2.51% | *Vejez, viejo* | R54 |
| 11 | Exposure to unspecified factor | 67 | 2.02% | *Accidente* | X58 |
| 12 | Unspecified drowning | 65 | 1.96% | *Ahogado* | W74 |
| 13 | Fever of unknown origin | 52 | 1.57% | *Fiebre* | R50 |
| 14 | Other complications of labor and delivery | 46 | 1.39% | *Mal parto* | O75 |
| 15 | Drowning and submersion while in natural water | 44 | 1.33% | *Ahogado en el mar, ahogado en la playa* | W69 |
| 16 | Syphilis, unspecified | 42 | 1.27% | *Galico* | A53.9 |
| 17 | Victim of earthquake (Mission San Juan Capistrano 1812) | 41 | 1.24% | *'Murieron sepultados en las ruinas de la dicha Yglesia . . . '* | X34 |
| 18 | Other land transport accidents - fall from a horse | 32 | 0.97% | *Caido de un caballo* | V80 |
| 19 | Respiratory TB, unspecified | 28 | 0.85% | *Tisis* | A6.9 |
| 19 | Hemorrhage | 28 | 0.85% | *Vomito de sangre, sangre por la boca* | K92 |
| 19 | Unattended death | 28 | 0.85% | *Quemaron su cuerpo los gentiles, comido de animales* | R98 |
| 22 | Legal execution (capital punishment imposed by Spanish) | 26 | 0.79% | *Pasado por las armas* | Y35.5 |
| 23 | Unspecified smoke, fire, and flames | 24 | 0.72% | *Quemado* | X09 |
| 24 | Open wound, unspecified | 23 | 0.69% | *Llagas* | T14.1 |
| 25 | Contact with venomous snakes and lizards | 22 | 0.66% | *Vivora* | X20 |
| 26 | Assault by sharp object | 18 | 0.54% | *Flechazo, puñalada, degollado, achazo* | X99 |
| 27 | Diseases of the stomach | 17 | 0.51% | *Dolor de estomago* | K31 |

(*continued*)

Appendix 2 – *continued*

| | Cause of death listed in burial records | Number | % of N (3312) | Cause stated in burial records | ICD Code |
|---|---|---|---|---|---|
| 27 | Coma, unspecified | 17 | 0.51% | *Privado de sentidos* | R40.2 |
| 29 | Pain in chest, unspecified | 16 | 0.48% | *Enfermedad de pecho, ydropesia* | R07.4 |
| 30 | Cough | 15 | 0.45% | *Tos* | R05 |
| 30 | Exposure to uncontrolled fire in building | 15 | 0.45% | *Quemada en su misma casa, temescal* | X00 |
| 32 | Common cold | 13 | 0.39% | *Catarro* | J00 |
| 32 | Acute pain | 13 | 0.39% | *Dolor* | R52 |
| 32 | Other specified noxious substances eaten as food | 13 | 0.39% | *Aver comido carne, comiendo atole, aver comido yslay* | T62.8 |
| 35 | Cholera | 11 | 0.33% | *Colera* | A00 |
| 35 | Stroke | 11 | 0.33% | *Apoplegia* | I64 |
| 35 | Assault by bodily force | 11 | 0.33% | *Golpes* | Y04 |
| 35 | Unspecified fall | 11 | 0.33% | *Caido* | W19 |
| 40 | Other respiratory disorders | 10 | 0.30% | *Afección de pecho* | J98.8 |
| 40 | Unspecified threat to breathing | 10 | 0.30% | *Sofoco, sufocado* | W84 |
| 42 | Indigestion | 9 | 0.27% | *Empacho* | K30 |
| 42 | Exposure to excessive natural cold | 9 | 0.27% | *El frío* | X31 |
| 42 | Hanging, strangulation and suffocation, undetermined intent | 9 | 0.27% | *Ahorcado* | Y20 |
| 42 | Struck by thrown, projected or falling object | 9 | 0.27% | *Caido de un roble* | W20 |
| 46 | Dysentery | 8 | 0.24% | *Desenteria* | A03 |
| 46 | Unspecified dementia | 8 | 0.24% | *Demencia* | F03 |
| 46 | Other fish and shellfish poisoning | 8 | 0.24% | *De resultas de una Almeja* | T61.2 |
| 49 | Fever with chills | 7 | 0.21% | *Pasmo* | R50.8 |
| 50 | Pain in throat | 6 | 0.18% | *Mal de garganta* | R07.0 |
| 50 | Pleurisy | 6 | 0.18% | *Dolor de costado* | R09.1 |
| 50 | Injury, unspecified | 6 | 0.18% | *Heridas* | T14.9 |
| 50 | Fall from tree | 6 | 0.18% | *Caido de un arbol* | W14 |
| 54 | Fetus and newborn affected by maternal death | 5 | 0.15% | *Muerte su madre, operación caaesaria* | P01.6 |
| 54 | Disorder of the urinary system | 5 | 0.15% | *Pujos* | N39 |
| 54 | Inflammatory disease of the uterus | 5 | 0.15% | *Enfermedad del vientre* | N71.9 |
| 54 | Gunfire | 5 | 0.15% | *Balazo* | X94 |
| 57 | Rabies | 4 | 0.12% | *Rabia de la mordedura de un zorrillo* | A82 |

