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All Is Not LOST: Tracking California's Local Option Sales Tax Revenues for Transportation During the Pandemic

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All Is Not LOST: Tracking California's Local Option Sales Tax Revenues for Transportation During the Pandemic

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16. Abstract The COVID-19 pandemic dramatically affected transportation systems, including the ability of localities to pay for them. We explore the effects of the pandemic and the associated economic turbulence on local option sales taxes (LOSTs), an increasingly common revenue source for transportation in California and across the U.S. LOSTs have many advantages over alternative finance instruments, and they can raise prodigious amounts of revenue. However, LOST funding relies on consumer spending. During times of economic weakness, spending and therefore LOST revenues will lag. This is precisely the pattern we observe in California counties during the initial months of the pandemic. Fortunately for local transportation budgets, LOST revenues recovered after the initial economic shock of COVID-19, albeit at a lower level than they likely would have otherwise. LOST revenue trends during the pandemic were affected by national and regional economic conditions and government policy as well. This public health crisis illustrates both the pitfalls and resilience of LOSTs during economic downturns and recoveries. The lessons from the pandemic's effects on LOSTs will be useful for policymakers and analysts in preparing for inevitable future economic fluctuations.					
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Introduction

Over the past five decades, financial responsibility for highways and public transit systems has gradually devolved from the federal government to states and lower levels of government. In many states, this fiscal devolution has shifted down from states to regions, counties, and local governments as well. To fill the revenue vacuums left by higher levels of government, voters in many counties and localities across the U.S. have agreed to tax themselves to fund transportation. In California, 25 counties, home to a substantial majority of the state's population, currently finance major portions of their transportation systems and services—roads, streets, transit, bikeways, and specialized services for elderly and disabled people—using revenue produced by voter-approved countywide sales taxes (UCLA ITS, 2021 and U.S. Census Bureau, 2021). LOSTs are most common in California (Lederman et al., 2018), the most populous state and a quite diverse state that is often emblematic of transportation trends nationwide or at the forefront of them. These local option sales tax (LOST) ballot measures typically commit localities to use the tax revenues to fund a specific set of projects and programs.

This emerging means of transportation finance was thrown into considerable uncertainty by the spread of the SARS-CoV-2 virus (Severe Acute Respiratory Syndrome Coronavirus 2, the virus that causes Coronavirus Disease 2019 or COVID-19) and the pandemic-induced economic downturn of 2020. Accordingly, this chapter explores LOSTs in the most populous U.S. state amidst the COVID-19 pandemic. We begin by describing the prevalence of LOSTs for transportation in California and the types of transportation programs they support. We then investigate the effect of the pandemic and the resulting economic turbulence on sales tax revenues and, consequently, on transportation program budgets. We show that the pandemic and associated federal fiscal relief legislation affected counties' LOST revenue streams in variable ways, with noticeable differences in direction, degree, geography, and timing across counties. We conclude by examining the factors associated with this variance across counties and their implications for transportation finance and policy post-pandemic.

LOSTs: An Overview

Local option sales taxes have emerged over the past several decades in part as a response to a relative decline in federal transportation revenues, particularly for highways and public transit. While federal funding for surface transportation has been growing in absolute terms, it has been falling in inflation-adjusted terms per capita and per vehicle mile of travel (Hess and Lombardi, 2005). Most of this slow-growing federal funding for local surface transportation comes from national taxes on motor fuels. Governments began to levy excise taxes on motor fuels—initially at the state level beginning with Oregon in 1919 and then at the federal level in 1932—as automobile ownership rose and demand for improved and expanded roads grew (Brown, Morris, and Taylor, 2009).¹ Today, national motor fuel tax revenues are allocated to states and/or directly to lower levels of government according to various statutory, categorical, and formula rules.

Motor fuel taxes are easy to administer and have low administrative costs because governments collect them at the wholesale level (thus limiting the number of actors to oversee and opportunities for tax evasion) rather than from individual retailers. Motor fuel taxes also satisfy notions of fairness as a “user fee,” in that people who consume more fuel and, generally, drive more pay more in fuel taxes, which in turn go to building and maintaining the roads they use. Motor fuel taxes provide an imperfect mechanism for society to be compensated for the otherwise uncompensated externalities of fossil fuel consumption and vehicle travel, such as emissions of pollutants and greenhouse gases. However, fuel taxes do not account for many important costs of road use, such as the delays imposed on others when the demand for road space exceeds the supply. Moreover, motor fuel taxes imperfectly account for the fact that, while heavier vehicles tend to consume more fuel, they can cause exponentially more wear and tear on roads than lighter cars (Wachs, 2003).

This system of financing of federal, state, and most local highways and roads using federal and state motor fuel tax revenues worked well throughout much of the 20th century, as vehicle ownership dramatically increased and tax rates (which are most often levied per gallon) were regularly adjusted to account for the effects of inflation. The ability of fuel taxes to pay for local transportation needs nonetheless declined over time, as vehicle ownership and travel both continued to rise, vehicle fuel efficiency increased, maintenance costs for the aging surface transportation system grew, and hybrids and electric vehicles entered the marketplace. Despite the eroding buying power of the federal fuel tax, Congress has been reluctant to raise motor fuel taxes, with the last increase in 1991. Relative declines in federal surface transportation funding have led local governments to increasingly rely on locally-generated sources of revenues. Transportation LOSTs—which are typically incremental increases to the sale of all goods and services subject to sales taxes and not just on fuel—are perhaps the most prominent of these local funding mechanisms. This is particularly true in light of the extreme reluctance of many local officials to raise property taxes since the “tax revolts” of the late 1970s and early 1980s (Hajiamiri and Wachs, 2010 and Wachs, 2009).

LOSTs, both nationwide and in California, are typically approved by voters. They are most commonly levied by counties, though states can authorize other units of government to levy them as well. LOSTs are levied at a given rate on the price of all goods and services subject to sales taxes, which can vary substantially from state to state. The incremental rates typically vary from ¼ cent per dollar to one cent per dollar; ½ cent levies per dollar are

1. Although demand for improved roads pre-dated mass vehicle ownership: in the late 1800s, bicycling interest groups advocated for improved local roads, for example (Gordon, 2016).

common (Fraade and Speroni, 2019).

LOST ballot measures generally outline an estimate of forecasted revenues and specific projects to be funded by measure revenues and/or lay out funding criteria, such as percentages of revenues to be allocated toward projects for specific modes (Goldman and Wachs, 2003).² The project lists approved by voters are often longer and costlier than the revenues generated can fund in the specified time horizon. Projects may be delayed or cancelled in response to revenue shortfalls. Project lists are often prioritized. High-priority projects are funded first, with any remaining revenues dedicated to increasingly lower-priority projects. Unfunded projects often form the basis of new ballot efforts to extend or renew LOSTs after their scheduled expiration. More rarely, revenues exceed forecasts, allowing priority projects to be delivered sooner and low-priority projects to be implemented.

Often, a percentage of LOST revenues is dedicated to so-called “local return” to cities within a county. Governments are free to spend this local return portion on transportation projects (often local roads) of their choosing.³ Transportation LOSTs thus provide an alternative source of funding for local transportation needs, with a different structure and method of enactment than fuel taxes. LOST funding is locally generated and therefore frees local governments from the constraints (and oversight) of federal funding. This allows cities and counties to fund local priority projects more freely (Lederman et al., 2021). One common motivation for LOSTs are public transit projects, although measures typically dedicate at least some revenues toward roadway projects as well. LOSTs are usually authorized for a set period of time, with ten or 20 years being common (Crabbe et al., 2005). Measures are, however, often renewed, typically accompanied by a revision of project priorities and timelines. LOSTs with no expiration date, like Los Angeles County’s 2016 Measure M, do occasionally pass as well (Lederman et al., 2021).

LOSTs thus inherently come with a degree of uncertainty tied to supply of and demand for taxable goods and services. This supply and demand sets the quantity and price of taxable purchases, which in turn determine tax revenues. In other words, LOSTs link transportation funding to much larger macroeconomic trends. For instance, the supply of taxable goods is influenced by the ability of supply chains to ensure that goods are available where and when they are demanded. During the COVID-19 pandemic, sales of many consumer goods were heavily affected, at least temporarily, by the disruptions to supply chains (Harapko, 2021). Likewise, consumers’ level of disposable income influences demand, with lower-income and especially unemployed workers as well as those outside of the workforce less able and willing to spend. During economic downturns, such during a pandemic, consumer demand declines as employment decreases and wages stagnate. Federal stimulus payments designed to counteract this—the Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020 (FTA, 2021b), the Coronavirus Response and Relief Supplemental Appropriations (CRRSA) Act in December 2020 (FTA, 2021c), and the American Rescue Plan (ARP) Act in March 2021 (FTA, 2021a)—therefore also affected tax revenues. These laws included both direct payments to households and support for public and private employers that helped sustain employment and wages (U.S. Department of the Treasury, 2021).

2. In New York, Ohio, and Tennessee, local governments are allowed to use LOSTs as a source of general revenues (i.e., for non-transportation purposes). Other states that allow LOSTs are divided between those that specifically require an enumerated project list (e.g., Arizona, California, South Carolina, and Wyoming) and those that allow funds to be dedicated to broad project categories like “road improvements” (e.g., Florida, Iowa, Louisiana, New Mexico, Oklahoma, and Texas) (Goldman and Wachs, 2003).

3. Spending rules are laid out in the LOST ballot proposition approved by voters. Local return funds may come with categorical spending requirements, but localities retain some level of autonomy regarding spending decisions. For example, Alameda County’s Measure B allocates both local return funds and formula-based Americans with Disability Act funding to localities within the county (Lederman et al., 2021).

The COVID-19 pandemic in California provides a vivid and timely example of how sales tax revenues are linked to the strength and structure of the economies in which they exist. In the next section, we examine how the volume of LOST revenues raised in each county relates to different characteristics of the counties' economies. Our primary goal in this analysis is to identify factors that have an empirical relationship with LOST revenue generation during the pandemic. Our analysis in this chapter is largely descriptive; we make no formal claims about causality or statistical significance. Rather, we illustrate commonalities and differences across California LOST counties in relation to LOST trends, at a period when, at time of writing, every relevant variable has yet to be determined as the halting economic recovery proceeds.

We find that the overall strength of the local economy and the specific employment structure across industries of different counties are correlated with variations in transportation LOST revenues. As a result, revenues in the initial stages of the pandemic in all counties fell below budgeted levels. LOST revenues did, however, hold up better than many analysts predicted in the pandemic's early months. Revenues largely increased after the pandemic's initial months, albeit with significant variation across counties. Perhaps counterintuitively, LOSTs generally fared worse in higher-income counties. Counties with heavy employment in certain sectors, particularly in information, professional services, and arts/recreation, also tended to lose more revenues.

The COVID-19 Pandemic and LOST Revenues

In the initial stages of the pandemic in the second and third quarters of 2020, uncertainty about both public health and the economy was at its highest, and many analysts produced dire near-term predictions of revenues falling far below previous forecasts (Dadayan, 2020). Despite this initial fret and fluctuations within the pandemic, LOSTs proved unexpectedly resilient. In March 2020, when California’s shelter-in-place orders began, counties across the state braced themselves for drastic losses, layoffs, and savage budget cuts. The Los Angeles County Metropolitan Transportation Authority, for example, began prioritizing which services and projects could continue and which would not, in response to the dramatic declines in anticipated fare and tax revenue (Los Angeles Metro, 2020). Other counties and transit agencies constructed similar crisis budgets. Yet, although revenues did decline somewhat, worst-case revenue projections largely failed to manifest.

To determine how LOST revenues responded to the pandemic, we analyzed data from the California Department of Tax and Fee Administration (CDTFA) (CDTFA, 2021). CDTFA collects sales taxes across the state, including LOSTs, and then returns the appropriate amount to each governmental recipient. The amounts generated by the sales tax are returned to counties a few months after they are collected.

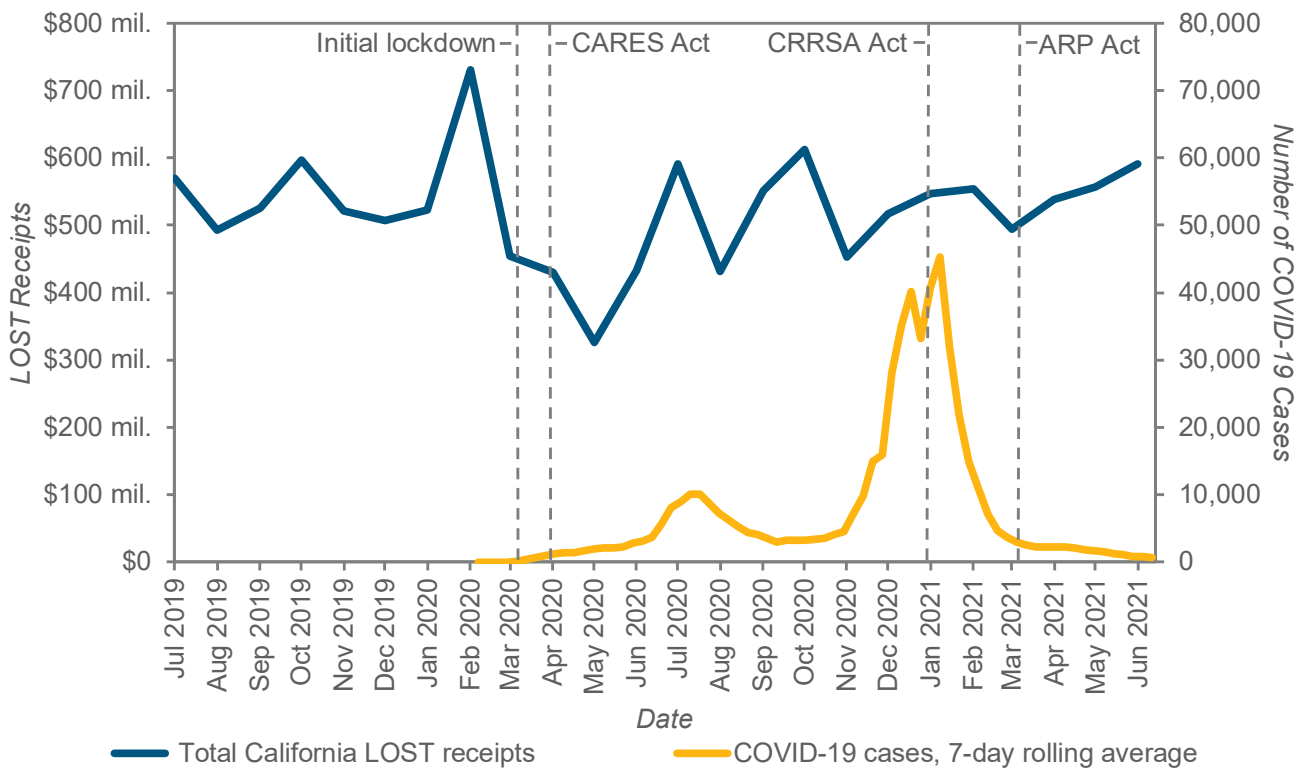


Figure 1. LOST Receipts and COVID-19 Cases in California

Data sources: California Health and Human Services, 2021 and CDTFA, 2021

Figure 1 shows that sales tax receipts began a steady decline as the state-level shelter-in-place order was announced on March 19, 2020 (Cowan, 2021). Receipts fell by \$276 million between February and March. Receipts continued to decline into May but rebounded in June and July, as businesses attempted to reopen and more people began moving about and spending. Even so, the number of COVID-19 cases continued rising (Cowan, 2021), and sales tax receipts fell. The number of new daily cases declined starting in July and reached a low point in September and October. After that, the number of cases grew dramatically again starting in November amidst a second major wave of infections. Sales tax receipts during this fall period began recovering when the number of new daily cases stagnated in September and October but quickly declined with the rise of infections afterward. Revenues also increased after November with the advent of the holiday shopping season. By the end of 2020 revenues had returned to levels seen the year previously. LOST revenues thus recovered but did not exceed the high of early 2020. LOST revenues also became much more volatile after March 2020. At the state level, then, the primary effects of the COVID-19 pandemic on LOST receipts were to decrease them in the short run and make them more volatile and unpredictable in the medium run. COVID-19 also likely dampened any potential growth in LOST receipts that may otherwise have occurred.

The statewide trends in LOST receipts mask considerable variability across counties in California. **Figure 2** presents the percent change in LOST receipts by month against the same month in 2019, capturing the large variation observed during 2020 and 2021.⁴ The counties with the best- and worst-performing LOSTs are highlighted. Starting in March 2020, each county reported steady declines in LOST revenues. After California's mid-summer peak in COVID-19 cases, however, LOST revenues in agricultural counties like Tulare in California's San Joaquin Valley began to improve, with receipts 30 to 40 percent *higher* than the same months the year before. While some counties across the state thus experienced growth in LOST revenues—agricultural Imperial County along the Mexican border, for instance, saw 53 percent *more* LOST revenue in August 2020 than August 2019—others, like urban San Francisco County, reported revenues far lower than for the same months in 2019. Despite these differences, sales tax receipt trends across counties moved in similar ways at a few key points in the pandemic, such as in March 2020 when lockdowns began and all counties reported LOST totals from five to 35 percent less than the previous year. Similarly, revenue growth compared with 2019 was approximately flat in all counties in December 2020 as cases began rising to record levels amidst the holiday shopping season. Going into 2021, most counties reported increases in LOST receipts, with the highest all-county average since the onset of the pandemic occurring in May 2021.

4. When a county has multiple LOSTs, **Figure 2** plots their average.

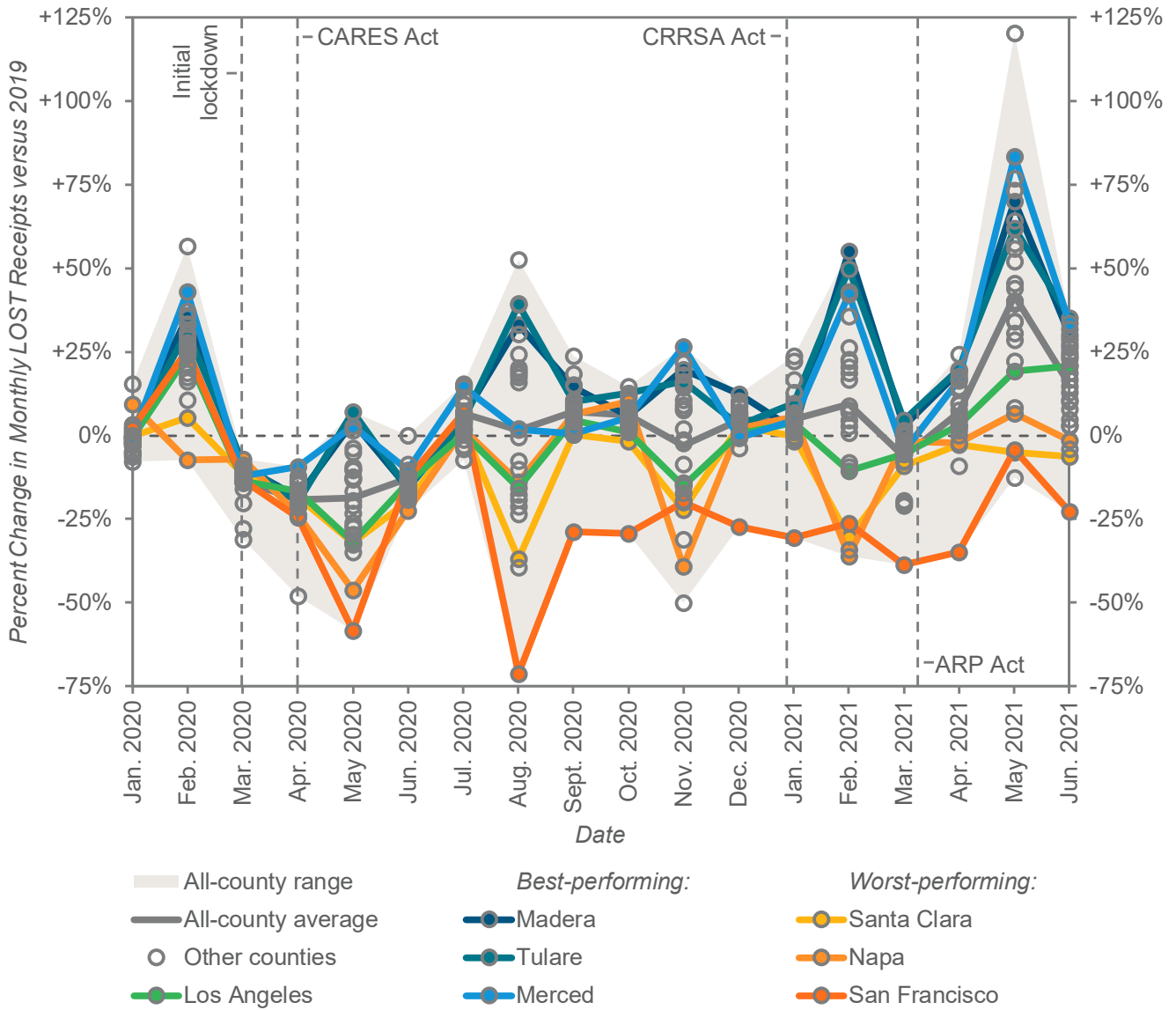


Figure 2. Changes in LOST Receipts Compared to the Same Month in 2019

Data source: CDTFA, 2021

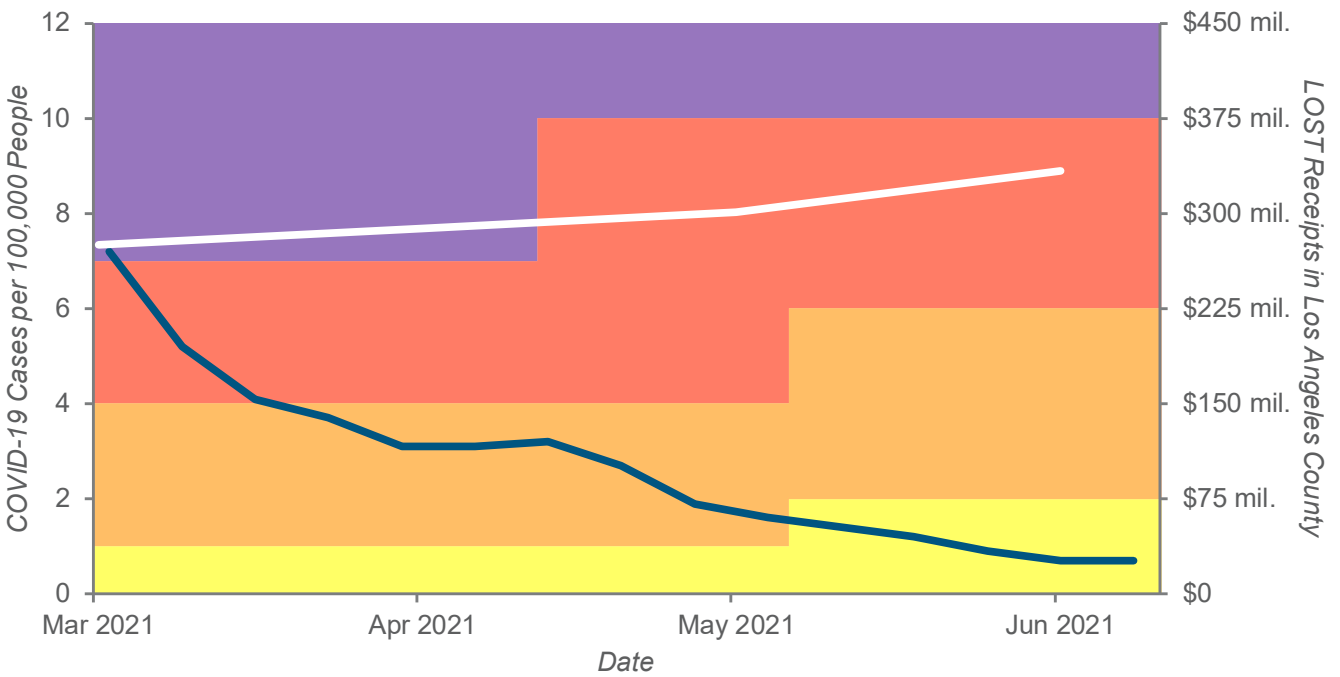
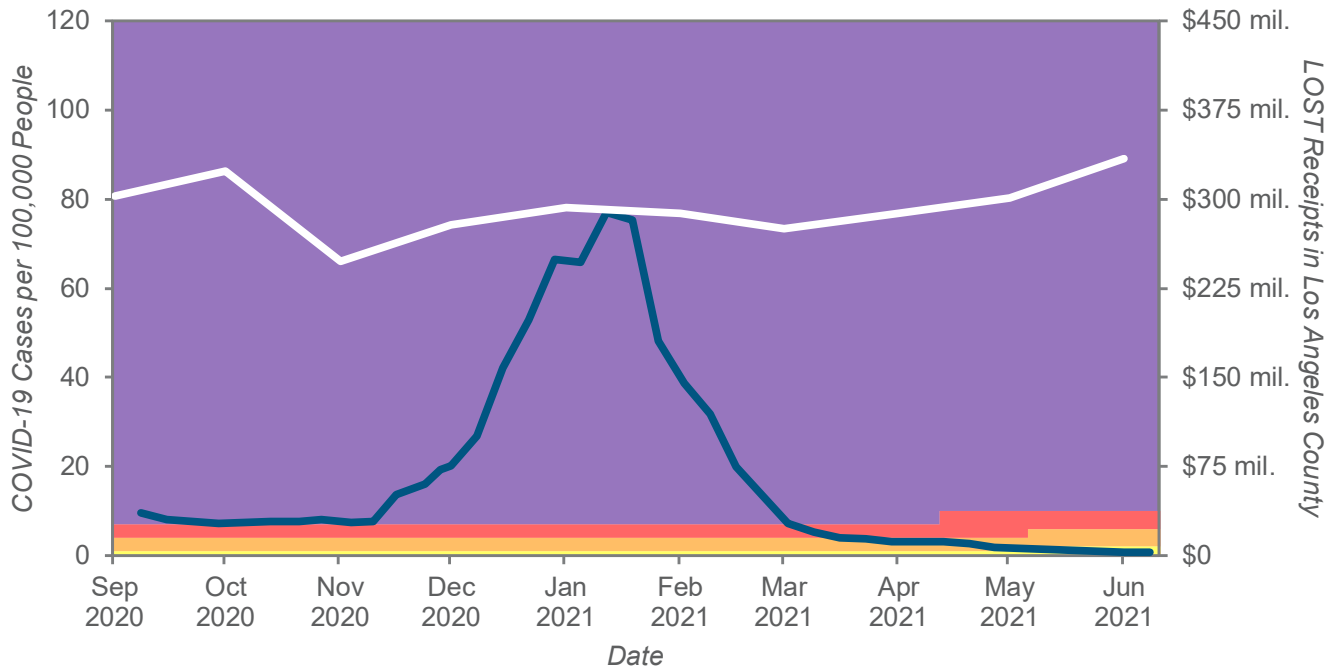
Factors Affecting LOST Revenues during COVID-19

What might explain these different patterns across California counties? To answer this question, we examined the relationship between the change in LOST receipts and a number of policy and economic and job market factors. For context, the counties that reported the largest relative losses between 2019 and 2020 were all in the San Francisco Bay Area, home to the tech industry and a booming regional economy during the first two decades of the century: San Francisco, Napa, Santa Clara (which has three separate LOSTs), and San Mateo. Meanwhile, the best-performing counties on this metric were clustered in the state's inland, agricultural, and fast-growing Central Valley (Kasler, 2020): Stanislaus, Tulare, Fresno, Madera, and San Joaquin.

We began by exploring the relationship between county-level lockdown restrictions and LOST receipts. After the initial lockdowns of March 2020, the state imposed restrictions based on a more systematic county-level system of tiers from late August 2020 to June 2021. Counties moved between tiers—purple, red, orange, and yellow—based on case rate thresholds and other public health metrics, with the former tiers having stricter restrictions on gathering and business operations (California Department of Public Health, 2021b and Cowan, 2021). Though the initial enactment of the state-level lockdown order in March 2020 coincided a dip—albeit a relatively brief one—in state LOST receipts (See **Figure 1**), we do not find a consistent relationship between these subsequent county-level lockdown restrictions and county-level LOST receipts (or rate of change of LOST receipts). **Figures 3** through **6** plot county-level LOST receipts against the seven-day average of COVID-19 case rates for four emblematic counties: two in the state's largest metropolitan area, Los Angeles (home to by far the most remunerative combined LOSTs) (**Figure 3**) and Orange (**Figure 4**); one, San Francisco, representative of the relatively poorly performing LOSTs in the Bay Area (**Figure 5**); and one, Tulare, representative of relatively well-performing LOSTs in the state's agricultural heartland (**Figure 6**). The case rate thresholds for each tier are colored on the graphs;⁵ as case rates peaked well into the purple tier, we zoom in to the period of recovery and vaccination in spring 2021 in the graphs at the bottom of each figure. The appendix of this report includes graphs for every county with a LOST in California.

Across the four selected LOST counties, we observe much more volatility in COVID-19 cases than in LOST receipts. Contrary to our expectations, when counties imposed stricter restrictions as they entered higher tiers, this did not coincide with reduced LOST receipts for any of the four counties shown here or, indeed, for any of California's LOST counties (See Appendix). Instead, county-level LOST revenues and COVID-19 case rates (and the restrictions tied to them) largely moved separately. If anything, peak county-level case rates weakly coincide with slight *increases* in county-level LOST receipts, the latter possibly driven by holiday shopping. The lack of an obvious relationship is perhaps because the tier-based restriction system did not begin until five months into the pandemic. By September 2020 and after, the economic factors that underlie patterns in LOST receipts had had time to adjust to lockdown restrictions, as well as the pandemic itself. County-level restrictions imposed well into the pandemic may simply have not influenced LOST receipts much atop the existing, base public health restrictions in place across the state since the start of the pandemic. To be sure, the degree to which individuals

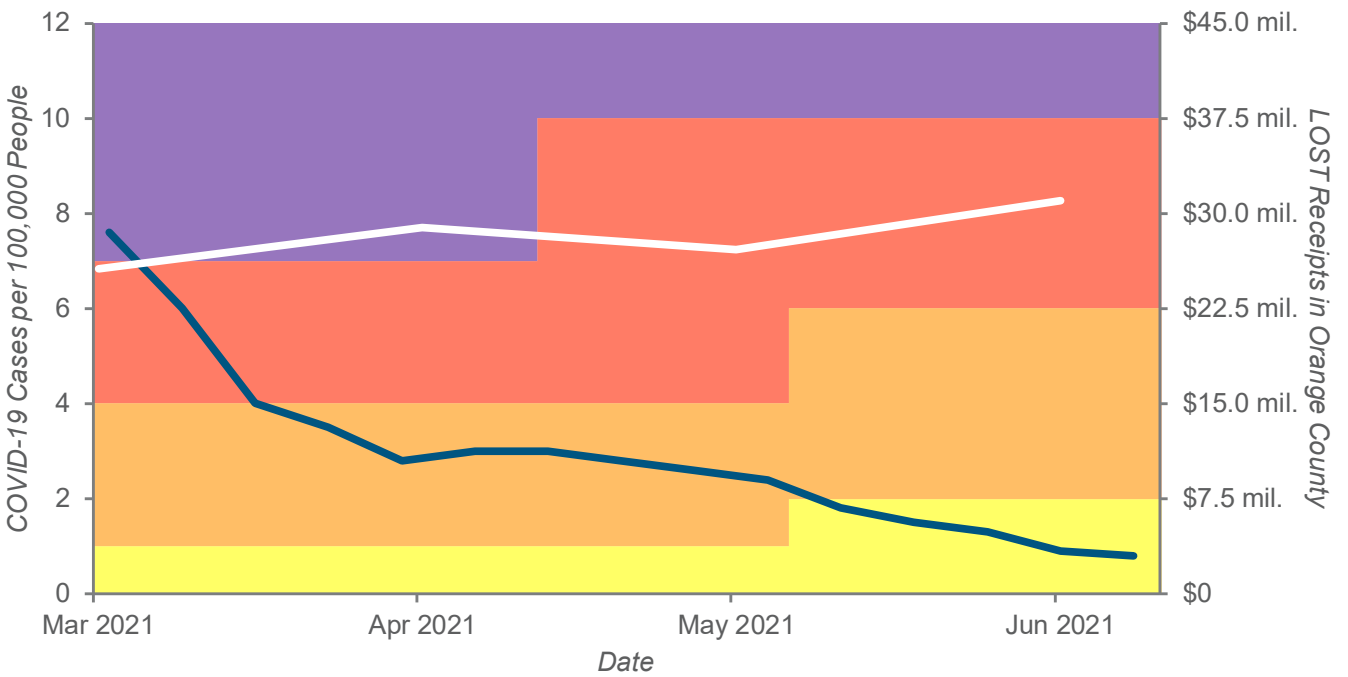
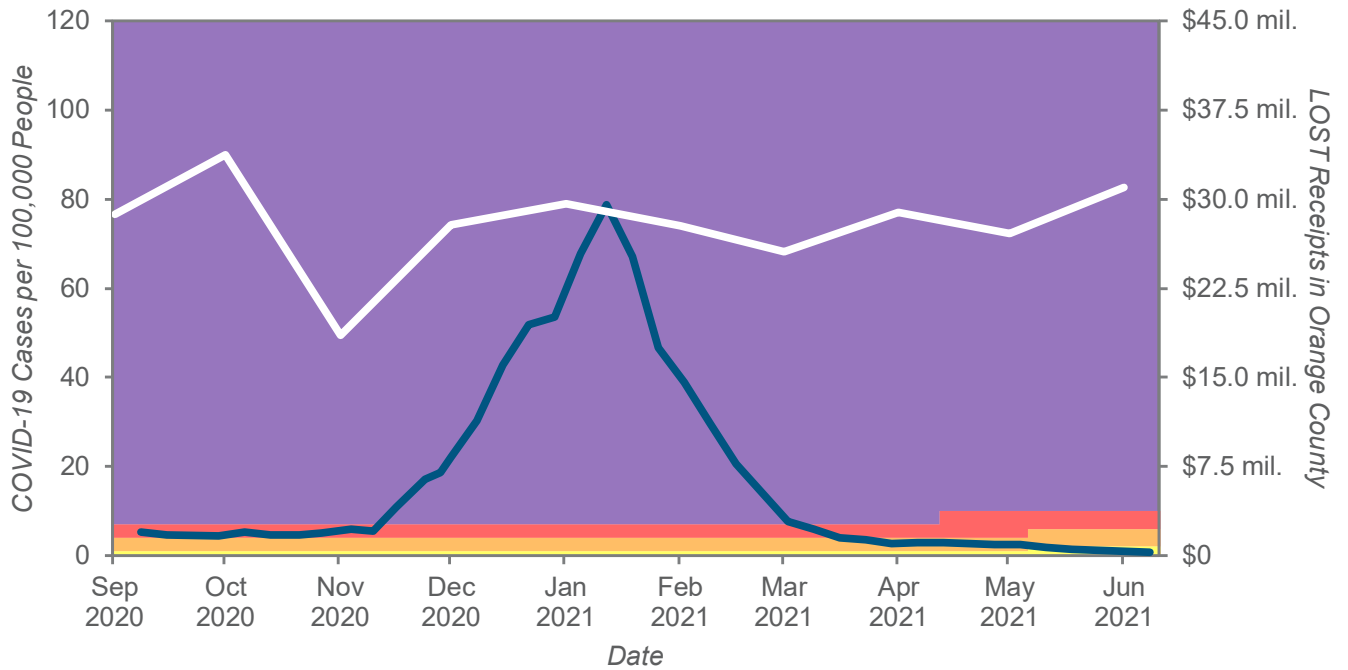
5. Case rates were a primary metric but not the sole metric for determining a county's tier (California Department of Public Health, 2021b and Cowan, 2021). Case rate thresholds changed once the state hit certain vaccination milestones (California Department of Public Health, 2021a; Ibarra and Becker, 2021; and Capital Public Radio, 2021).



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure 3. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Los Angeles County

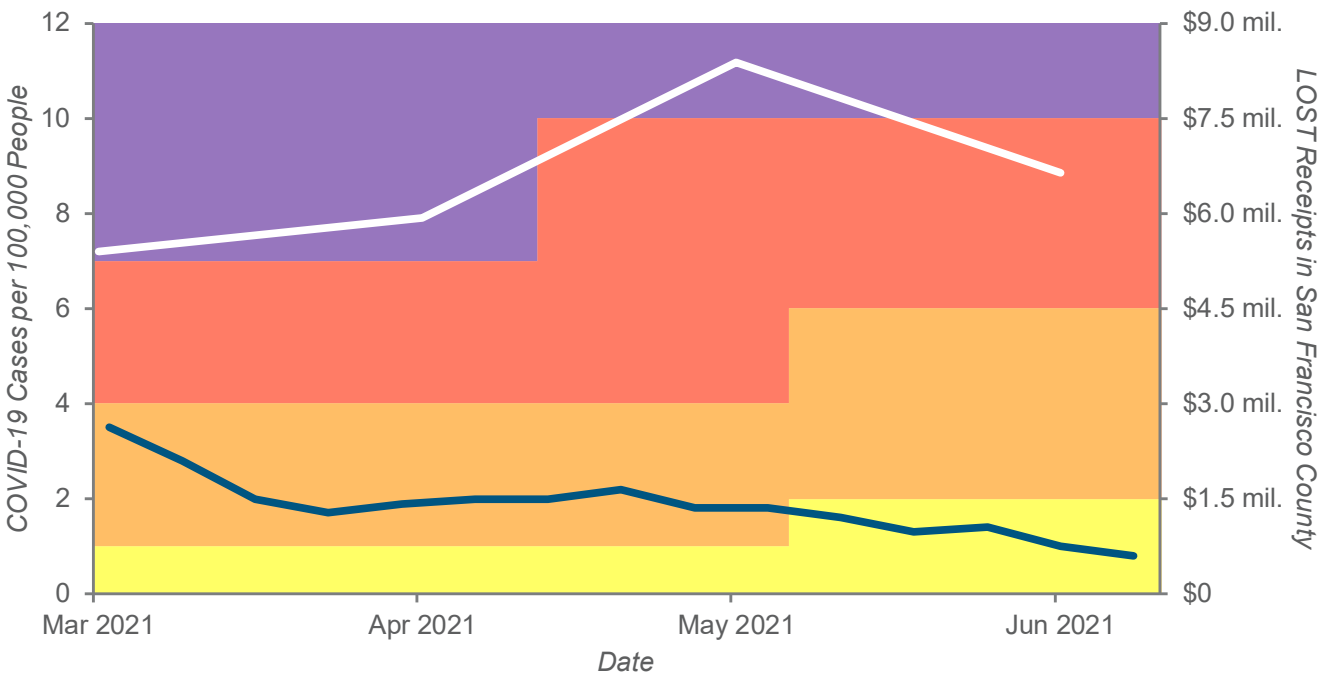
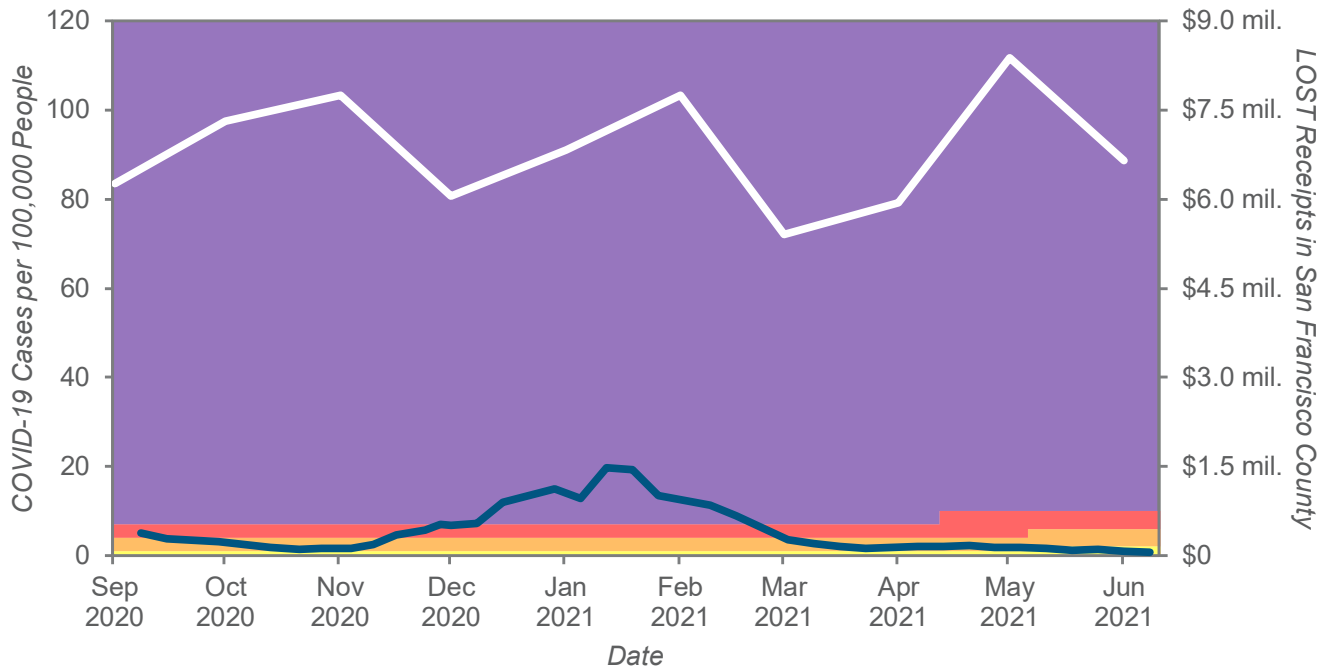
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure 4. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Orange County

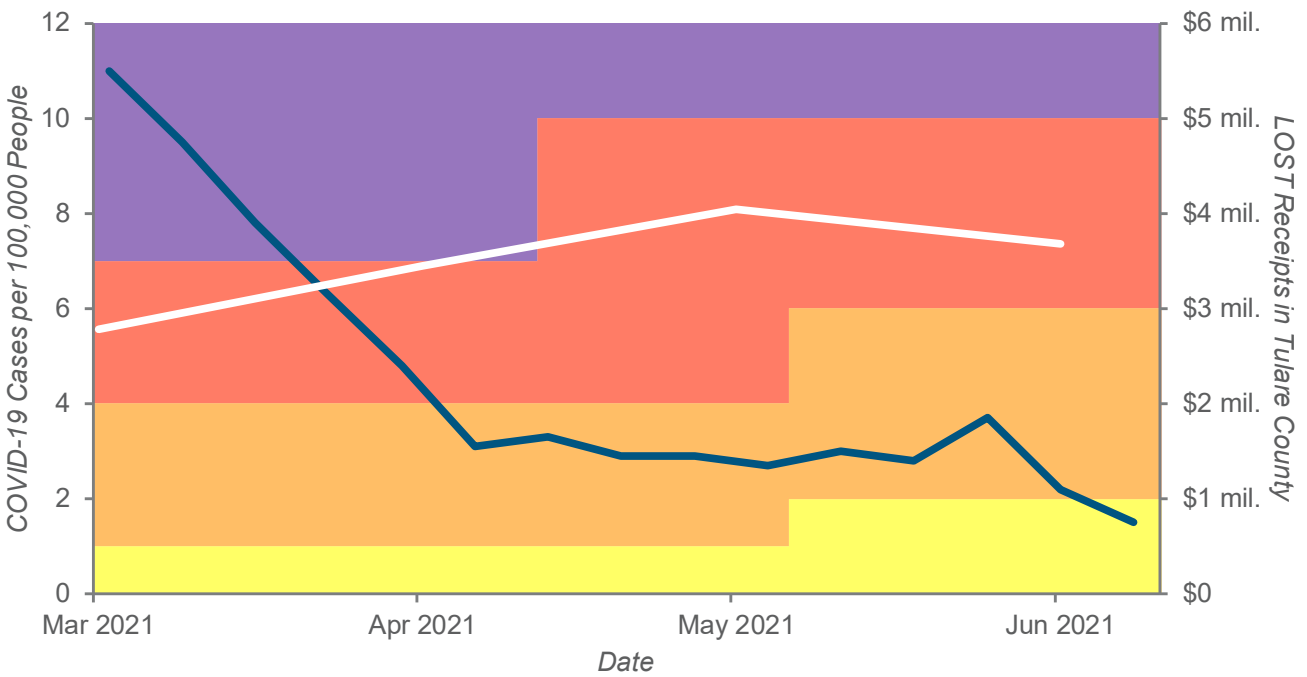
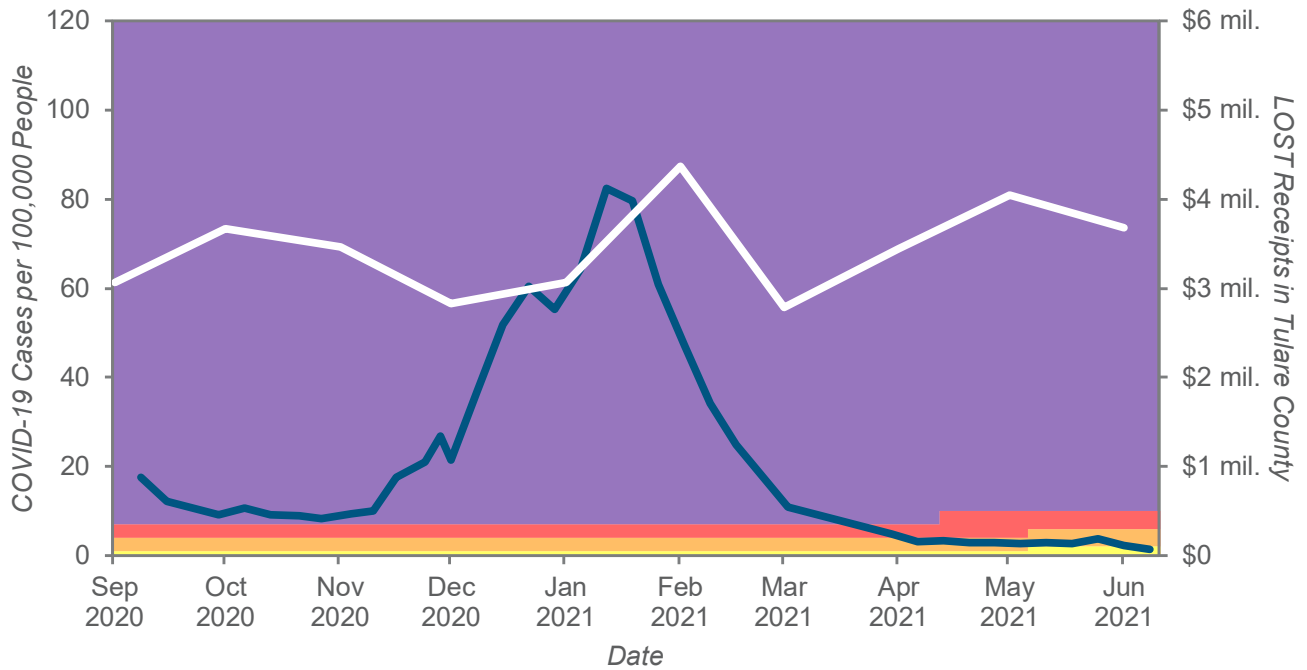
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure 5. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in San Francisco County

Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure 6. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Tulare County

Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021

and businesses abided by the restrictions and the strictness with which governments enforced them likely varied geographically. However, lacking data on compliance with these regulations, we still see little relationship to county LOST revenues.

Next, to better understand how national economic trends affected local revenues, we examined the relationship between unemployment and LOST revenues. We use unemployment as a proxy for the state of the economy. Unemployment should lead to reduced incomes and therefore reduced spending on goods and services subject to sales taxes. We expect unemployment and LOST revenues to be inversely related.

Figure 7 plots the average unemployment rate for all counties with LOSTs and LOST revenues collected. For California as a whole, we see the expected pattern: when unemployment rose, LOST receipts fell; when unemployment declined, LOST receipts increased. This relationship was particularly evident in January through July 2020, where the large spike in unemployment from the initial lockdown coincides with a drop in LOST revenues. During the second half of the year, the relationship between these two variables was slightly more ambiguous.

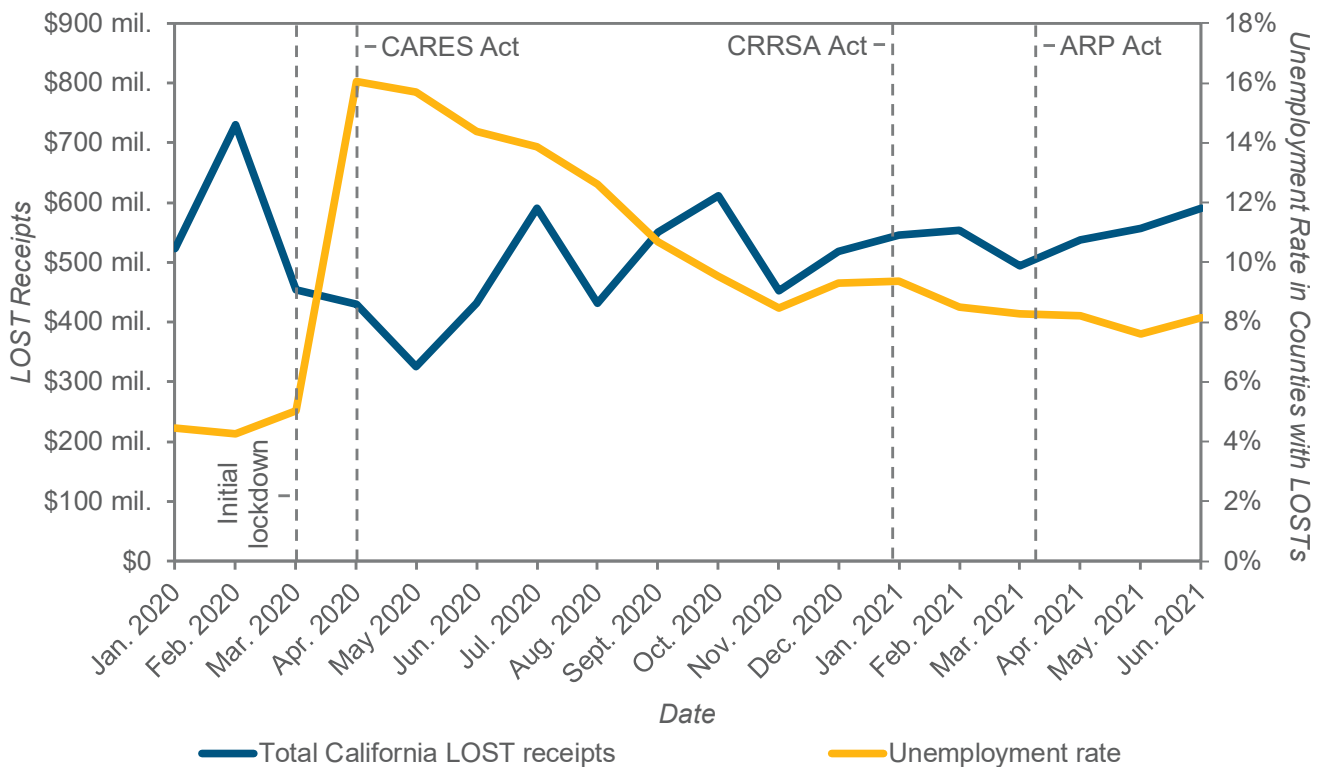


Figure 7. LOST Receipts and Unemployment in California

Data sources: California EDD, 2021 and CDTFA, 2021

Figure 7 also shows that unemployment was less volatile than sales tax revenues. While LOST revenues recovered after the initial drop, they did so unevenly, with revenues varying by hundreds of millions of dollars from month to month. By contrast, unemployment slowly and relatively consistently recovered over the following seven months. Only in December 2020, amidst rapidly rising cases, did unemployment rise again.