(*continued*)

Appendix 2 – *continued*

| | Cause of death listed in burial records | Number | % of N (3312) | Cause stated in burial records | ICD Code |
|---|---|---|---|---|---|
| 57 | Scabies | 4 | 0.12% | *Sarna* | B86 |
| 57 | Delirium | 4 | 0.12% | *Delirio* | F05 |
| 57 | Other paralytic syndromes | 4 | 0.12% | *Perlatico* | G83 |
| 57 | Pneumonia, organic unspecified | 4 | 0.12% | *Pulmonia* | J18 |
| 57 | Unspecified abortion | 4 | 0.12% | *Abortada* | O06 |
| 57 | Headache | 4 | 0.12% | *Dolor de cabeza* | R51 |
| 57 | Pedestrian injured – hit by a cart | 4 | 0.12% | *Mato una carreta* | V06 |
| 57 | Homicidal poisoning | 4 | 0.12% | *Enyerbado* | X90 |
| 66 | Adjustment disorders (death of parent, child, relative) | 3 | 0.09% | *Haver muerta de tristesa por el fallecimiento de su hijo* | F43.2 |
| 66 | Witchcraft | 3 | 0.09% | *Maleficiado, hechico* | NA |
| 66 | Miscarriage | 3 | 0.09% | *Nacio completamente ya estaba muerta* | O03 |
| 66 | Toxic effect of alcohol | 3 | 0.09% | *Ebrio* | T51 |
| 66 | Ingested mushrooms | 3 | 0.09% | *Haber comido hongos venenosos* | T62 |
| 66 | Handgun discharge | 3 | 0.09% | *Escopetazo que desgraciadamente se disparo de una casa al tiempo de passar* | W32 |
| 66 | Accidental suffocation and strangulation in bed | 3 | 0.09% | *Sofocaron sus padres dormidos* | W75 |
| 66 | Lack of food | 3 | 0.09% | *Nesesidad, hambre* | X53 |
| 66 | Assault by spouse | 3 | 0.09% | *Fue matada por su marido* | Y07.0 |
| 66 | Other and unspecified firearm discharge, undetermined intent | 3 | 0.09% | *De un balazo en la puerta de su casa* | Y24 |
| 76 | Cancer | 2 | 0.06% | *Cancer* | D48.9 |
| 76 | Gangrene | 2 | 0.06% | *Grangena* | R02 |
| 76 | Open wound to the head | 2 | 0.06% | *Abrio la cabeza* | S01 |
| 76 | Fracture of neck | 2 | 0.06% | *Fractura en el pescueso* | S12 |
| 76 | Decapitation | 2 | 0.06% | *Perdida de la cabeza* | S18 |
| 76 | Contact with other hot fluids | 2 | 0.06% | *Caido en el cazo de atole caliente* | X12 |
| 76 | Hallucinogens | 2 | 0.06% | *Por haber vevido tolociche* | X42 |
| 83 | Elephantiasis | 1 | 0.03% | *Lazarino* | B74 |
| 83 | Scurvy | 1 | 0.03% | *Escorbuto* | E54 |
| 83 | Epilepsy | 1 | 0.03% | *Epilepsia* | G40 |

(*continued*)

Appendix 2 – *continued*

| | Cause of death listed in burial records | Number | % of N (3312) | Cause stated in burial records | ICD Code |
|---|---|---|---|---|---|
| 83 | Angina | 1 | 0.03% | *Angina* | I20 |
| 83 | Asthma | 1 | 0.03% | *Asma* | J45 |
| 83 | Constipation | 1 | 0.03% | *Constipación* | K59 |
| 83 | Fetal blood loss from ruptured cord | 1 | 0.03% | *Ombligo mal cortado* | P50.1 |
| 83 | Malaise & fatigue | 1 | 0.03% | *Aletargada* | R53 |
| 83 | Bitten or stung by nonvenomous insect | 1 | 0.03% | *Resultos de haber tragado una mosca* | W57 |
| 83 | Contact with venomous spiders | 1 | 0.03% | *Picado de una araña venenosa* | X21 |
| 83 | Tobacco | 1 | 0.03% | *Por haber comido tabaco* | X41 |
| 83 | Neglect and abandonment by parent | 1 | 0.03% | *Miserablemente abandonada de sus parientes* | Y06.1 |
| 83 | Imprisonment | 1 | 0.03% | *En el calabozo* | Z65.1 |