However, the relationship between unemployment and sales tax receipts is not as straightforward at the county level. For example, counties that experienced a greater loss in sales tax revenue had *lower* pre-pandemic unemployment rates than those that gained or only slightly lost sales tax revenue. This trend continued during the pandemic: unemployment levels tended to be lower in counties with larger LOST revenue declines. At the same time, unemployment trends were broadly similar across most LOST counties: unemployment spiked sharply in March and April 2020 during the initial stages of lockdown orders in California and gradually declined after, although by the end of 2020, the state-level unemployment rate (9%) still greatly exceeded levels seen a year before (around 5%).

Across all LOST counties, then, unemployment appears to be related to LOST revenue generation, particularly during the early months of the pandemic. On the whole, LOST receipts during the pandemic increased when unemployment fell, and vice versa. LOST revenues depend on consumer spending, so revenues drop when consumer demand does. That all counties followed this basic pattern shows that state- and national-level economic trends affected different counties in similar ways. This does not, however, explain variation in LOST revenue patterns across counties. To better understand county-level variation in LOST revenues, we examined additional, local socioeconomic factors.

One of these factors is income. Counties that maintained or increased LOST revenues during the pandemic had lower pre-pandemic median incomes than those that saw declines in tax receipts (See **Figure 8**, top left). Although not all high-income counties had poorly performing LOSTs, all counties with the worst-performing LOSTs were high-income. Conversely, the counties with best-performing LOSTs were relatively lower-income. This pattern likely reflects the influence of income on consumer demand for taxable goods. Both absolute and relative spending on discretionary taxable goods and services tends to be higher for higher-income workers, who also make larger cuts to their spending during times of economic weakness. Lower-income individuals have more stable consumption patterns, as a smaller share of their spending is discretionary (Berger and Vavra, 2015; Meyer and Sullivan, 2013; and Toivonen, 2000). Therefore, counties with higher amounts of disposable income experienced more volatility in LOST revenues than lower-income counties.

While these relationships between sales tax revenues and both unemployment and median income are suggestive, additional characteristics of counties' economies may also have contributed to patterns of LOST revenue collection during COVID-19. The pandemic affected various sectors of the economy differently, as government public health mandates, employer policies, consumer attitudes, and the toll of the disease itself unevenly affected the state's industries. For example, many office workers were able to maintain full-time employment by working from home rather than commuting into the office. Many service and retail workers, by contrast, faced lay-offs or furloughs because their place of business was forbidden from operating or allowed to operate only under reduced capacity. Thus, LOST revenue was likely depressed more in counties that rely heavily on industries that were most affected by COVID-19. Such counties had a relatively larger number of taxpayers with relatively less income in circulation and fewer opportunities to spend what income they did have.

To explore the effect of industry composition on LOST revenue generation, we investigated whether counties with employment concentrated in different sectors saw larger declines in LOST revenues. We compared employment across industry sectors to changes in LOST revenues in each county between 2019 and 2020. For most industries, we did not find an obvious relationship between industry-specific employment and LOST revenues changes. Two sectors where we do see such a relationship are the information sector (See **Figure 8**, top right) (for example, software companies) and professional, scientific, and technical services (See **Figure 8**, bottom left) (for example, consulting and office work). Overall, counties with higher levels of employment in both of these industries tended to see larger LOST revenue declines during the COVID-19 pandemic. Employment in the

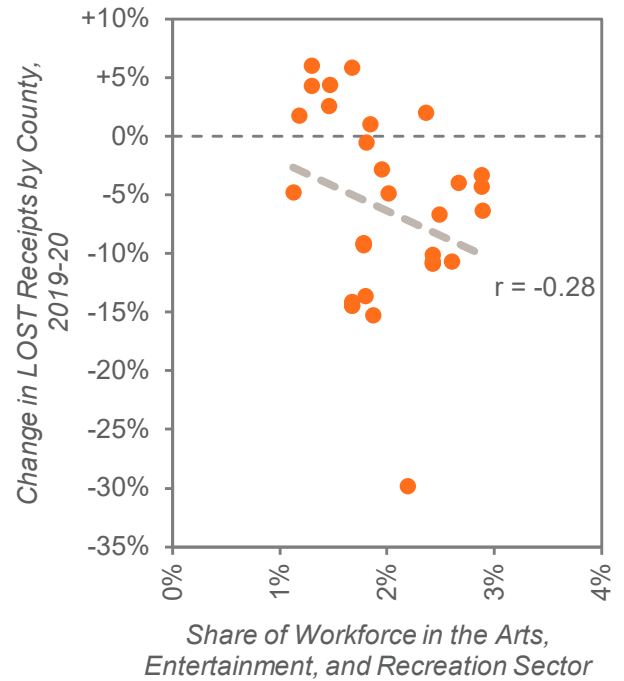
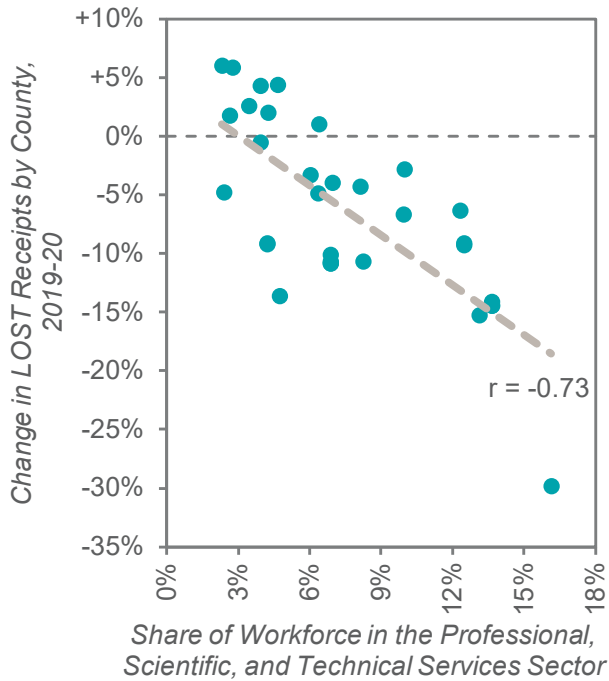
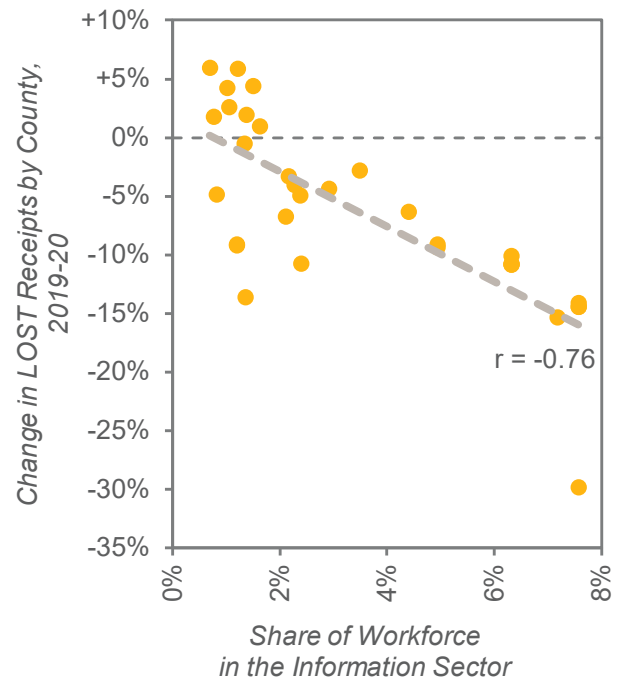
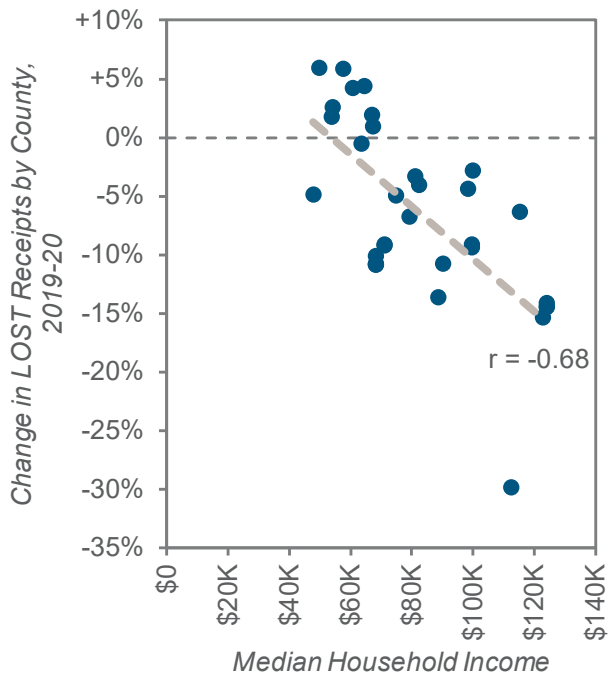


Figure 8. Changes in LOST Receipts in Relation to Various Characteristics of County Economies⁶

Data sources: California EDD, 2021; CDTFA, 2021; and U.S. Census Bureau, 2020, 2021

6. As new measures in 2019, San Benito Measure G and San Mateo Measure W are excluded.

professional, scientific, and technical services sector was up to four times higher in the counties with the largest revenue losses in comparison with the best-performing LOST counties and up to eight times higher in the information sector. Workers in these sectors were much more likely to work from home during the pandemic and, we suspect, eschew discretionary out-of-home activities like dining out, discretionary shopping, travel, and entertainment, compared with workers in lower-income counties who were more likely to work in other industrial sectors. These findings suggest that residents of these lower-income counties with relatively small shares of local employment in information technology and professional services tended to spend relatively less on out-of-home activities subject to sales taxes prior to the pandemic and thus had fewer taxable purchases to forego amidst the pandemic.

Similarly, we observe differences, albeit more modest, with respect to employment in arts, entertainment and recreation (See **Figure 8**, bottom right). During the pandemic, amusement parks, theaters, museums, concert venues, sporting arenas, and other types of destinations closed or were strictly limited in their operations. Counties that lost the most LOST revenues during the pandemic tended to have a higher percentage of employment concentrated in this sector.

Discussion

We find that transportation revenues in the 25 California counties with LOSTs dramatically collapsed at the start of the COVID-19 pandemic, but recovered to a remarkable degree thereafter. Variation in LOST revenues across counties correlates with key differences in labor markets and consumer demand. For instance, LOST revenues in lower-income counties generally proved less vulnerable to the economic downturn than revenues in higher-income jurisdictions whose residents have more disposable income, on average. Unemployment—a symptom of a weak economy and lagging consumer demand—was also associated with lower revenues. Similarly, counties with higher levels of employment in sectors whose operation was significantly curtailed under government public health restrictions experienced larger percentage declines in LOST revenues. Surprisingly, we find no substantive relationship between county-level LOST revenues and county-level lockdown restrictions. LOST revenues did fall after state-level lockdown restrictions were imposed close to the start of the pandemic, but later county-level restrictions do not noticeably coincide with patterns in LOST receipts.

The ability of LOSTs to generate revenue for transportation is therefore a function of both national economic trends and local socioeconomic context. In some ways, this parallels the reasons jurisdictions adopt LOSTs in the first place: counties gravitated towards LOSTs amid a national trend toward the devolution of transportation finance and enact them in response to local socioeconomic contexts. For example, jurisdictions that rely on tourism are more likely to adopt sales taxes as a way to “export” the tax burden on to non-voters. As our analysis illustrates, the resiliency of transportation LOSTs as a revenue instrument similarly relies on the interactions of national economic forces and local socioeconomic and policy contexts. Revenue projections should account for these differences, but many early, dire pandemic forecasts did not.

While LOST revenues declined due to the effects of COVID-19 on public health and economic activity, revenue decreases were not as large as some analysts first predicted. In part, this may be because many expected the economic impacts of the pandemic to resemble the Great Recession, which was followed by a very slow, protracted recovery. However, these two economic downturns had fundamentally different causes. The Great Recession stemmed from weaknesses internal to the economic system (such as the rise of subprime loans and credit default swaps in housing finance markets), while the economic disruption of 2020 was spurred by a public health crisis that quickly, albeit temporarily, put an otherwise booming economy into an induced coma, with enormous effects in particular sectors, such travel and leisure expenditures. Although sales dipped in the early months of the COVID-19 pandemic, at this writing (five quarters after its onset) consumer demand for owner-occupied housing is booming (Glink and Tamkin, 2021). Moreover, as the number of COVID-19 cases and, in particular, deaths decreased in large part as a response to rising vaccination rates, governments gradually relaxed public health restrictions limiting social and economic activities. As a result, the economic disruption caused by the COVID-19 pandemic started receding, allowing for a quick recovery. By contrast, it took housing markets many years to recover from the effects of over-reliance on subprime mortgage instruments. In addition, the three major federal COVID-19 relief bills provided funding to individuals, businesses, and governments to a far greater extent than similar legislation in the Great Recession (Martin, 2020). The Great Recession and what came after thus serves as a rather imperfect guide for the effects of COVID-19.

Federal relief and the (to date) relatively rapid economic bounce-back are good news for local government and transportation agency budgets in the wake of COVID-19. However, our findings highlight the need to better incorporate uncertainty into revenue projections. Sources of uncertainty include the strength of the economy, major public health events, and the particular revenue instruments in play, among others (Agrawal et al., 2020).

Such projections are necessary for governments to plan and deliver infrastructure and services, and the inherent uncertainty during times of crisis is unavoidable. Indeed, revenue projections should account for an uncertain degree of volatility. Projections that do not account for uncertainty are less likely to account for unlikely, but plausible, futures—like a global public health crisis. The importance of planning for uncertainty will only increase over time as climate change heightens the environmental stresses placed on transportation systems, as fuel-efficient and electric vehicles erode conventional surface transportation funding mechanisms, and as new technologies promise continued disruptions to transportation systems.

In the context of LOSTs, incorporating uncertainty into financial planning may mean more flexible project priority lists to account for potential revenue shortfalls (or windfalls) in the ballot proposals placed before voters. For example, Fresno County's Measure C divides projects into higher-priority Tier 1 projects and lower-priority Tier 2 projects (Lederman et al., 2021). By approving prioritized project lists, voters therefore sign off on what should happen if revenues fall short of projections or project costs greatly exceed them. Such a strategy maintains the democratic legitimacy of decision-making processes while acknowledging the inevitable uncertainty of all forecasting exercises. Analysts might also consider a wider variety of revenue scenarios or explicitly implement scenario planning strategies to account for multiple plausible futures. Further, planners can subject analytical results to sensitivity analyses, testing how revenue projections change under different assumptions.

Many transportation budgets overall fared better during the pandemic than LOSTs, due to emergency federal support. Despite losses in revenues from sources like fares and tolls, federal stimulus spending boosted many transportation budgets. For instance, public transit operators in California's counties with LOSTs received \$9.5 billion in federal stimulus funds from the three federal COVID-19 relief bills (FTA, 2021a, 2021b, 2021c).⁷ These transit operators used federal stimulus funding to fill gaps in revenues from both dramatically lower ridership (BTS, 2021 and Transit App, 2021) and reduced LOST revenues.

Despite their pandemic losses—or because of their pandemic resilience—LOSTs are likely to continue to proliferate in the long run as a way to fund local transportation needs. Voters tend to perceive LOSTs as a way to ensure locally generated tax revenues are expended locally, and LOSTs allow voters to export their tax burden at least partially onto non-resident visitors. LOSTs provide an alternative to motor fuel taxes, whose buying power will continue to decline over time as average fuel mileage rises and as a greater share of the vehicle fleet is composed of electric cars and trucks. LOSTs also allow transportation system costs to be spread out over all community members, some of whom benefit from transportation system improvements while paying no property taxes or taxes related to vehicle use. For example, carless renters may benefit from robust trucking delivery networks that ensure a continual supply of consumer goods.

Nevertheless, the pandemic has also laid bare and did not fundamentally change the disadvantages of LOSTs. As we have shown, LOST revenues are sensitive to the strength and structure of the economy. In addition, LOSTs are regressive with respect to income, in that lower-income people tend to dedicate a greater share of their income to purchases subject to sales taxes than higher-income people (Albrecht et al., 2017; Schweitzer and Taylor, 2008).⁸ Likewise, LOSTs decouple transportation system use from transportation tax payments. As a

7. \$3.6 billion from the CARES Act (FTA, 2021b), \$2.0 billion from the CRRSA Act (FTA, 2021c), and \$3.9 billion from the ARP Act (FTA, 2021a).

8. Any finance mechanism that does not account for ability to pay when charging contributors is likely to be regressive with respect to income (except perhaps consumption taxes on luxury goods). For example, motor fuel taxes are also regressive with respect to income, although they may be less regressive than sales taxes (Albrecht et al., 2017 and Schweitzer and Taylor, 2008). In California, the regressivity of sales taxes is somewhat mitigated by the fact that food (and items purchased

result, heavy users of the transportation system—who impose large costs on the system—may not pay enough in LOSTs to compensate for those costs, and the reverse is often true for those who travel little. Unlike vehicle-miles-traveled fees and congestion pricing, LOSTs do not vary according to the different costs imposed by particular trips. And unlike motor fuel taxes, LOSTs do not implicitly tax travel-related pollution. All told, LOSTs may reliably provide revenues, but unlike road use charges (including motor fuel taxes), they do not send price signals about the social costs of travel that can be used to encourage less costly and more sustainable travel.⁹ LOSTs, in other words, are not a tool for managing transportation systems, merely one for funding them. This is not necessarily a fatal flaw—the primary purpose of revenue instruments is, after all, to generate revenues, and LOSTs are certainly successful at that, even amidst the worst global pandemic in more than a century. But a choice to rely on a mechanism like LOSTs is a choice to depend on an income-regressive tax instrument that offers little opportunity to optimize access or the welfare benefits of improving system performance.¹⁰ In this way, the choice of a revenue instrument can be quite costly.

with food stamps), as well as transit fares (paid disproportionately by low-income travelers who also constitute the bulk of transit riders (Taylor and Morris, 2015)), are exempt from sales taxes (Albrecht et al., 2017 and CDTFB, n.d.).

9. An ideal surface transportation funding mechanism might account for variation in the marginal social costs of travel by location, time of day, axle weight of vehicle, and vehicle emission profile. Ideally, more socially expensive trips should cost travelers more than less socially expensive trips, which should encourage more socially optimal travel overall.

10 Vehicle miles traveled fees and congestion pricing generate revenues that could be used to directly address the disproportionate harms to low-income residents and people of color (such as using congestion fees on a specific roadway to fund transit improvements along that roadway). Sales taxes lack this ability, as the place and time of their collection has almost no direct relationship to where and on what types of projects the revenues are spent (Manville and Goldman, 2018).

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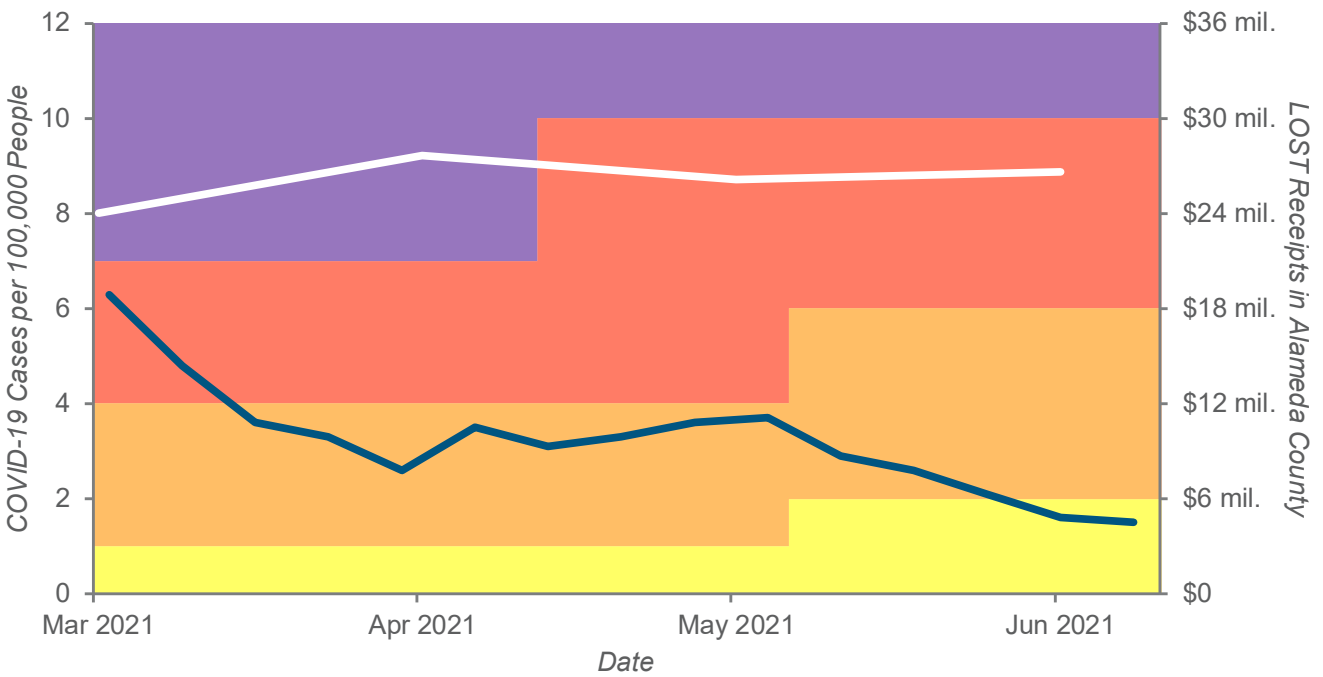
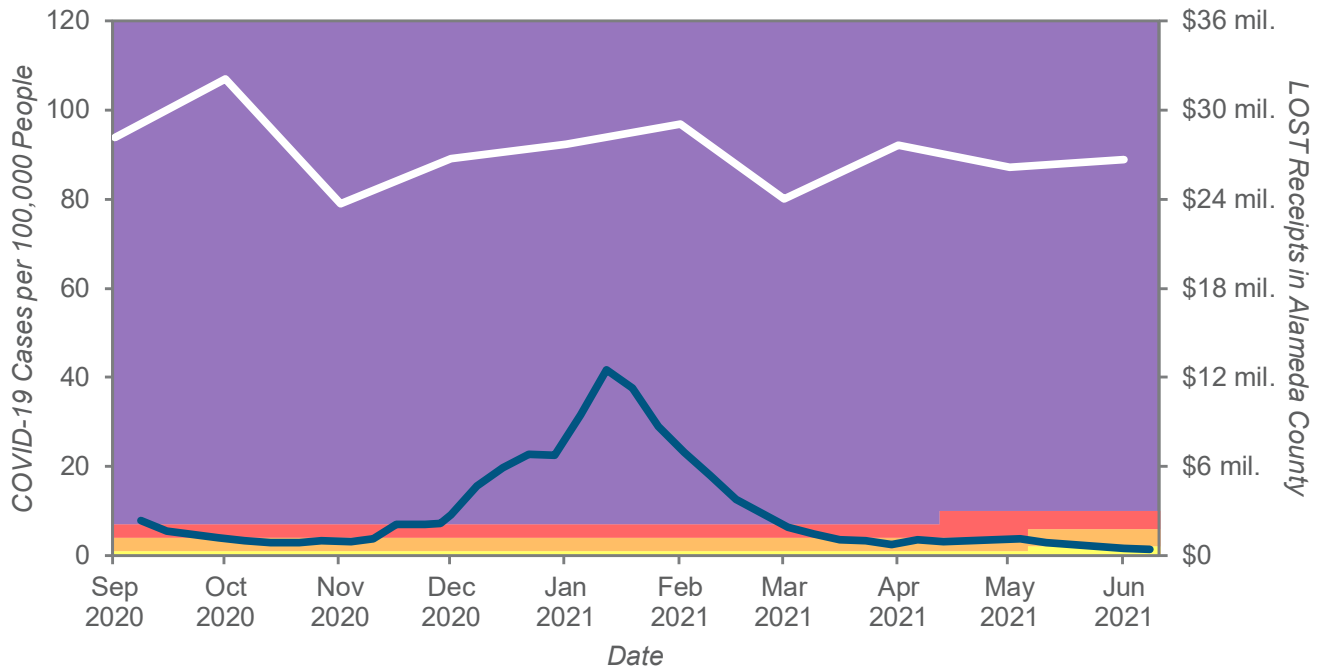
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Appendix

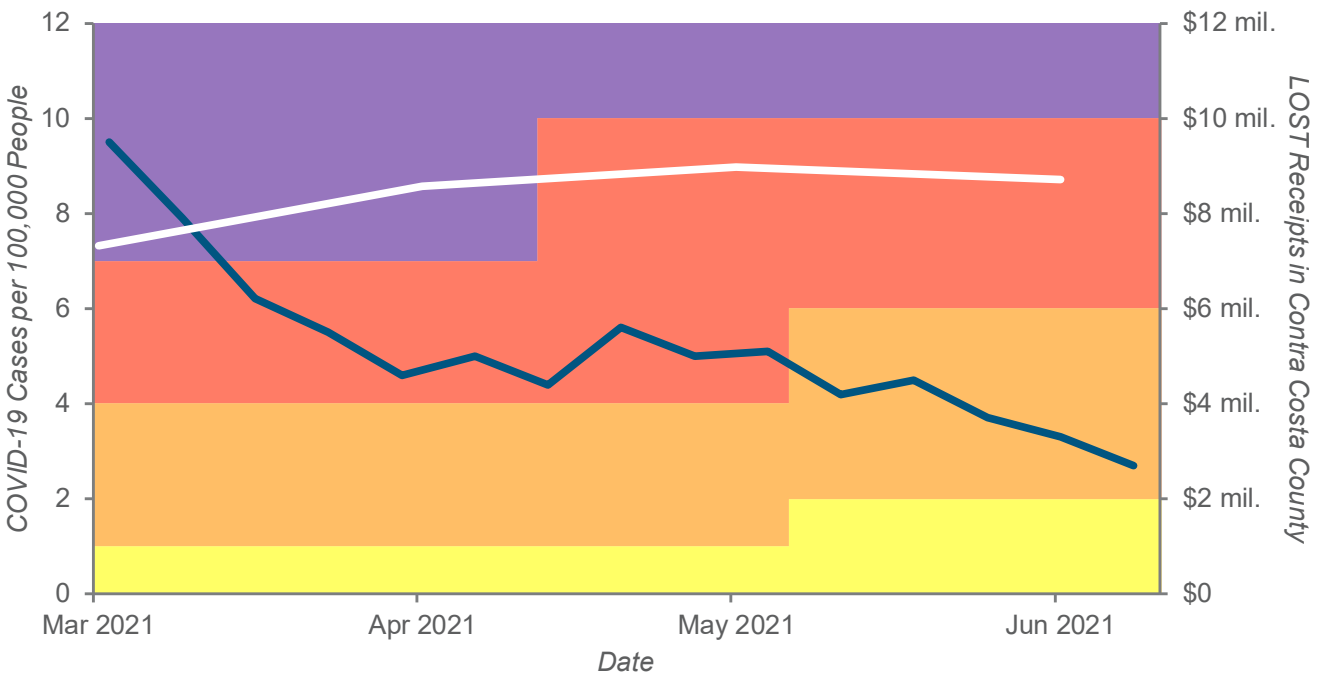
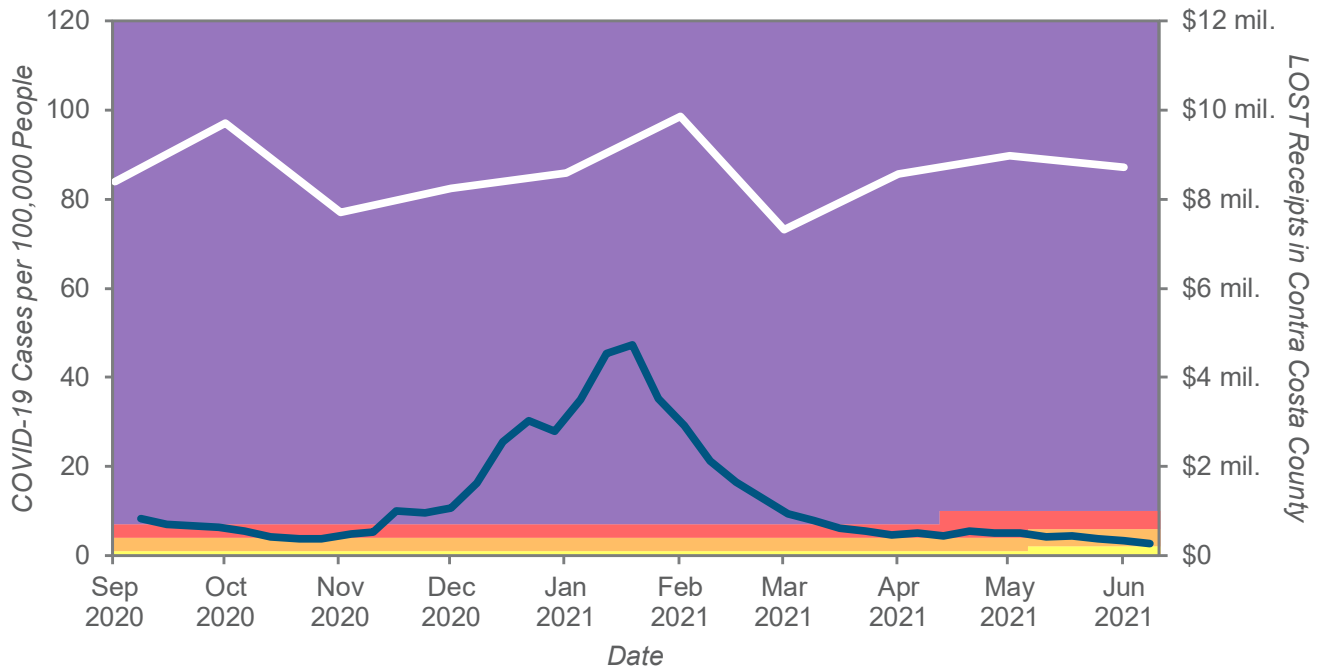
Appendix: COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts by County



— COVID-19 cases, 7-day rolling average
 — Monthly LOST receipts

Figure A-1. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Alameda County

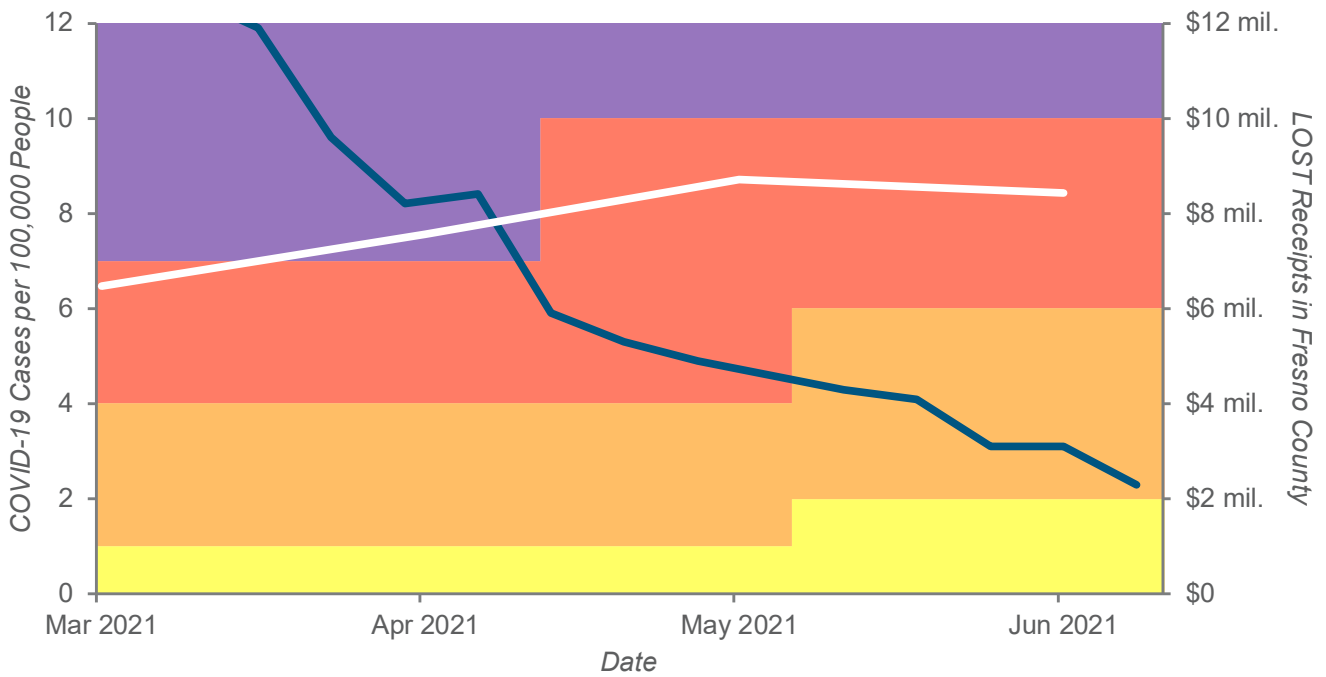
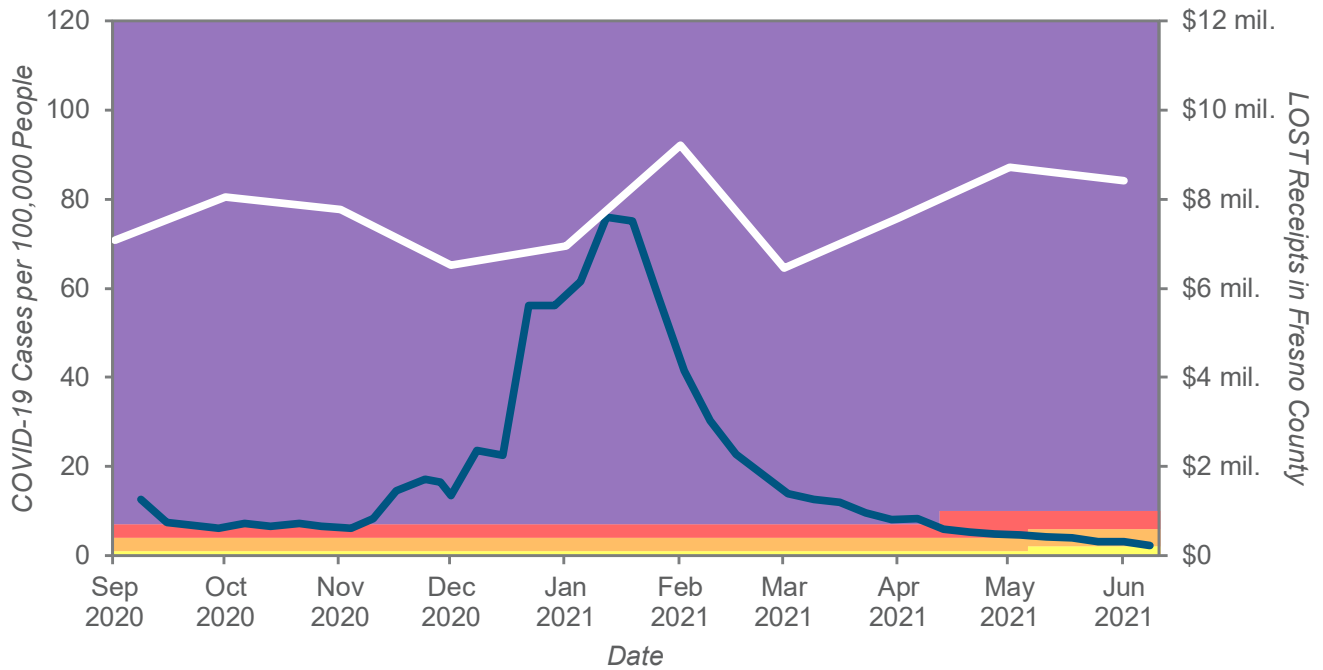
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-2. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Contra Costa County

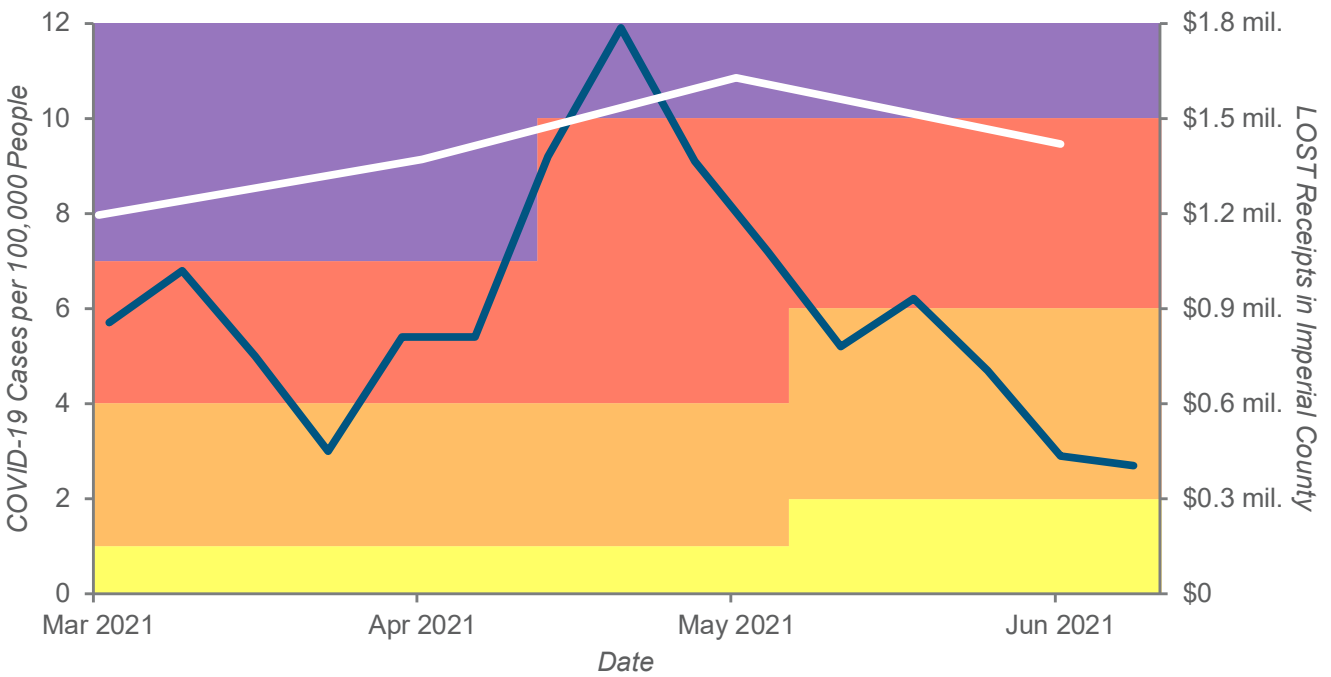
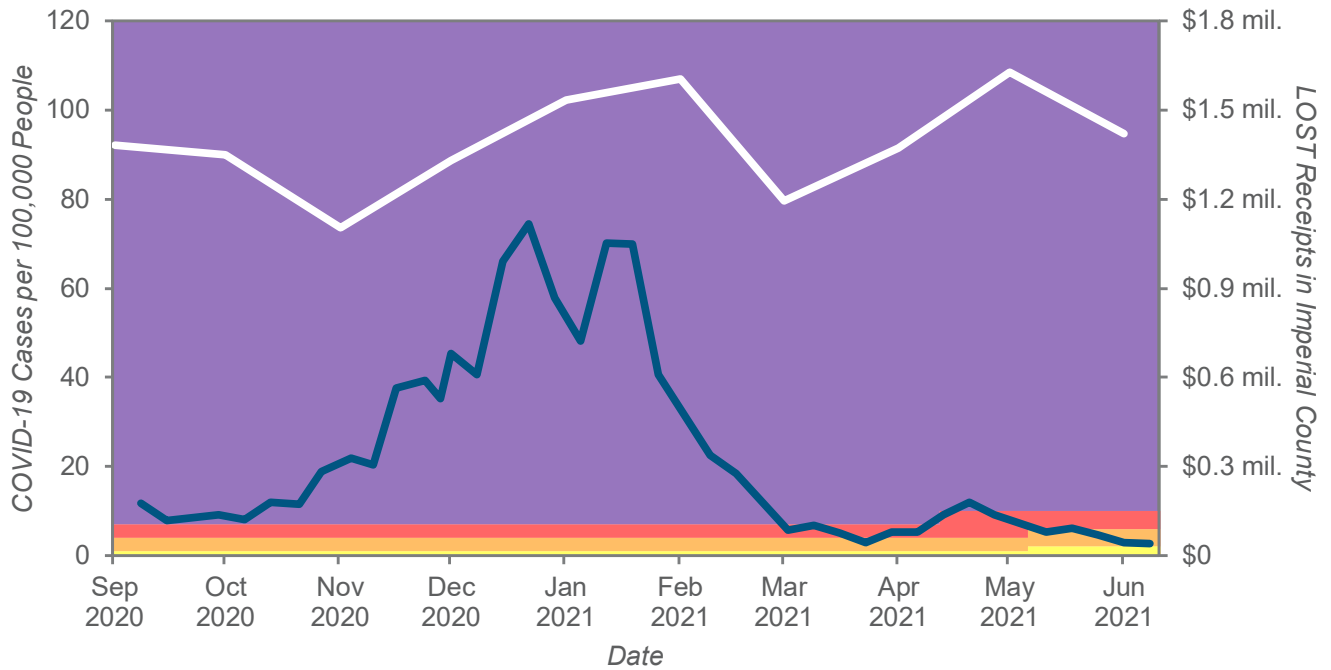
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average
 — Monthly LOST receipts

Figure A-3. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Fresno County

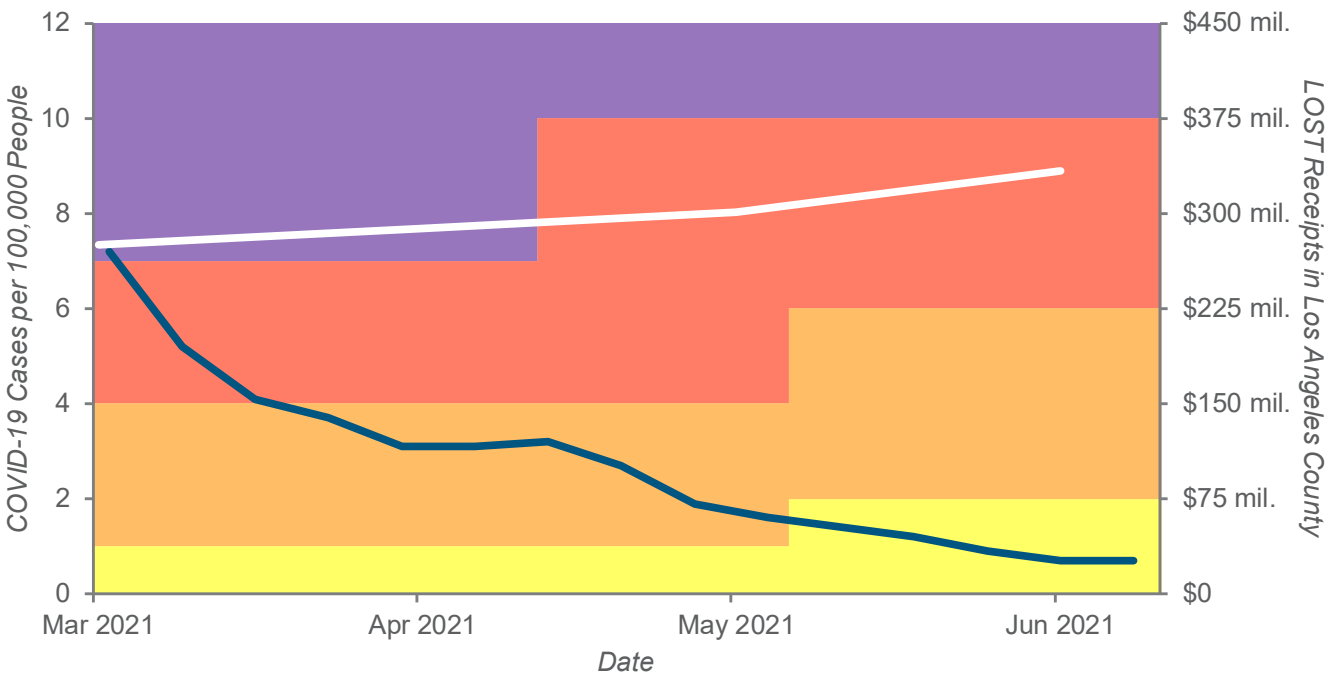
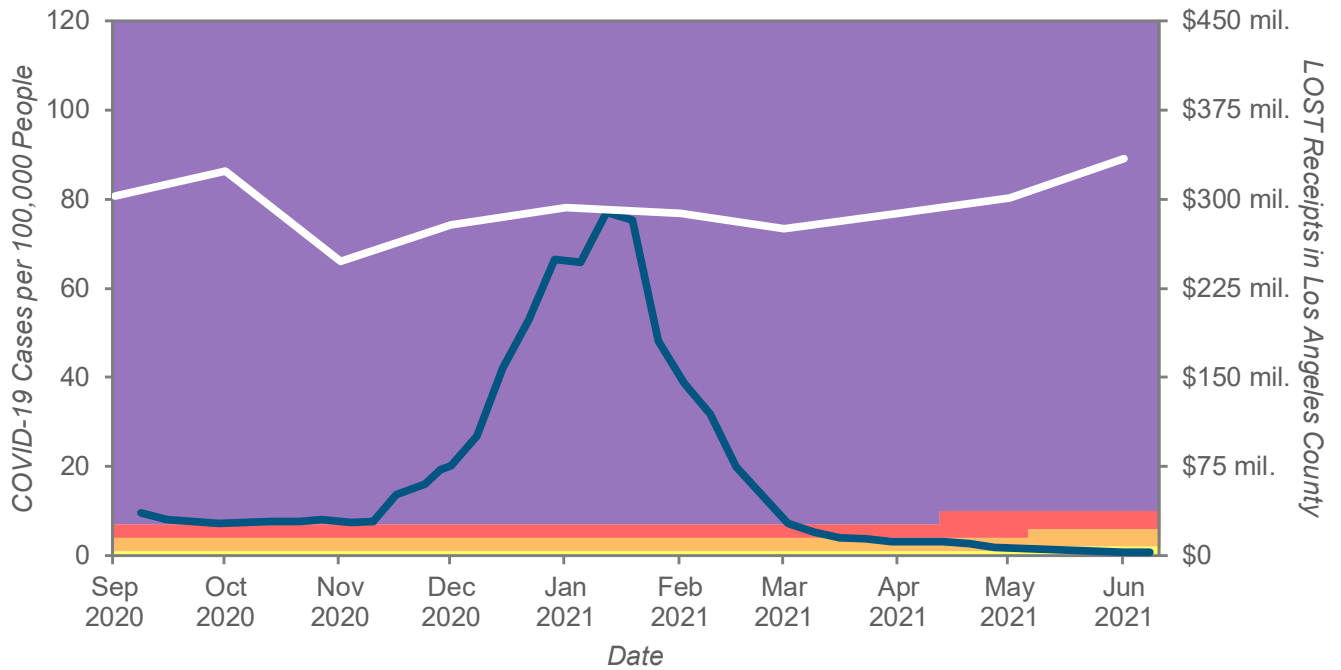
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-4. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Imperial County