**Appendix 3: Leading causes of death recorded in burial records of Indian men in California missions**

| | | Number | % of all male death causes |
|---|---|---|---|
| 1 | Sudden death, cause unknown | 314 | 16.0% |
| 2 | Unknown or unspecified cause of morbidity | 240 | 12.3% |
| 3 | Smallpox | 170 | 8.7% |
| 4 | Measles | 131 | 6.7% |
| 5 | Operations of war (Indians killed by *gentiles*) | 126 | 6.4% |
| 6 | Assault by unspecified means (homicide, murder) | 92 | 4.7% |
| 7 | Bitten or struck by other mammals | 87 | 4.4% |
| 8 | Other ill-defined and unspecified cause | 76 | 3.9% |
| 9 | Unspecified drowning | 56 | 2.9% |
| 10 | Old age, senility | 54 | 2.8% |
| 11 | Plague | 49 | 2.5% |
| 12 | Exposure to unspecified factor | 38 | 1.9% |
| 13 | Drowning and submersion while in natural water | 37 | 1.9% |
| 14 | Other land transport accidents – fall from a horse | 30 | 1.5% |
| 15 | Fever of unknown origin | 28 | 1.4% |
| 16 | Legal execution | 23 | 1.2% |
| 17 | Syphilis, unspecified | 21 | 1.1% |
| 17 | Unattended death | 21 | 1.1% |
| 19 | Operations of war (Indians killed by soldiers) | 20 | 1.0% |
| 20 | Hemorrhage | 17 | 0.9% |
| 21 | Open wound, unspecified | 15 | 0.8% |
| 22 | Respiratory TB, unspecified | 12 | 0.6% |
| 23 | Contact with venomous snakes and lizards | 11 | 0.6% |
| 23 | Assault by bodily force | 11 | 0.6% |
| 25 | Coma, unspecified | 10 | 0.5% |
| 25 | Pain in chest, unspecified | 10 | 0.5% |
| 25 | Cough | 10 | 0.5% |
| 25 | Cholera | 10 | 0.5% |
| 25 | Assault by sharp object (knife) | 10 | 0.5% |
| 30 | Unspecified fall | 9 | 0.5% |
| 31 | Acute pain | 8 | 0.4% |
| 31 | Victim of earthquake | 8 | 0.4% |
| 31 | Unspecified smoke, fire, and flames | 8 | 0.4% |
| 31 | Common cold | 8 | 0.4% |
| 31 | Stroke | 8 | 0.4% |

**Appendix 4: Leading causes of death recorded in burial records of Indian women in California missions**

| | | Number | % of all female death causes |
|---|---|---|---|
| 1 | Unknown or unspecified cause of morbidity | 252 | 18.6% |
| 2 | Sudden death, cause unknown | 224 | 16.5% |
| 3 | Measles | 198 | 14.6% |
| 4 | Smallpox | 108 | 8.0% |
| 5 | Plague | 56 | 4.1% |
| 6 | Other complications of labor and delivery | 46 | 3.4% |
| 7 | Other ill-defined and unspecified cause | 39 | 2.9% |
| 8 | Assault by unspecified means | 33 | 2.4% |
| 8 | Victim of earthquake | 33 | 2.4% |
| 10 | Old age, senility | 29 | 2.1% |
| 10 | Exposure to unspecified factor | 29 | 2.1% |
| 12 | Fever of unknown origin | 24 | 1.8% |
| 13 | Syphilis, unspecified | 21 | 1.6% |
| 14 | Operations of war (Indians killed by *gentiles*) | 20 | 1.5% |
| 15 | Bitten or struck by other mammals | 19 | 1.4% |
| 16 | Respiratory TB, unspecified | 16 | 1.2% |
| 16 | Unspecified smoke, fire, and flames | 16 | 1.2% |
| 18 | Hemorrhage | 11 | 0.8% |
| 18 | Contact with venomous snakes and lizards | 11 | 0.8% |
| 18 | Delivery by emergency C-section | 11 | 0.8% |
| 21 | Diseases of the stomach | 10 | 0.7% |
| 22 | Unspecified drowning | 9 | 0.7% |
| 23 | Open wound, unspecified | 8 | 0.6% |
| 23 | Exposure to uncontrolled fire in building (*casa*) | 8 | 0.6% |
| 25 | Drowning and submersion while in natural water | 7 | 0.5% |
| 25 | Unattended death | 7 | 0.5% |
| 25 | Coma, unspecified | 7 | 0.5% |
| 28 | Pain in chest, unspecified | 6 | 0.4% |
| 29 | Acute pain | 5 | 0.4% |
| 29 | Other specified noxious substances eaten as food (*atole*) | 5 | 0.4% |
| 29 | Cough | 5 | 0.4% |
| 29 | Common cold | 5 | 0.4% |
| 29 | Inflammatory disease of the uterus | 5 | 0.4% |
| 34 | Other respiratory disorders | 4 | 0.3% |
| 34 | Unspecified threat to breathing | 4 | 0.3% |
| 34 | Exposure to excessive natural cold | 4 | 0.3% |
| 34 | Dysentery | 4 | 0.3% |
| 38 | Legal execution | 3 | 0.2% |
| 38 | Stroke | 3 | 0.2% |
| 38 | Other fish and shellfish poisoning | 3 | 0.2% |
| 38 | Fever with chills | 3 | 0.2% |
| 38 | Pleurisy | 3 | 0.2% |
| 38 | Delirium | 3 | 0.2% |
| 38 | Assault by spouse | 3 | 0.2% |
| 38 | Adjustment disorders (death of parent, child, relative) | 3 | 0.2% |