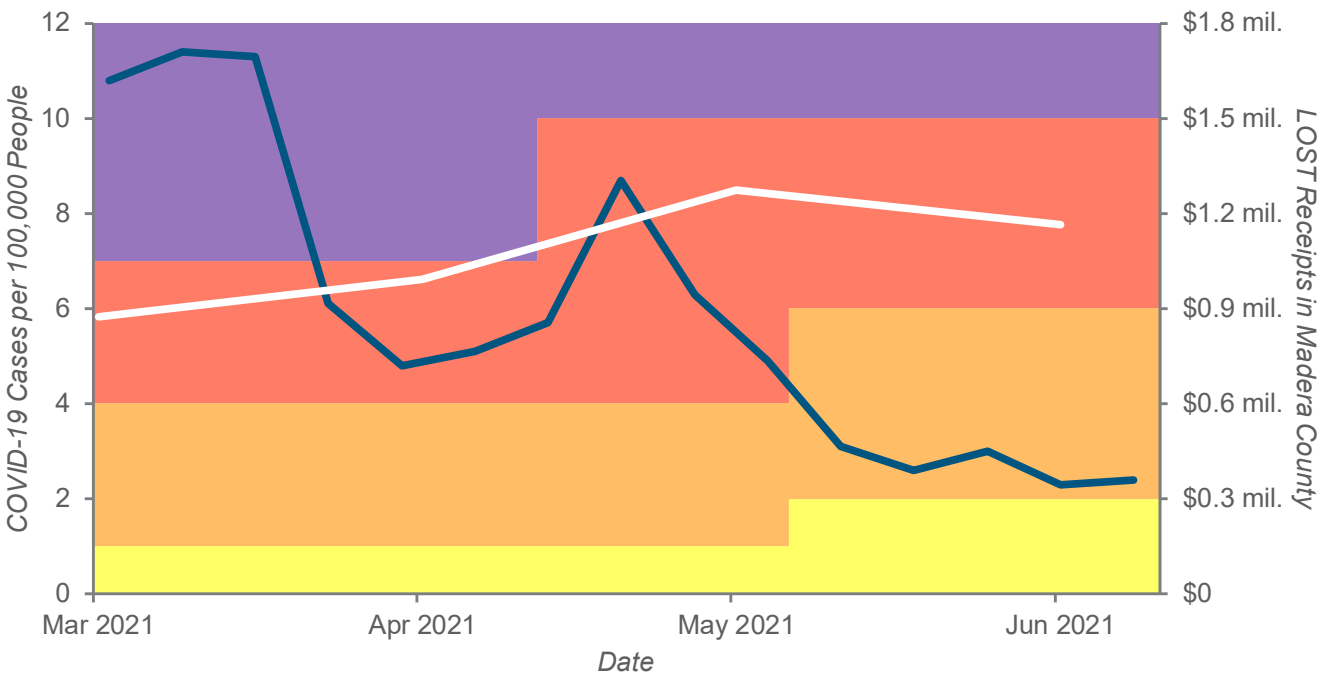
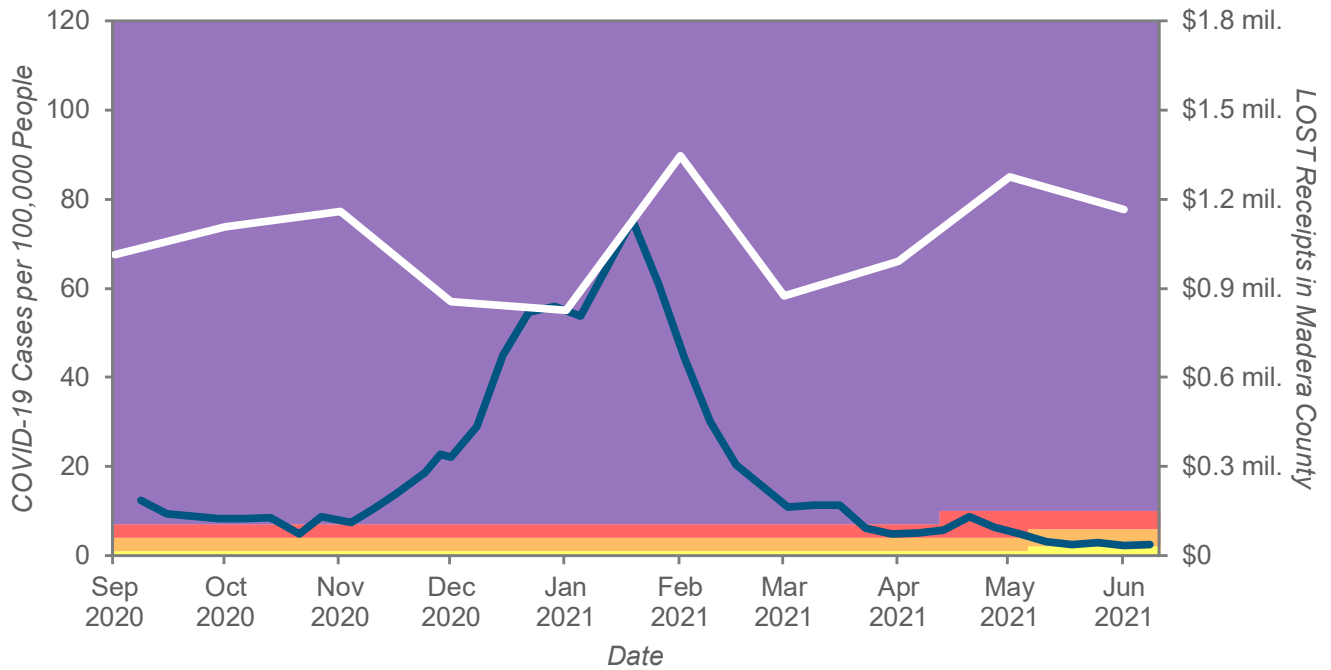
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-5. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Los Angeles County

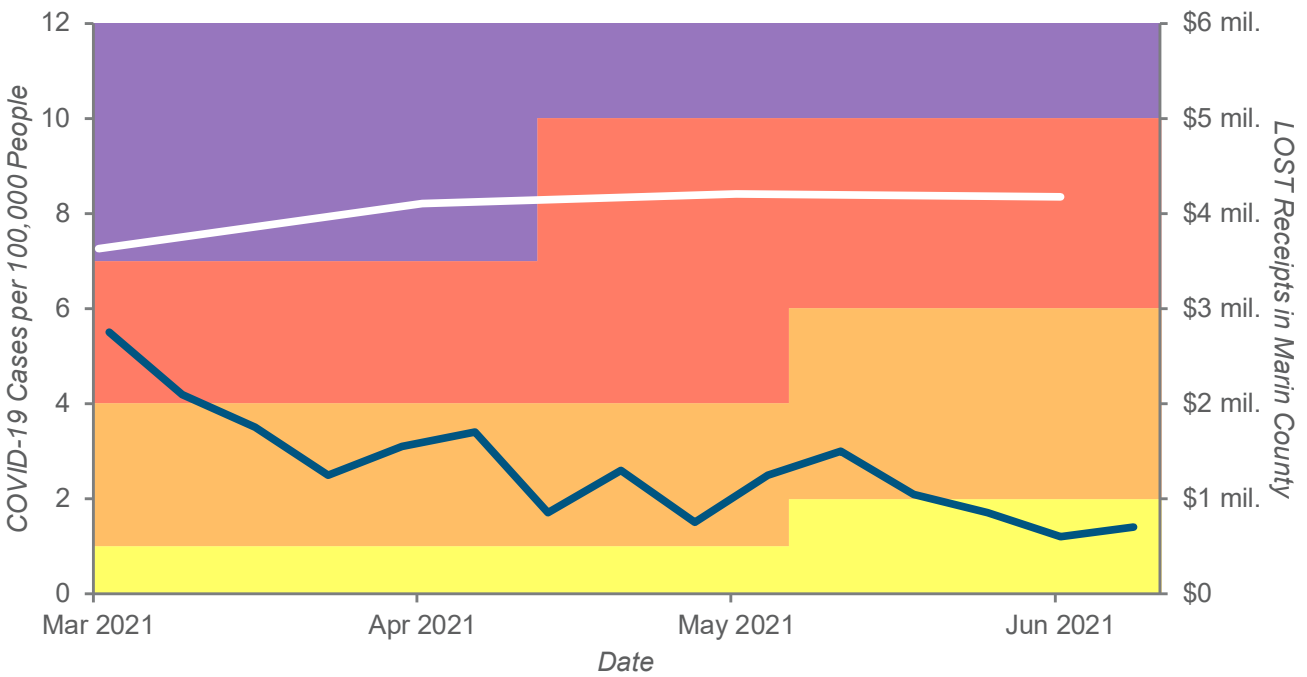
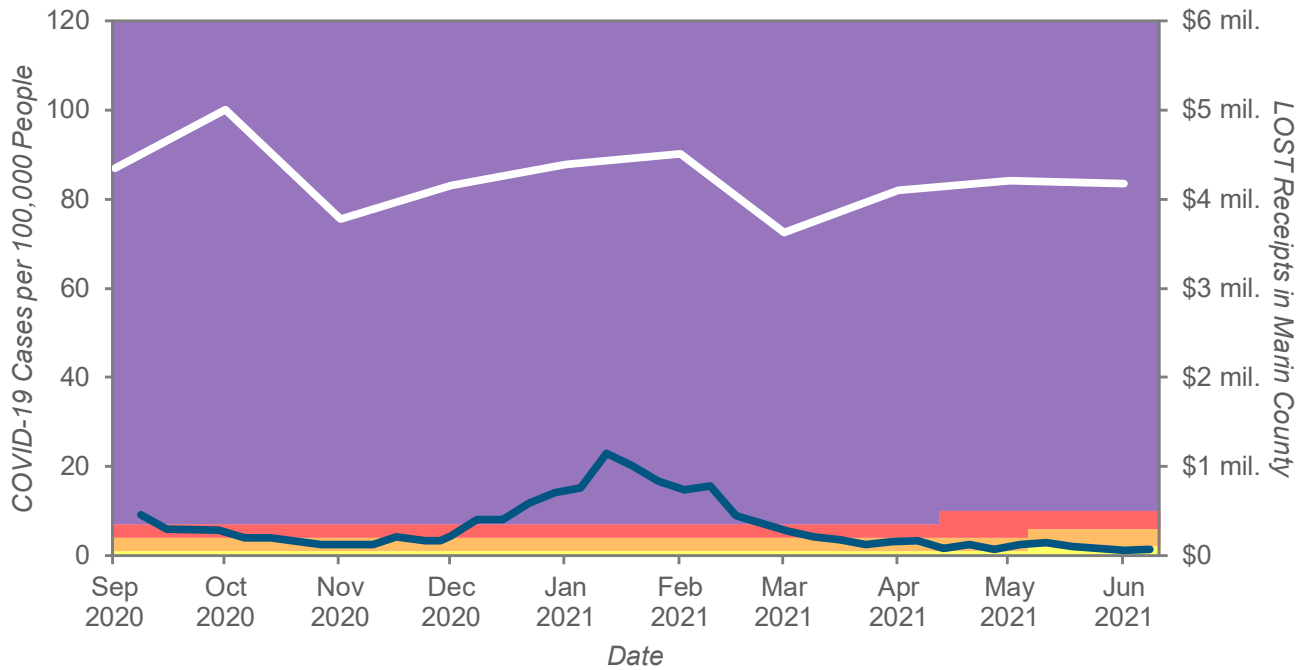
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-6. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Madera County

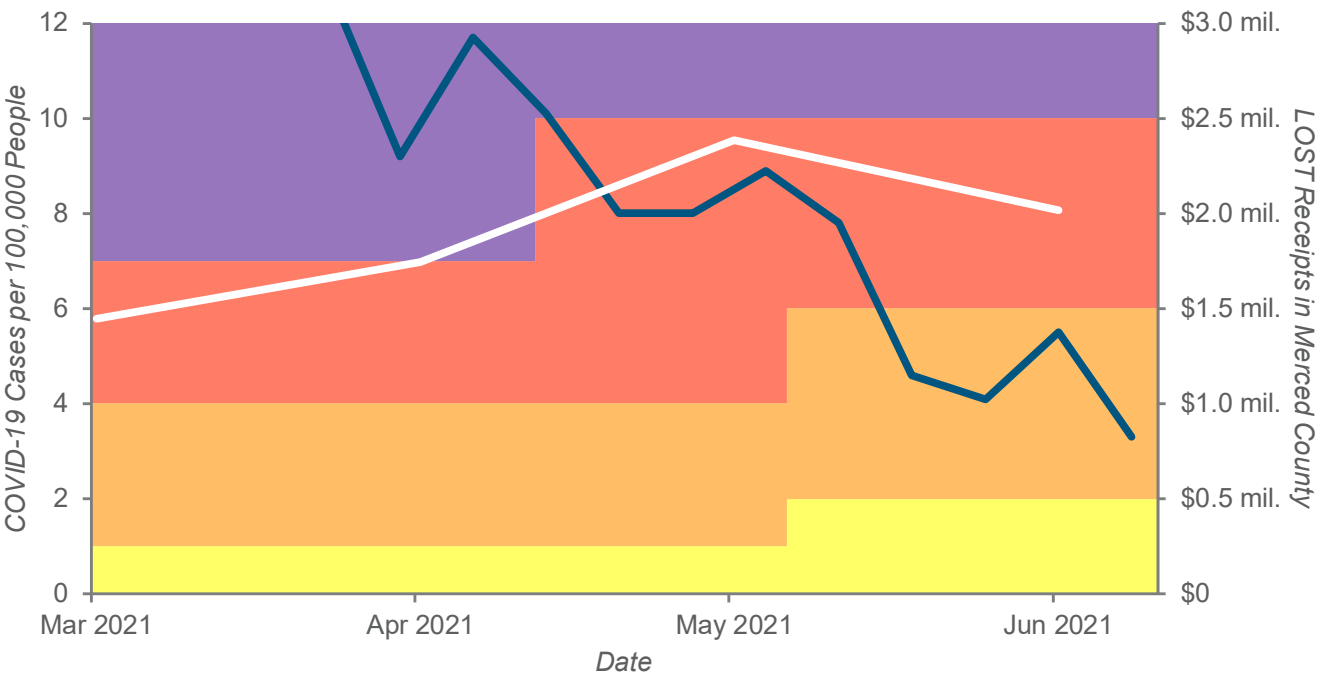
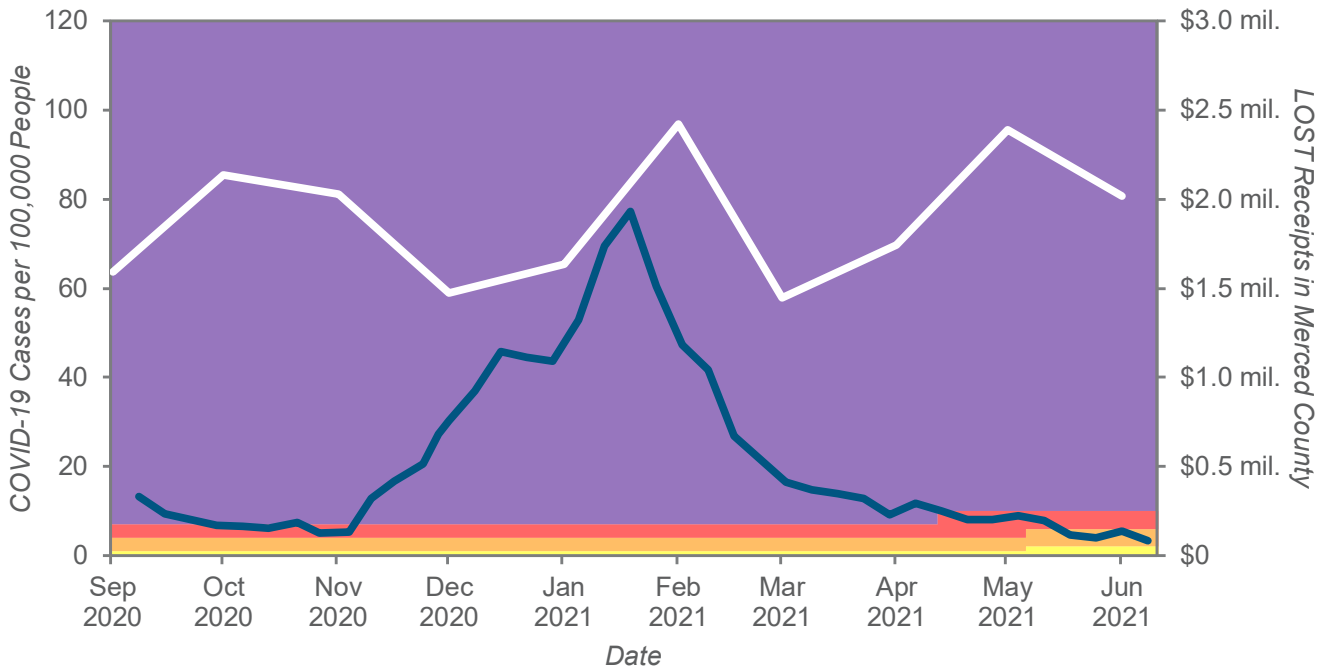
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-7. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Marin County

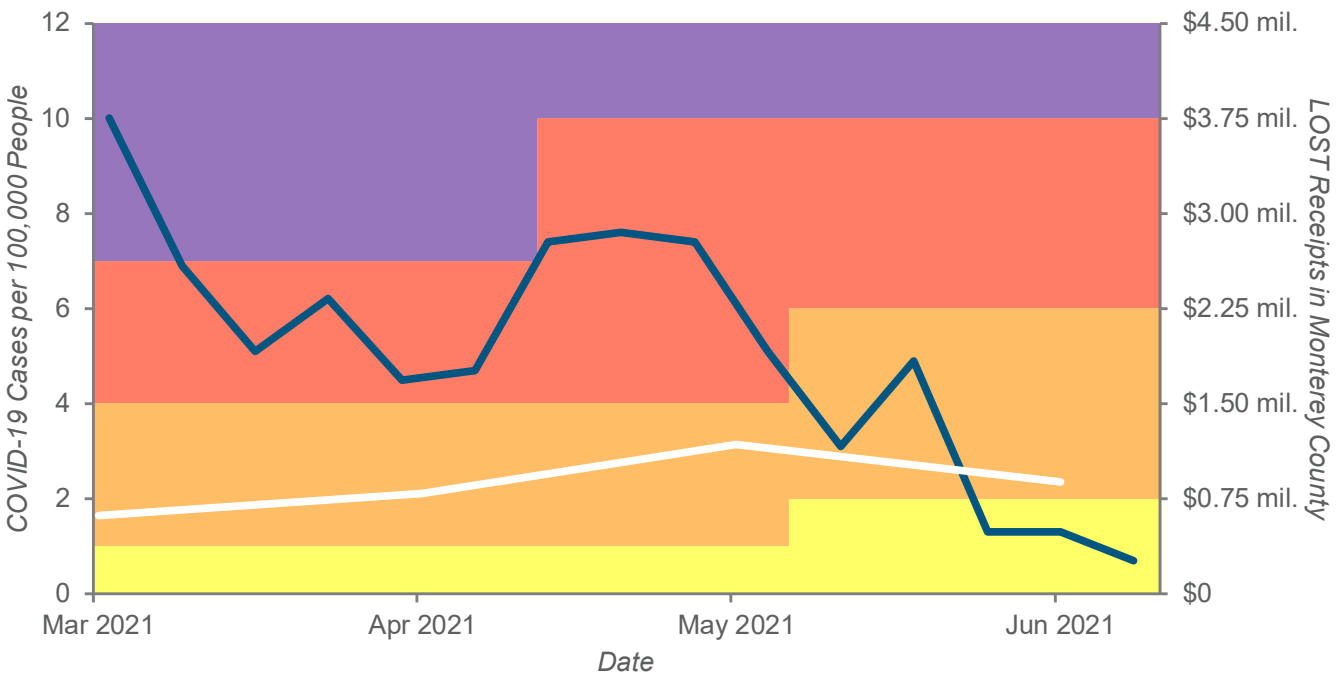
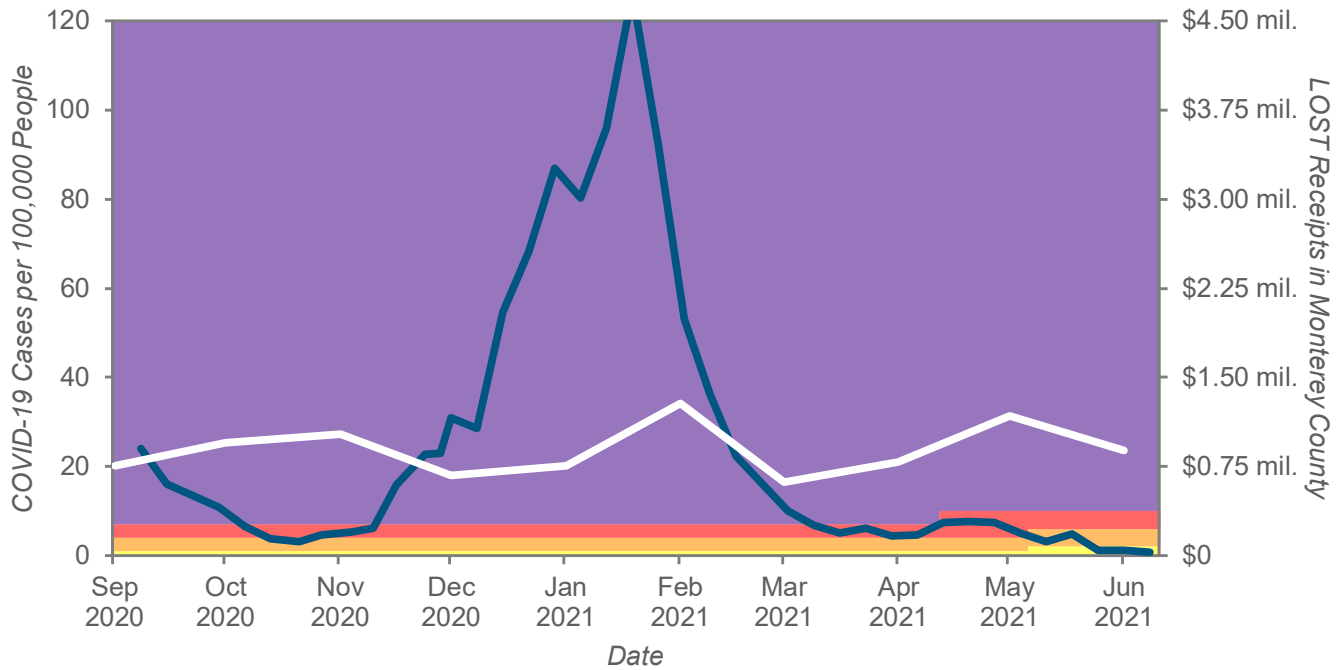
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-8. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Merced County

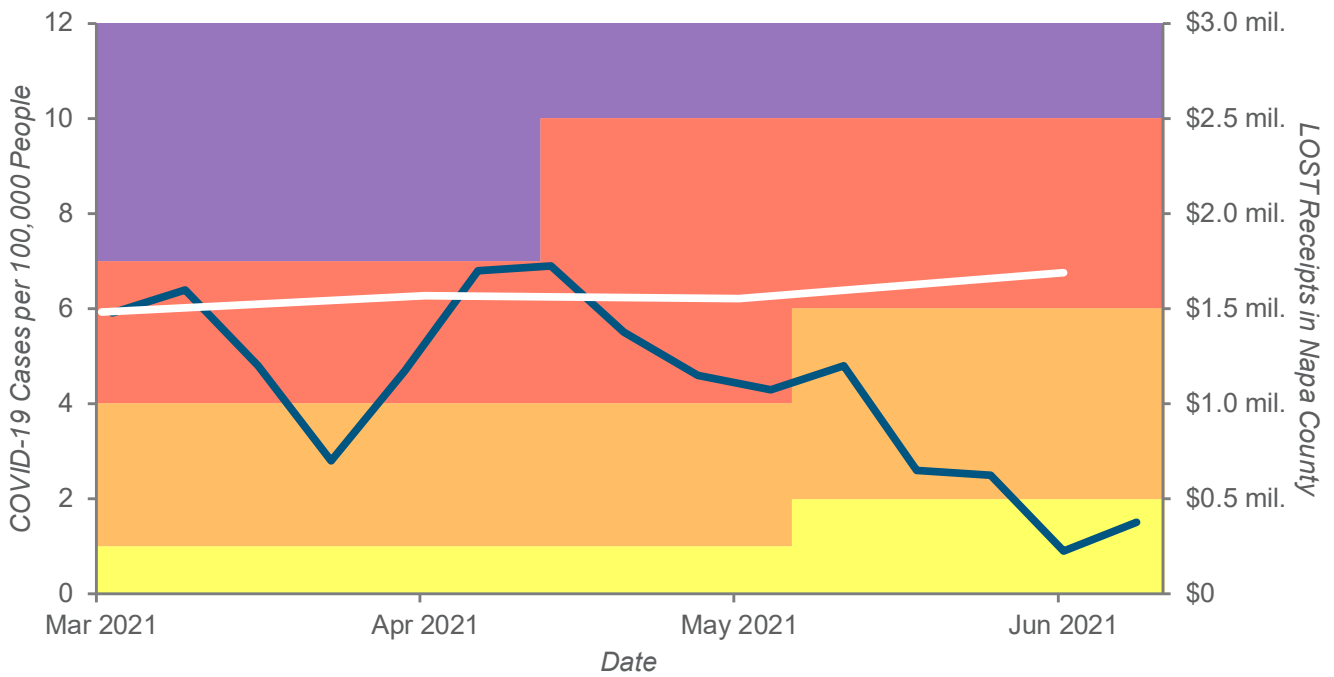
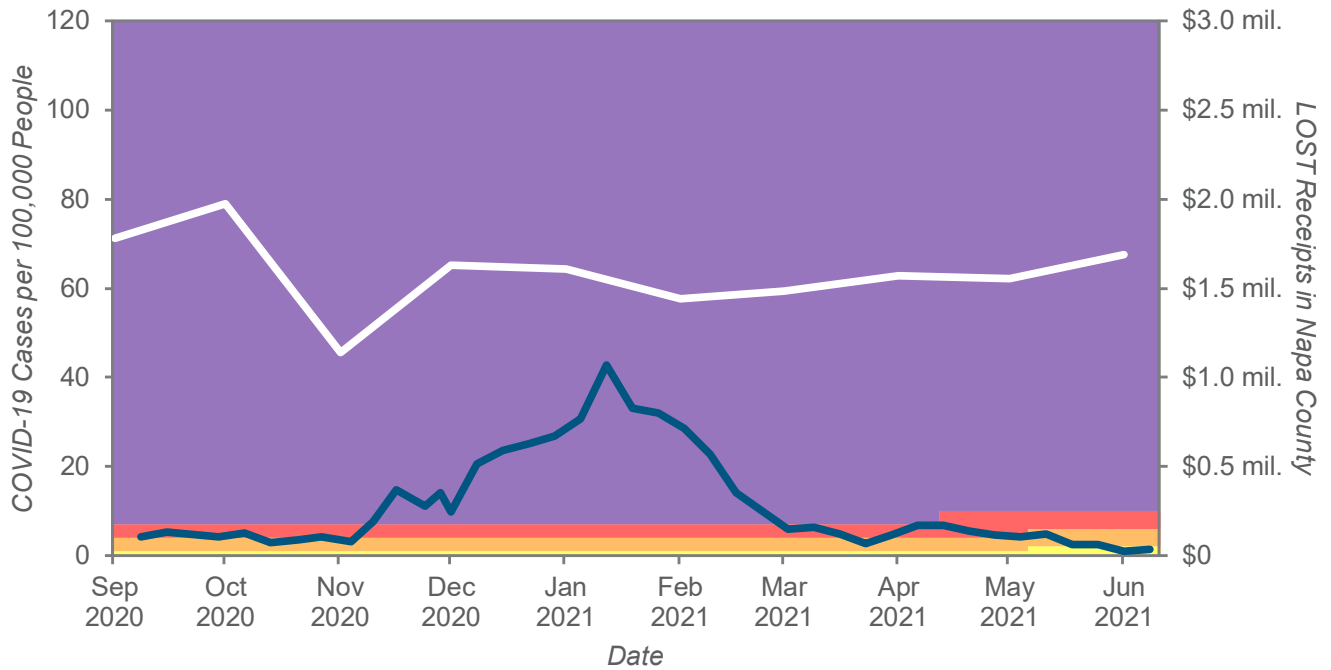
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-9. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Monterey County

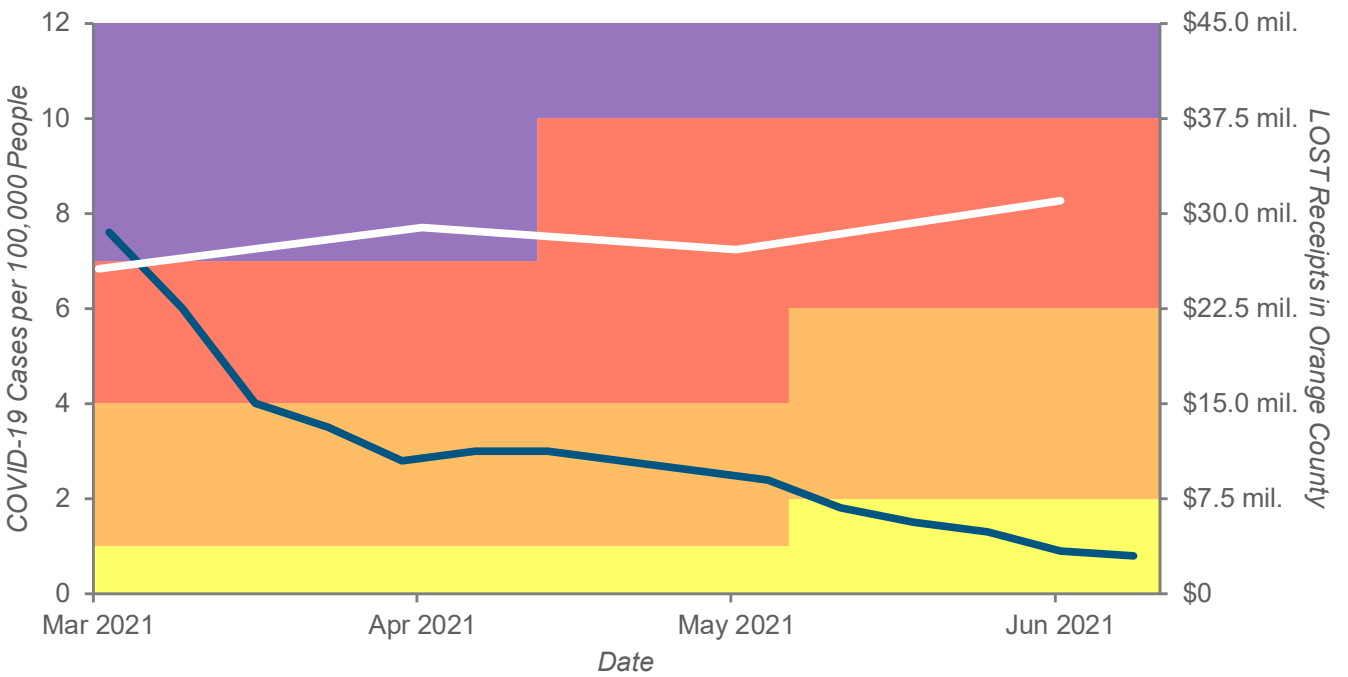
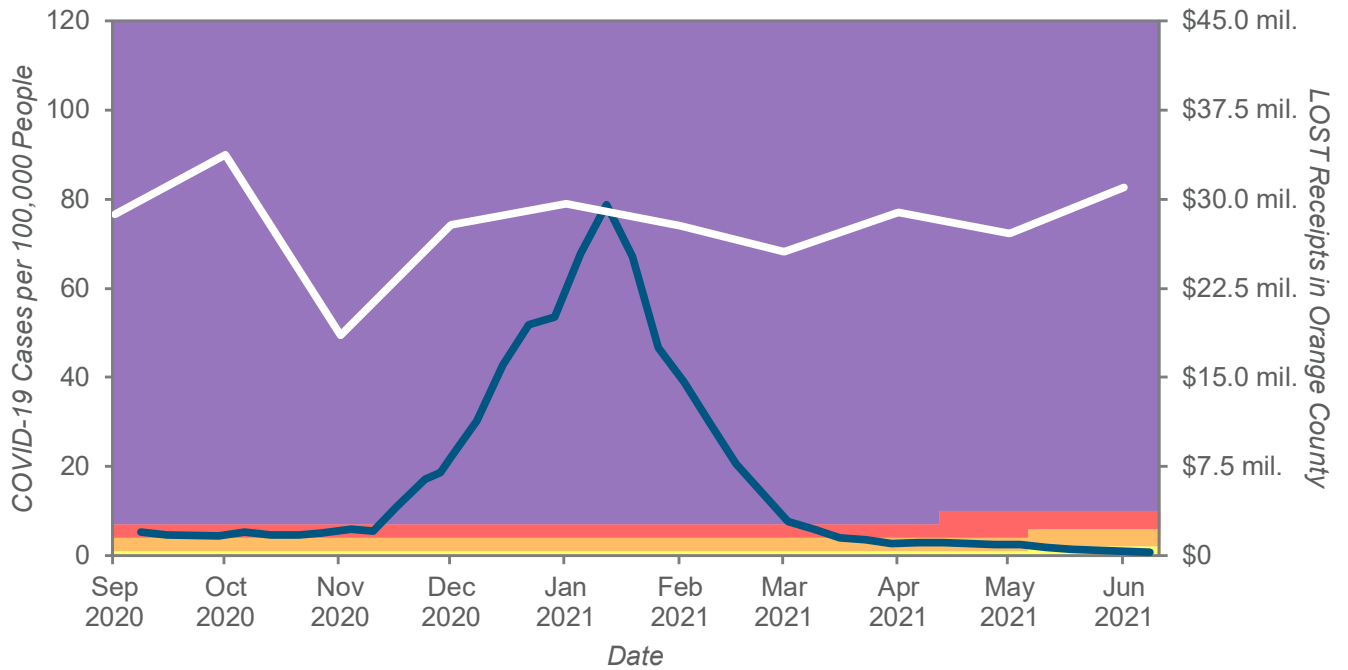
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average
 — Monthly LOST receipts

Figure A-10. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Napa County

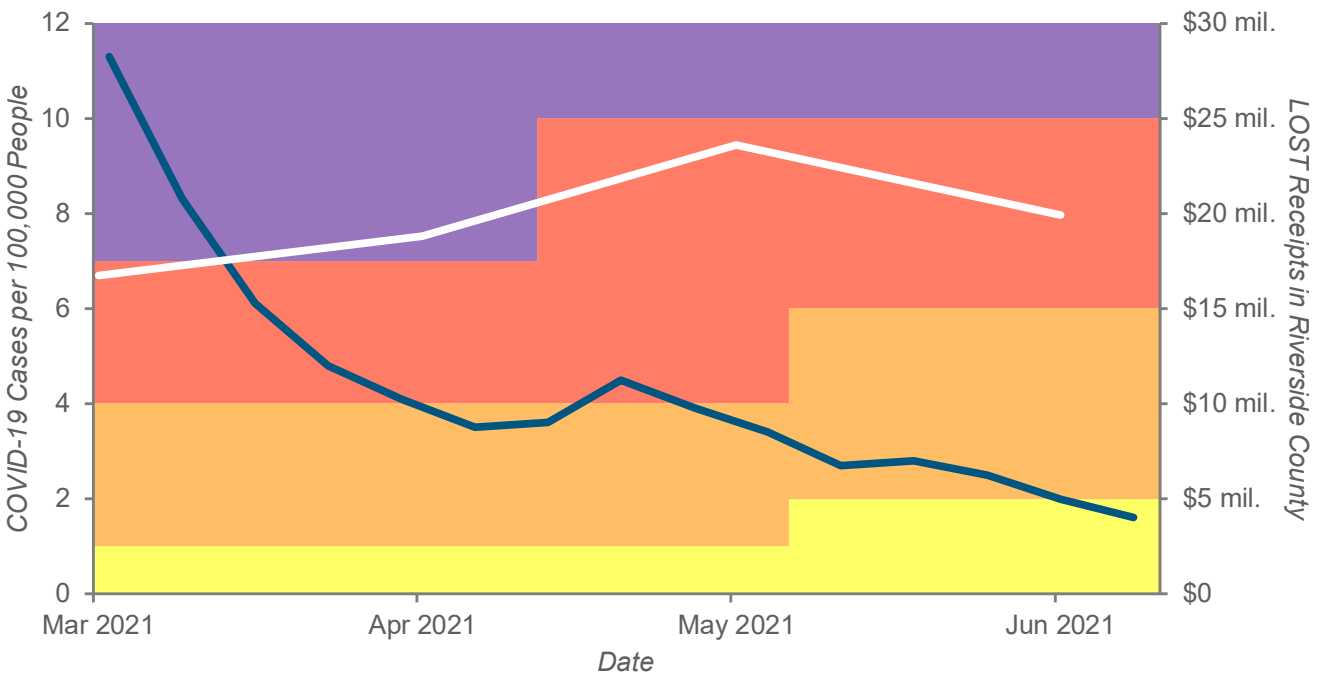
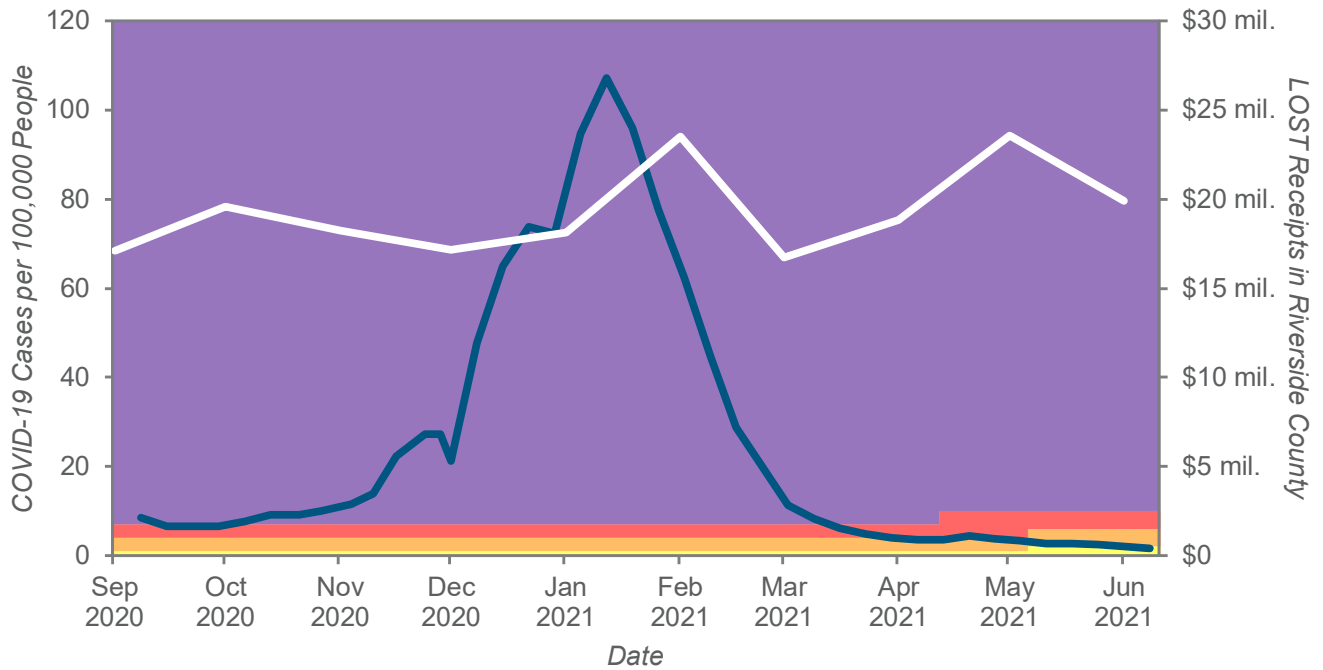
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-11. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Orange County

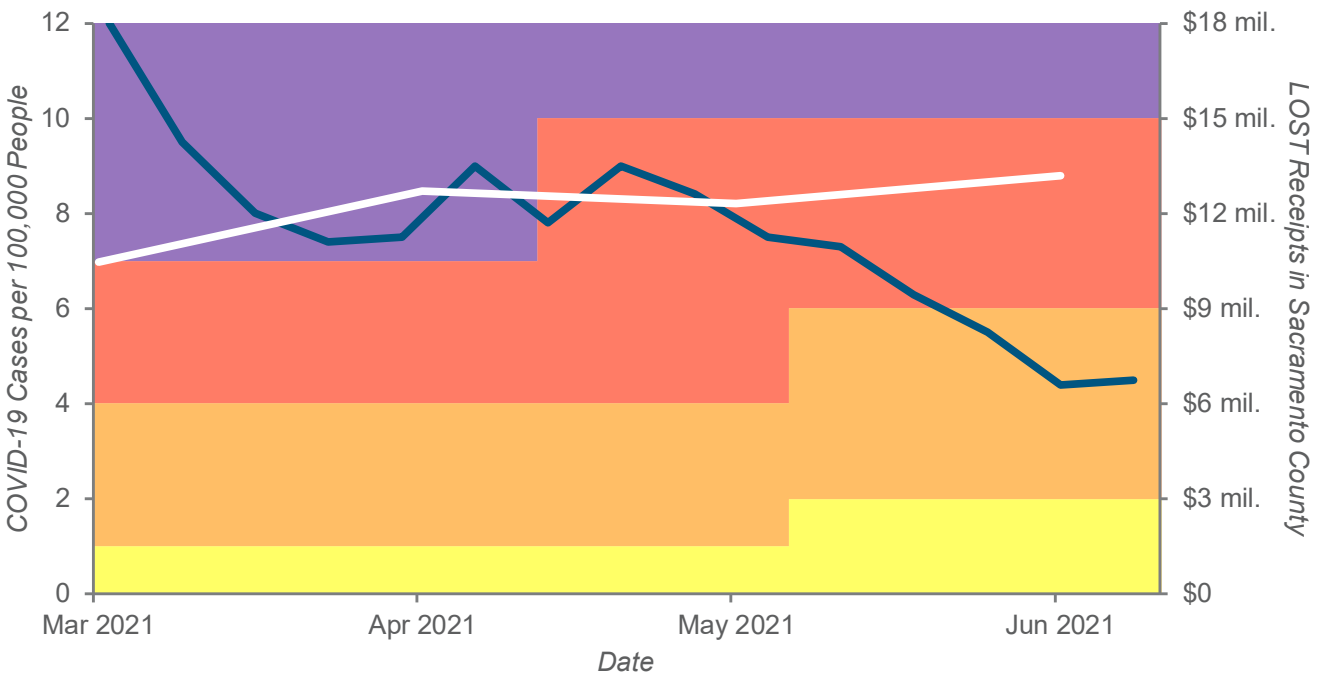
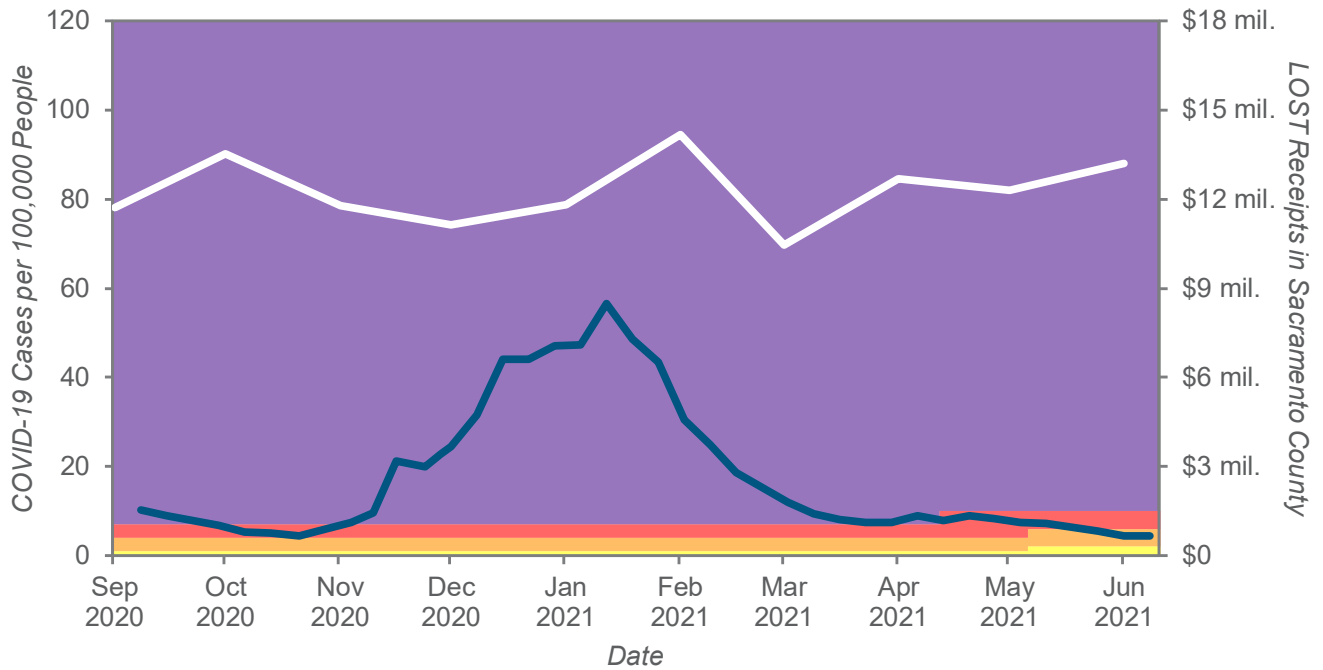
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-12. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Riverside County

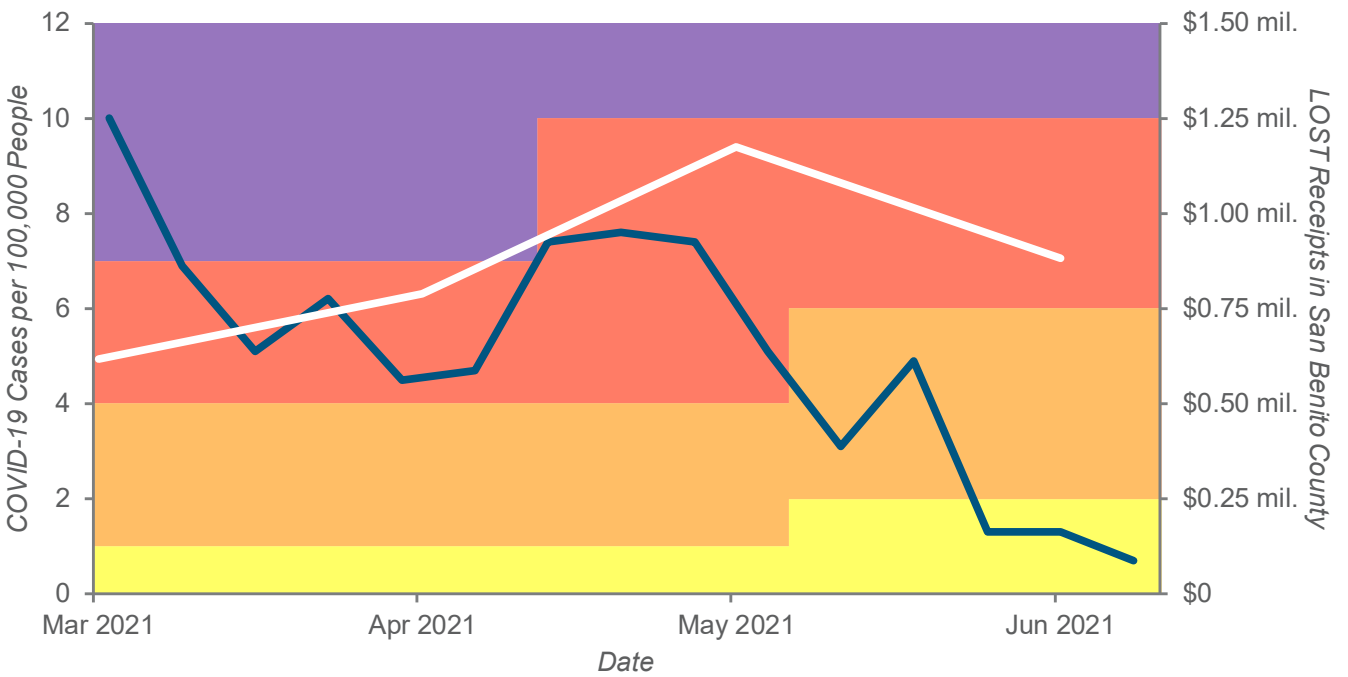
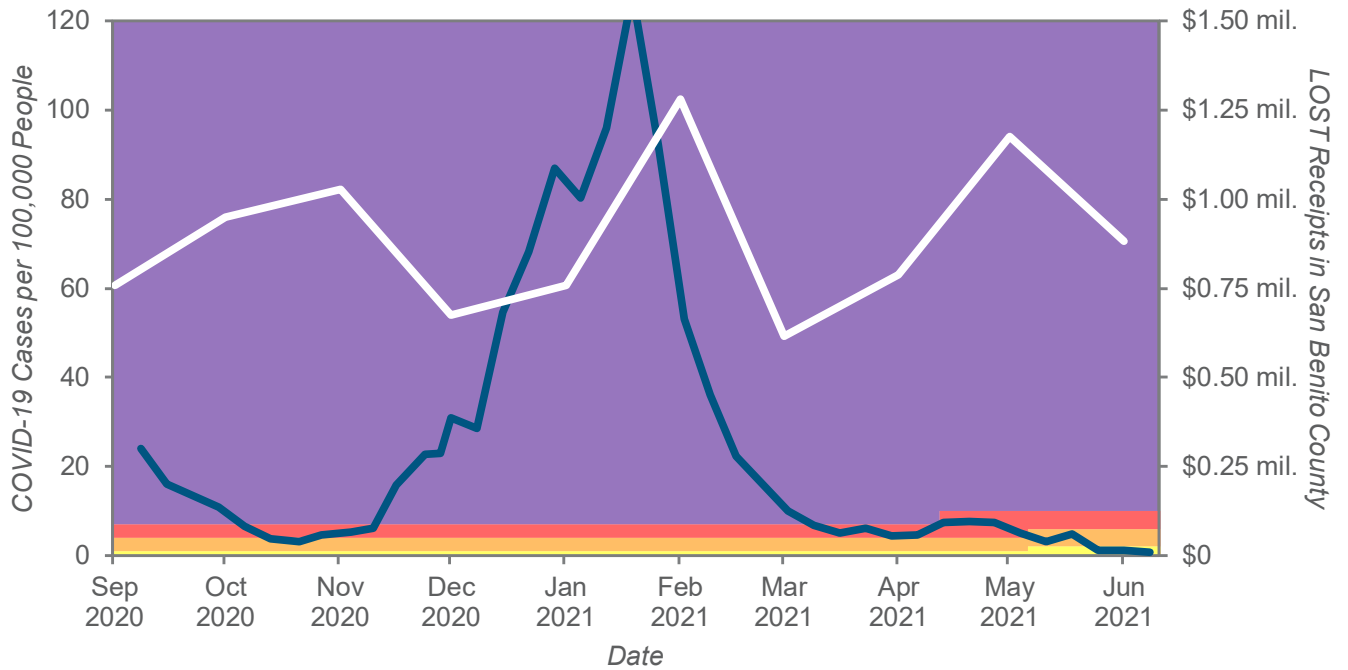
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-13. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Sacramento County

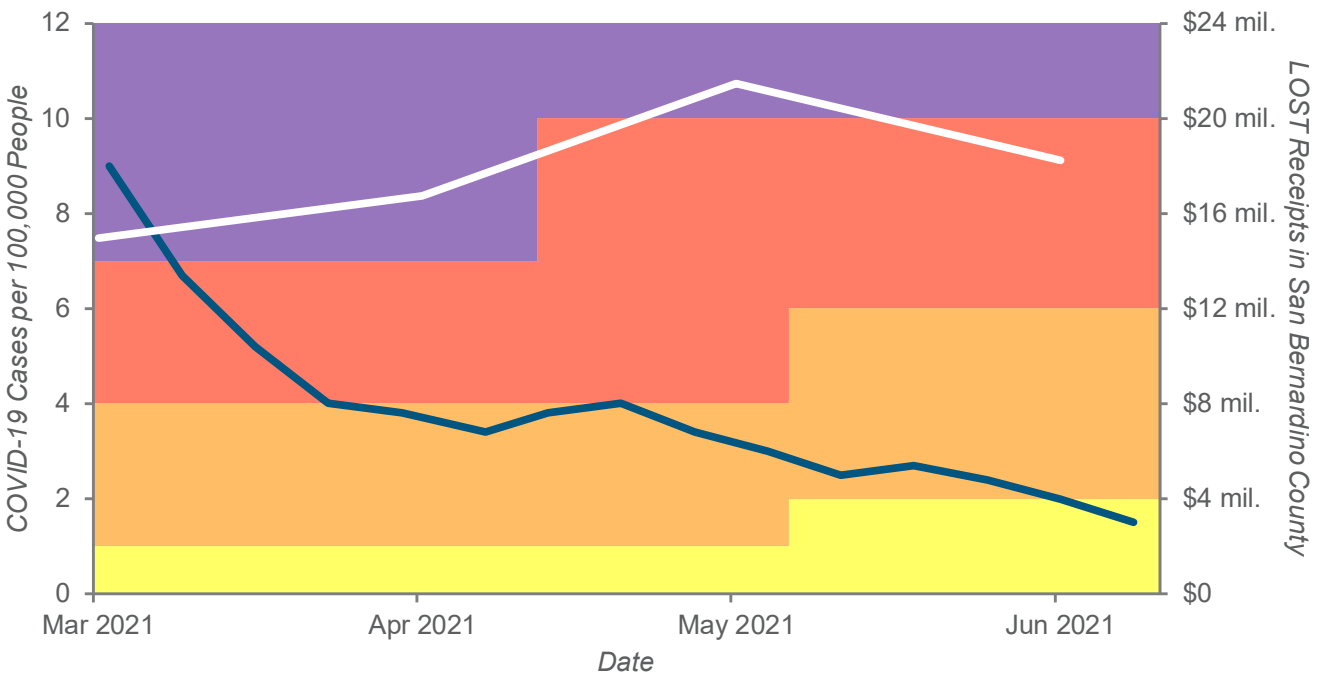
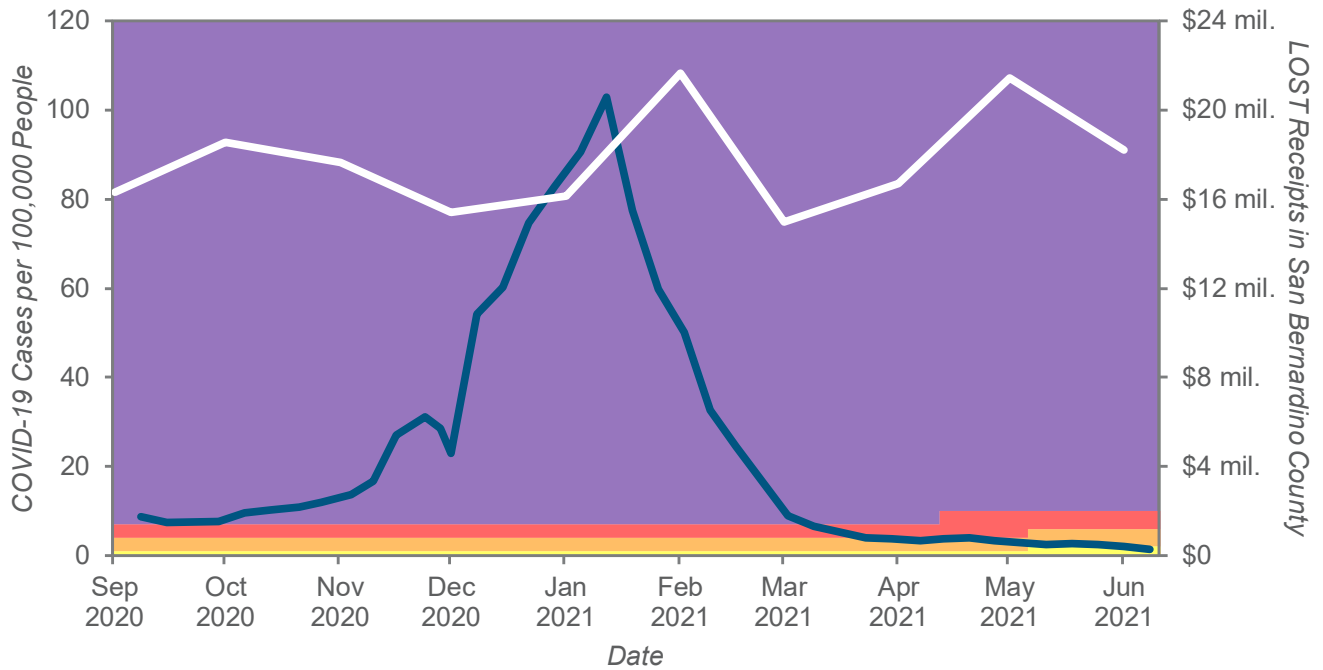
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-14. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in San Benito County

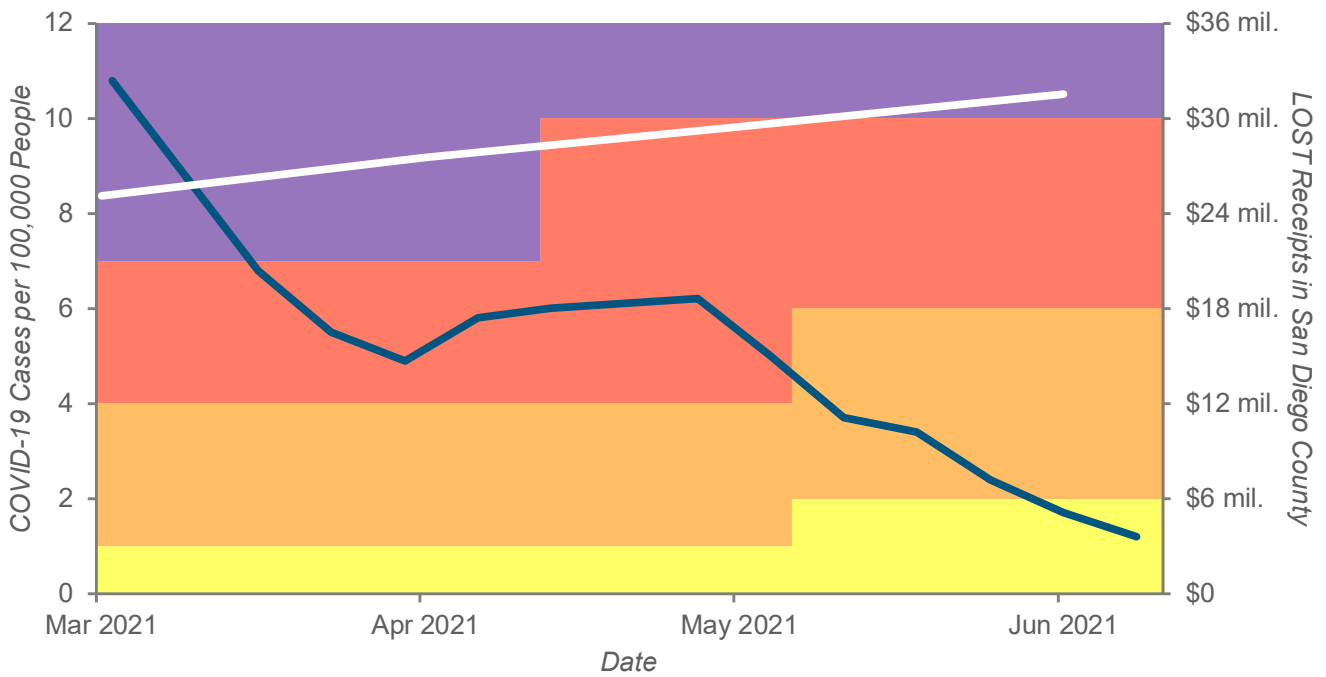
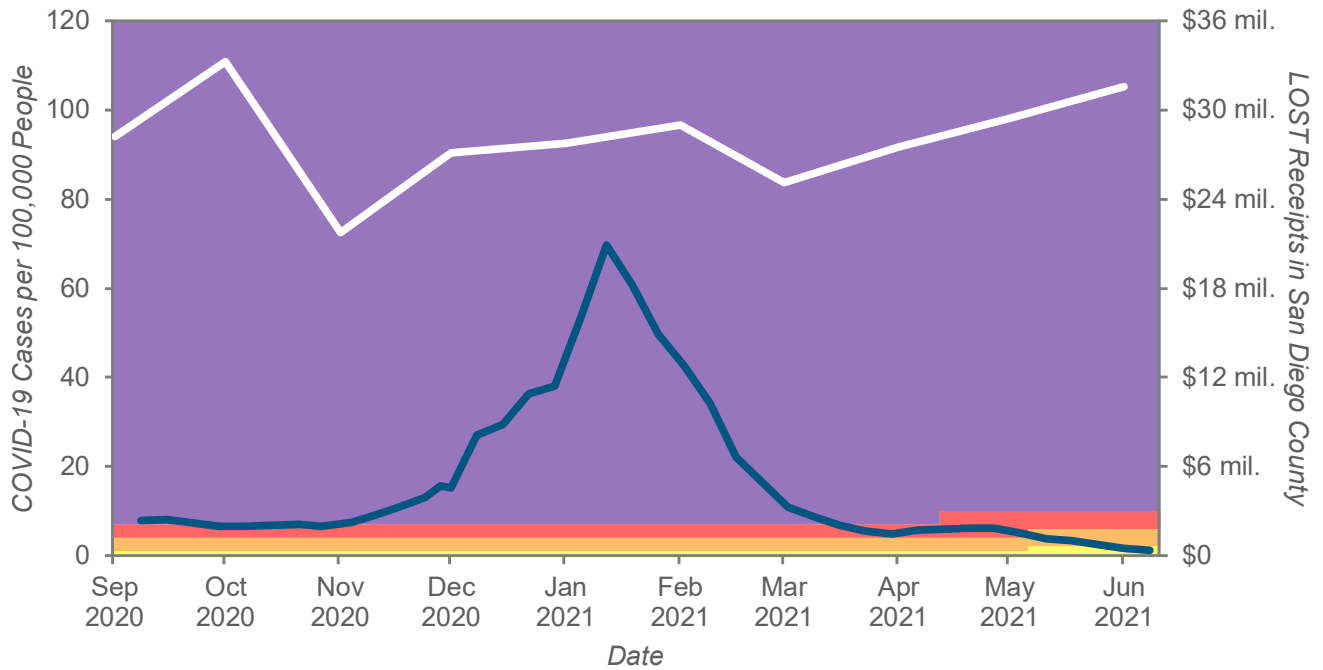
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-15. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in San Bernardino County

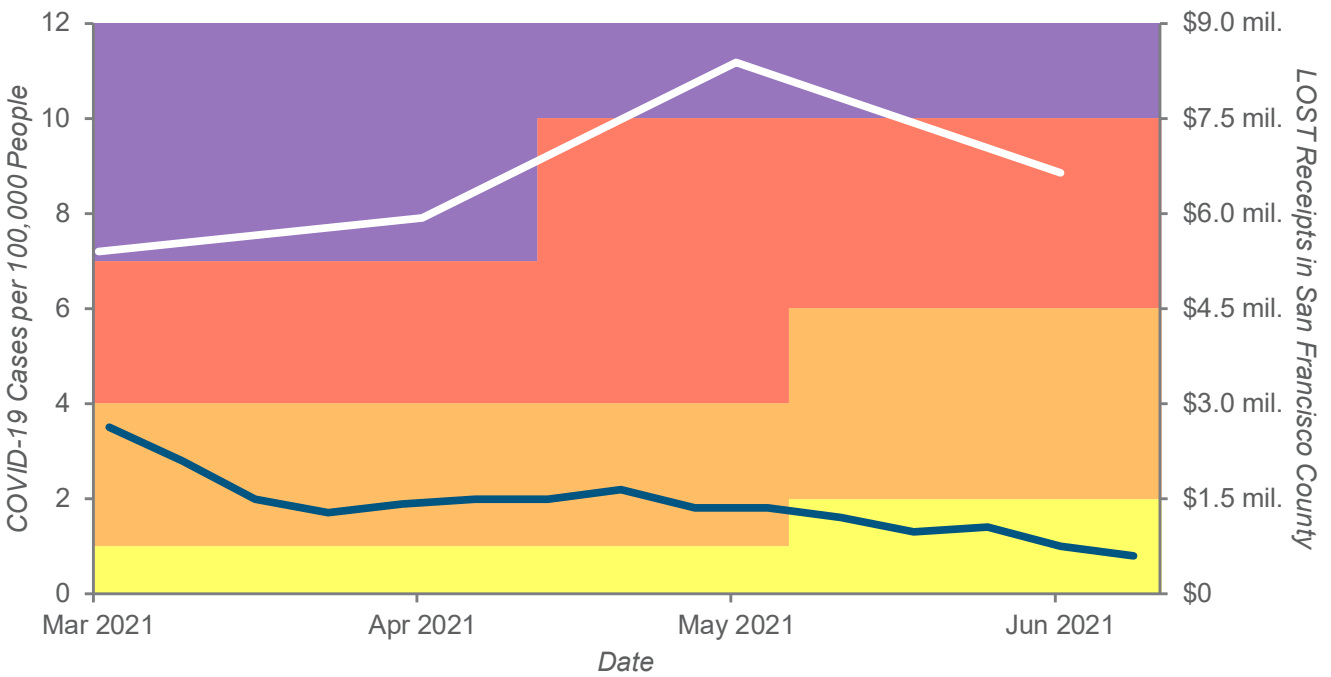
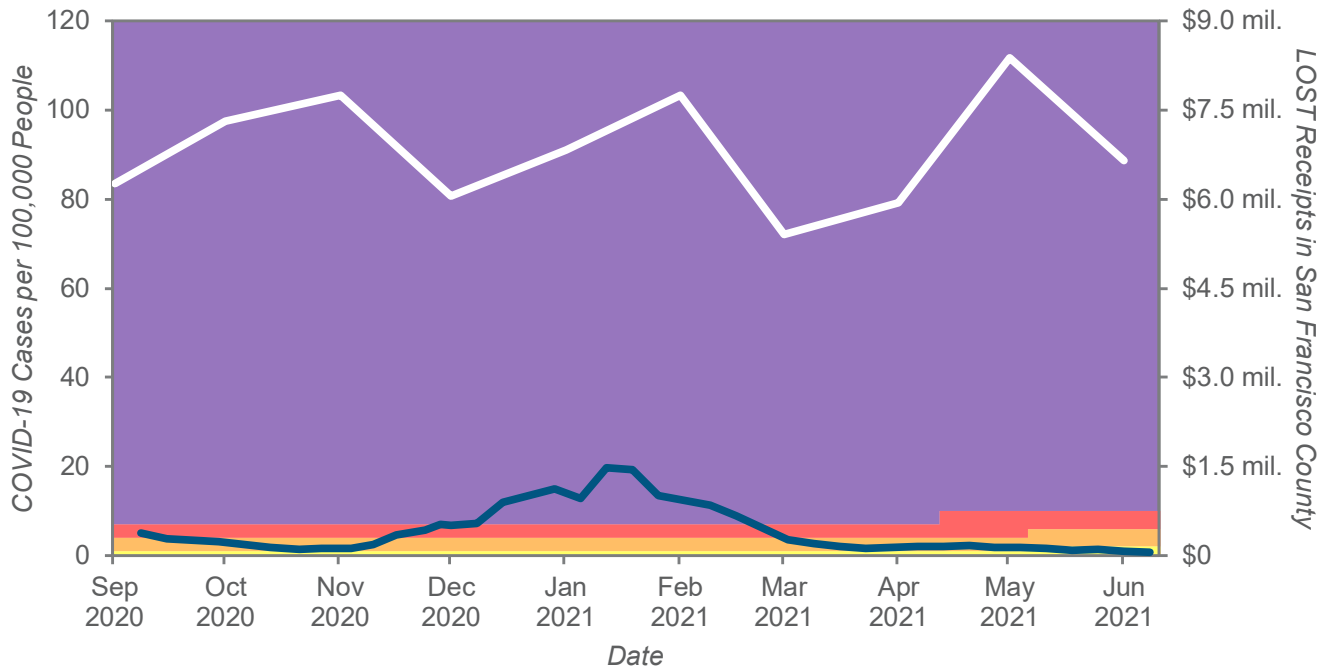
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average
 — Monthly LOST receipts

Figure A-16. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in San Diego County

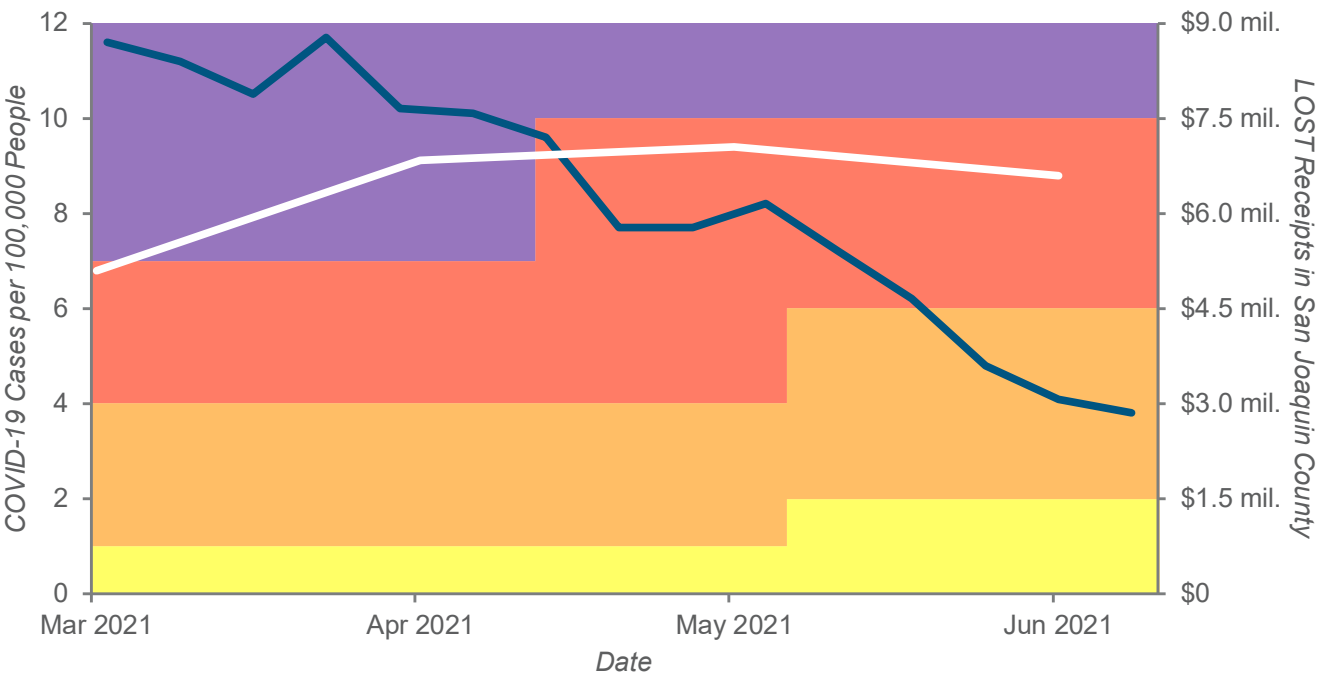
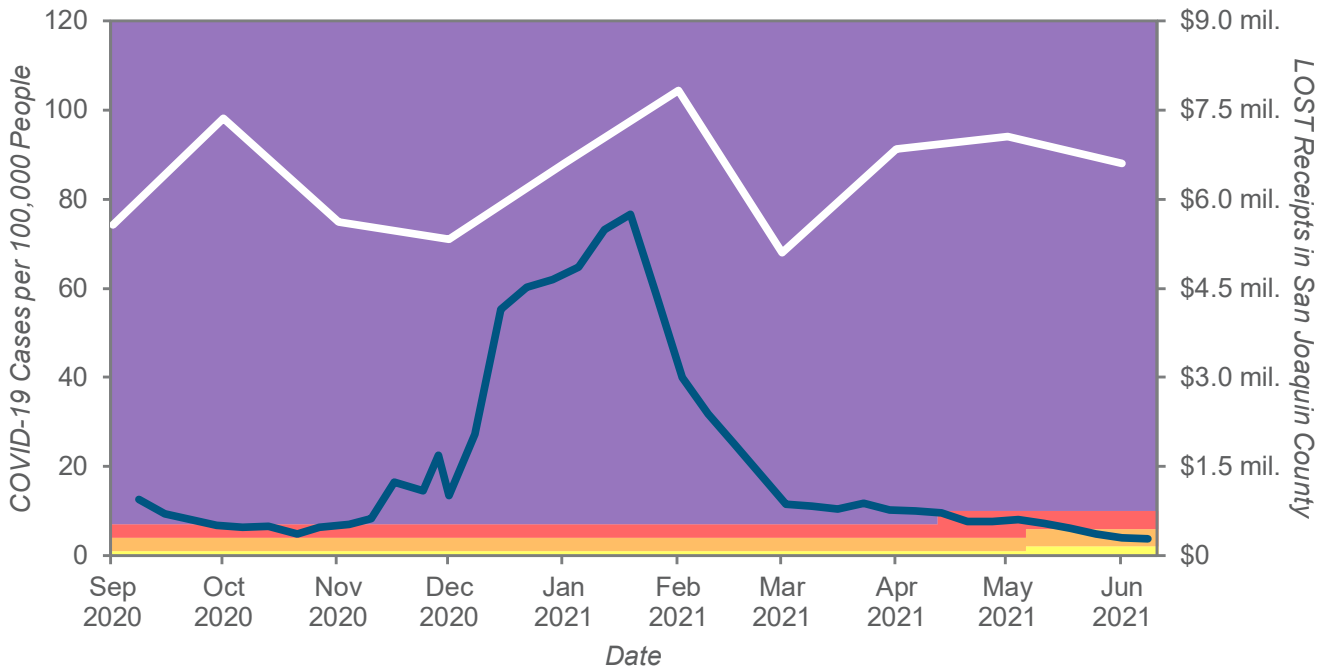
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-17. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in San Francisco County

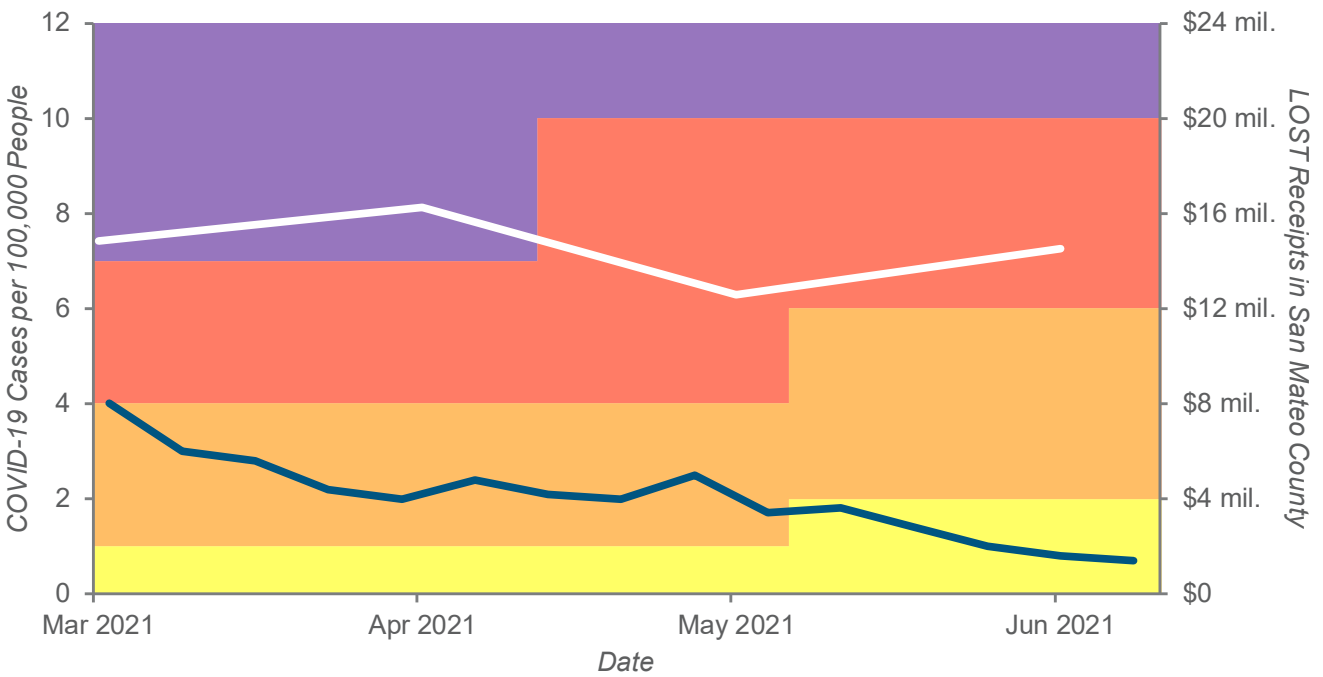
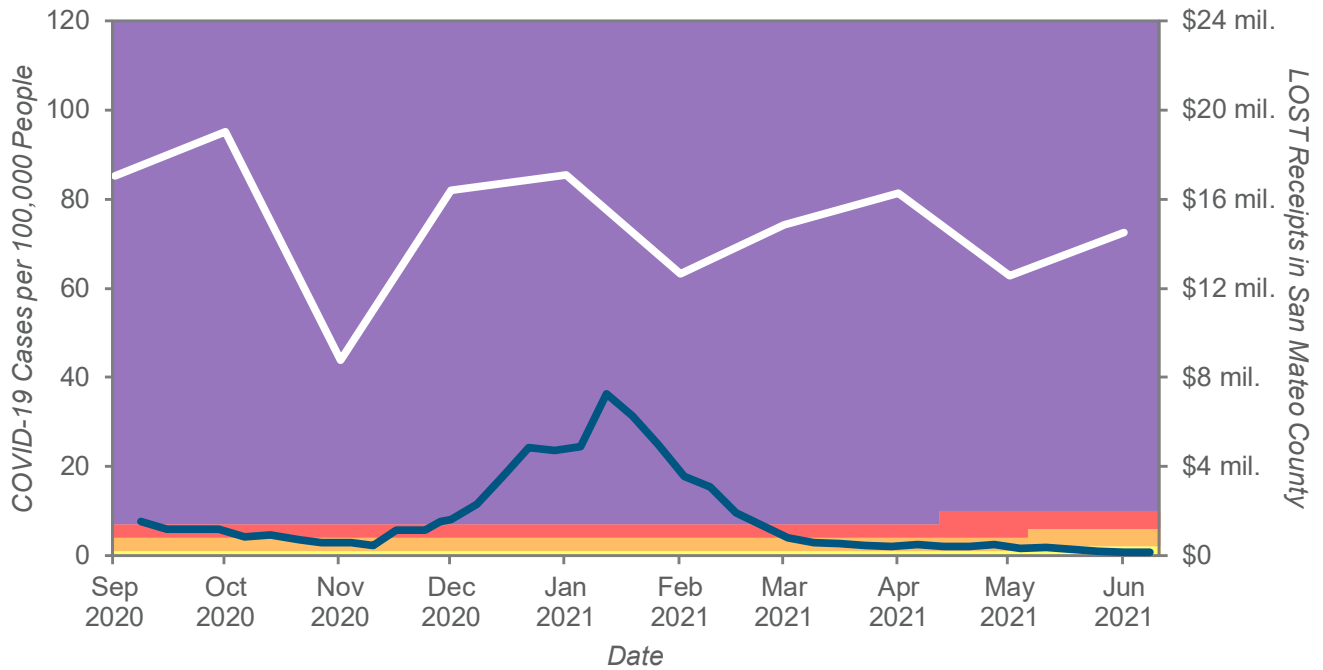
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-18. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in San Joaquin County

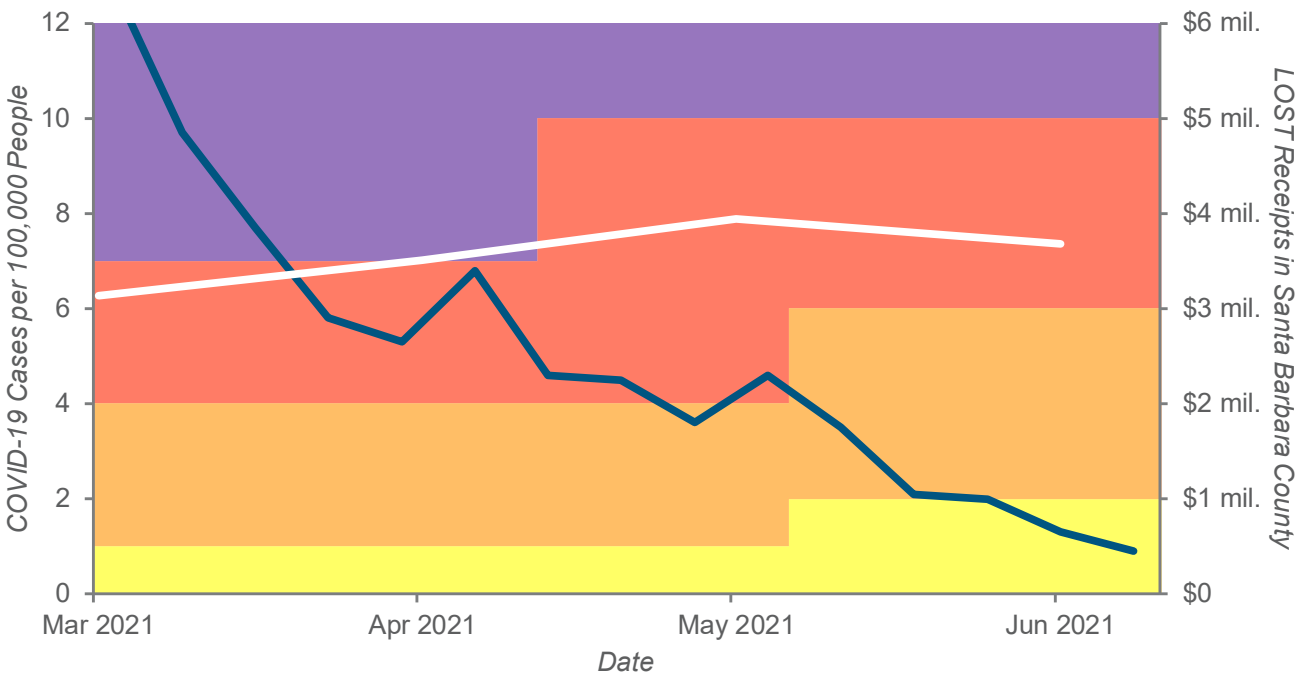
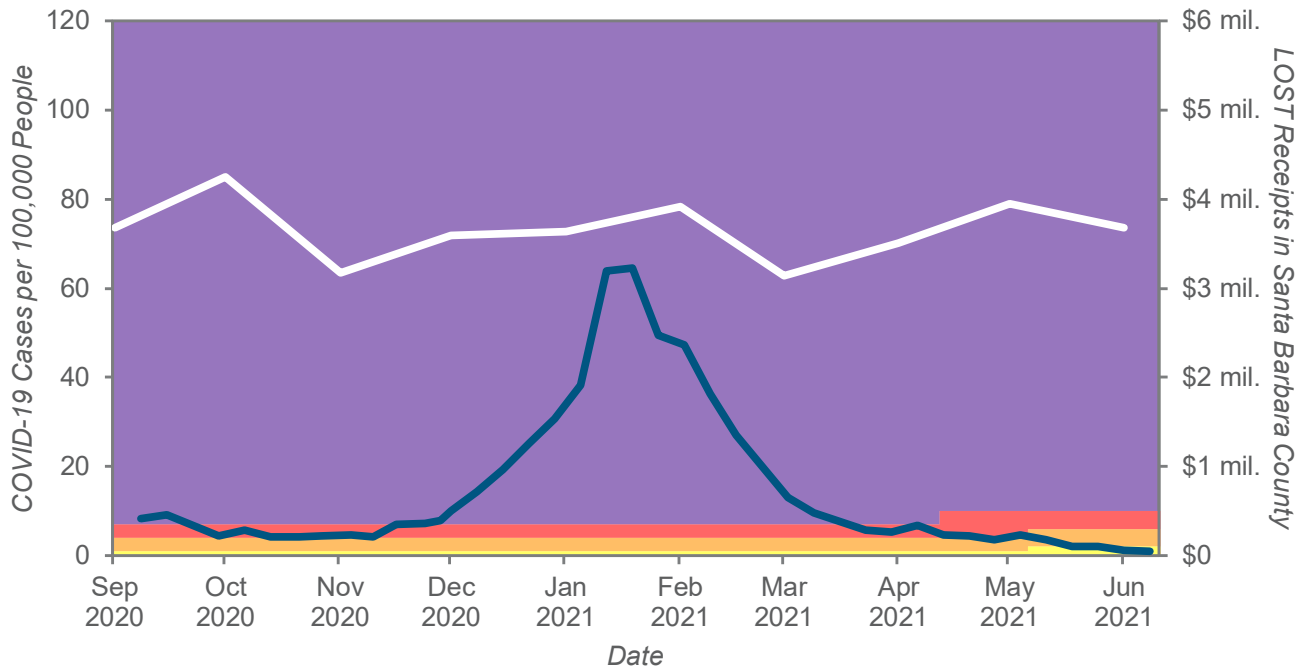
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-19. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in San Mateo County

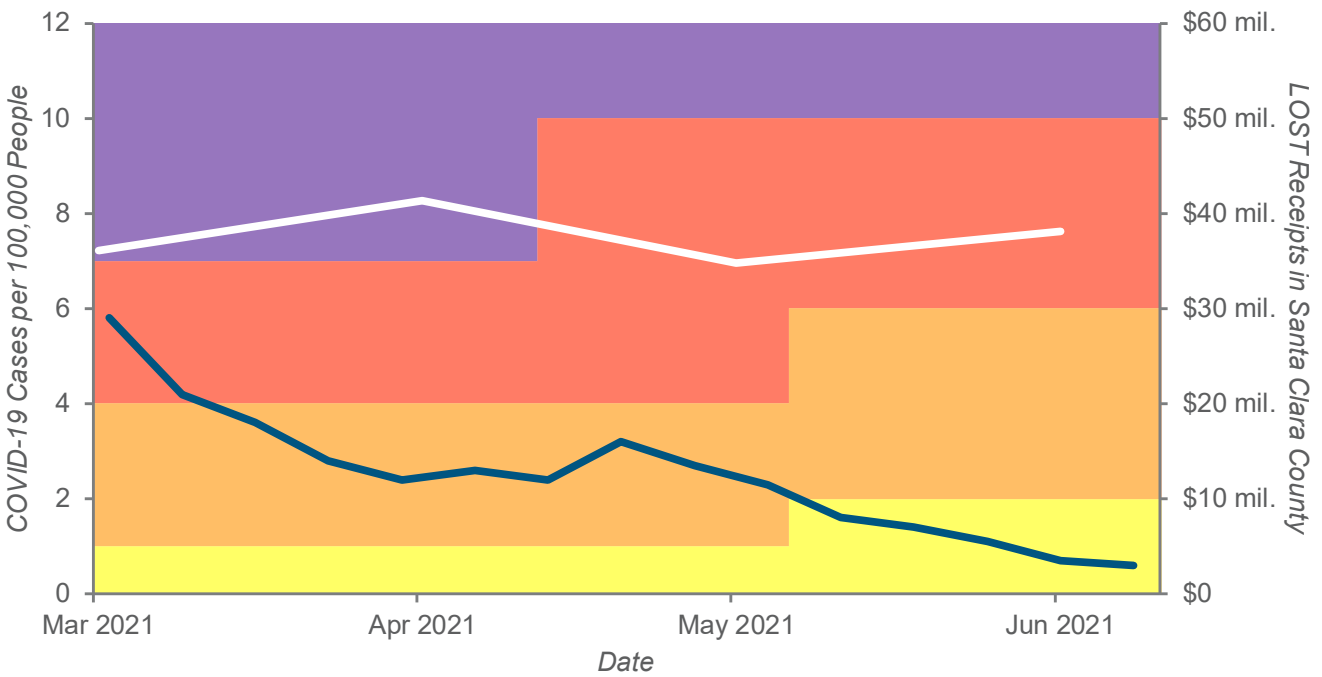
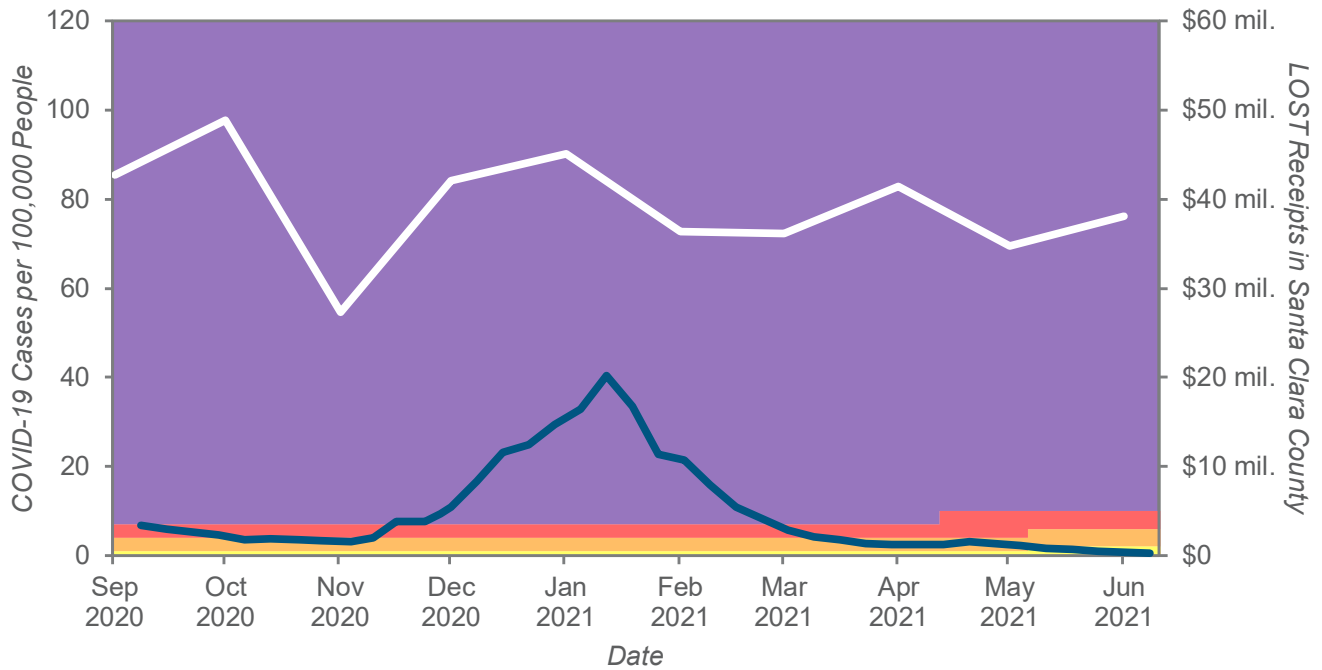
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-20. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Santa Barbara County

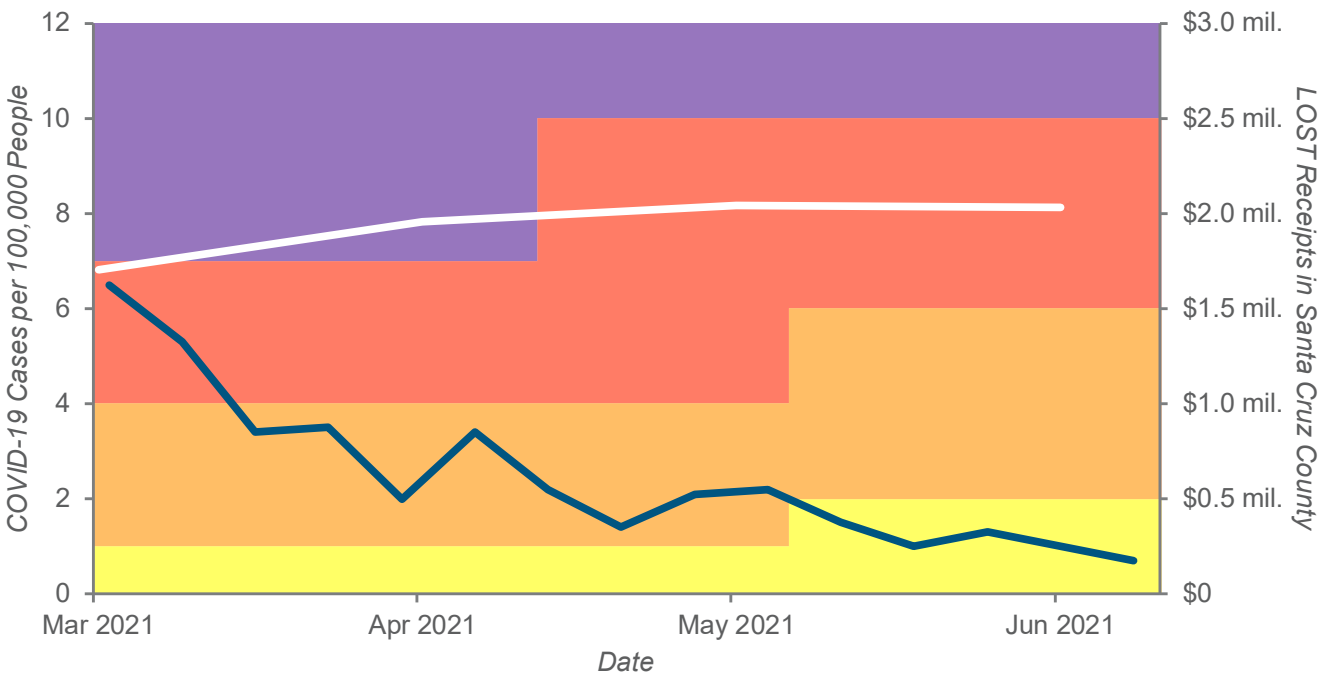
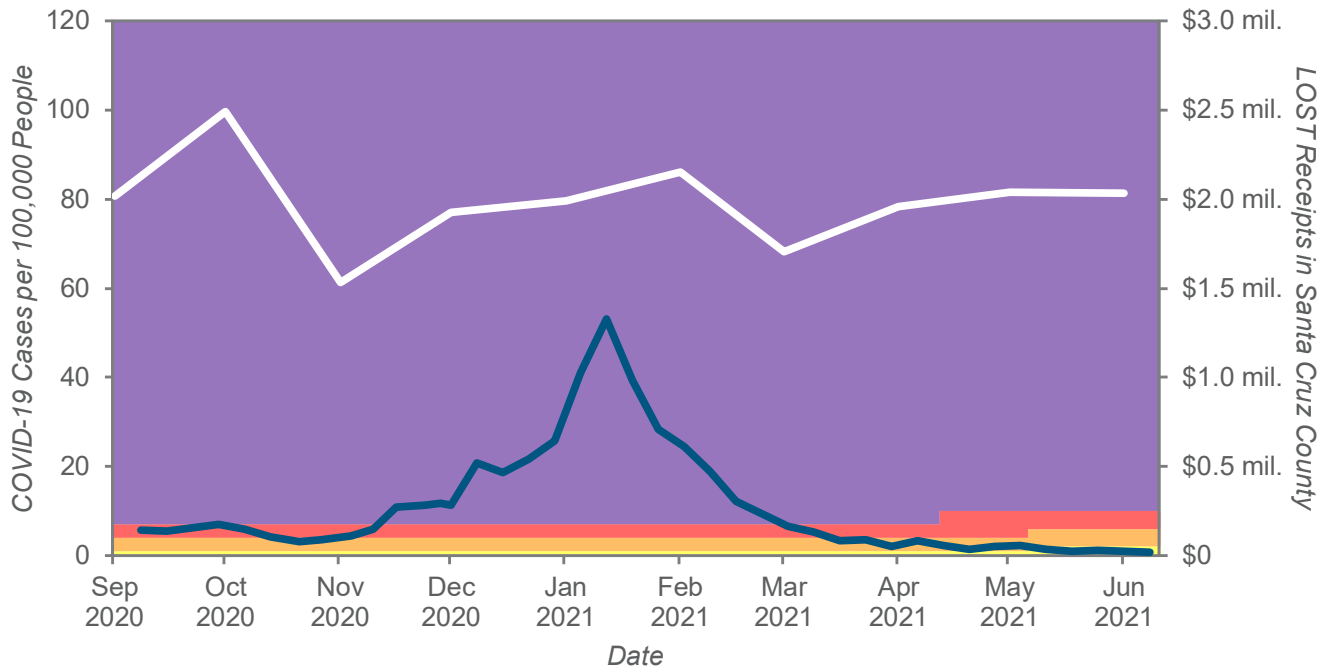
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-21. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Santa Clara County

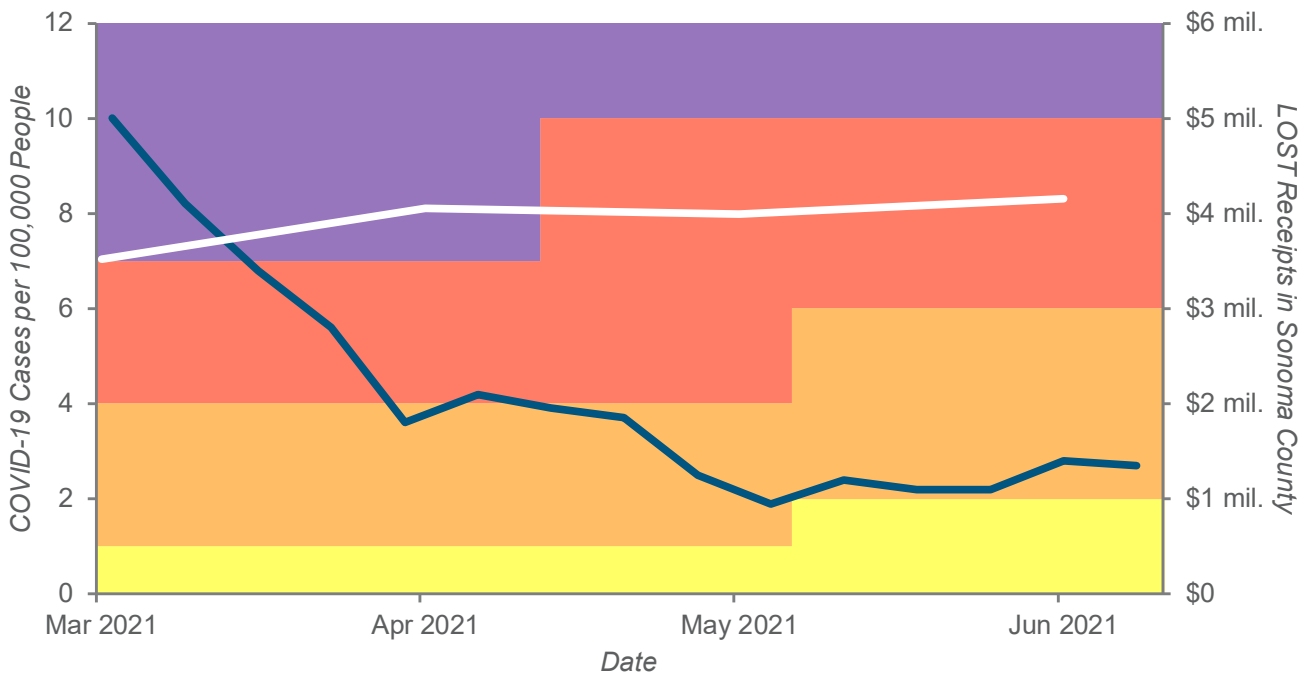
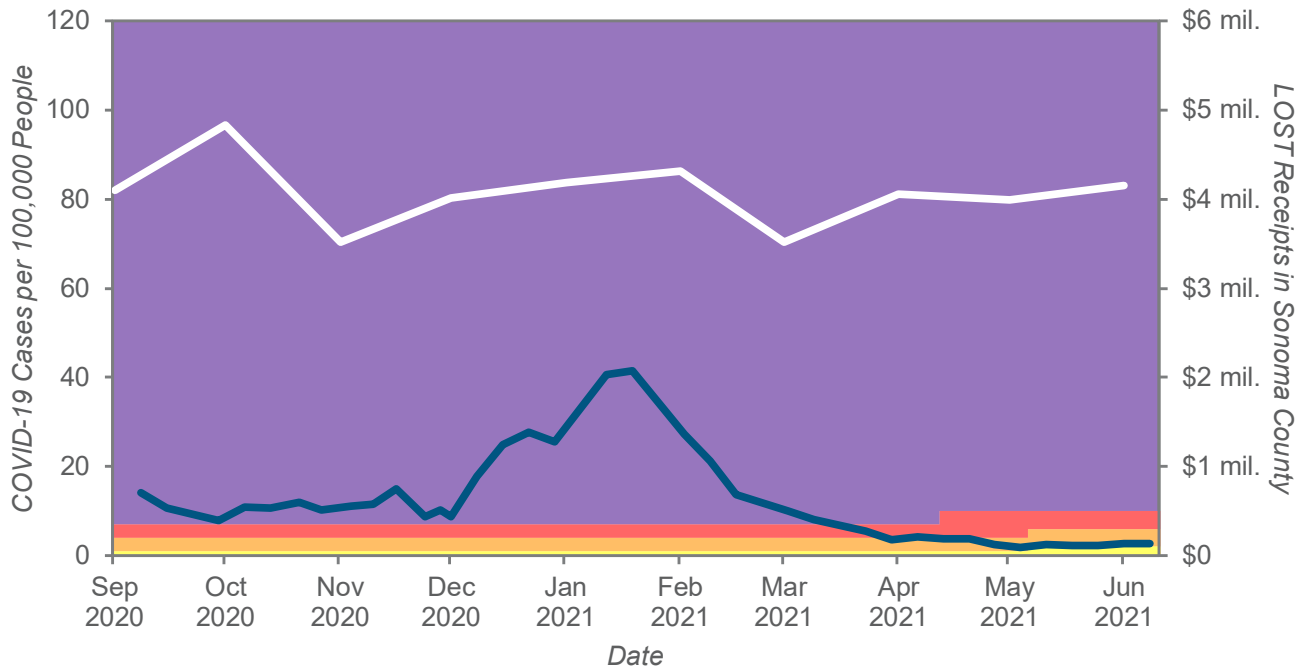
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-22. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Santa Cruz County

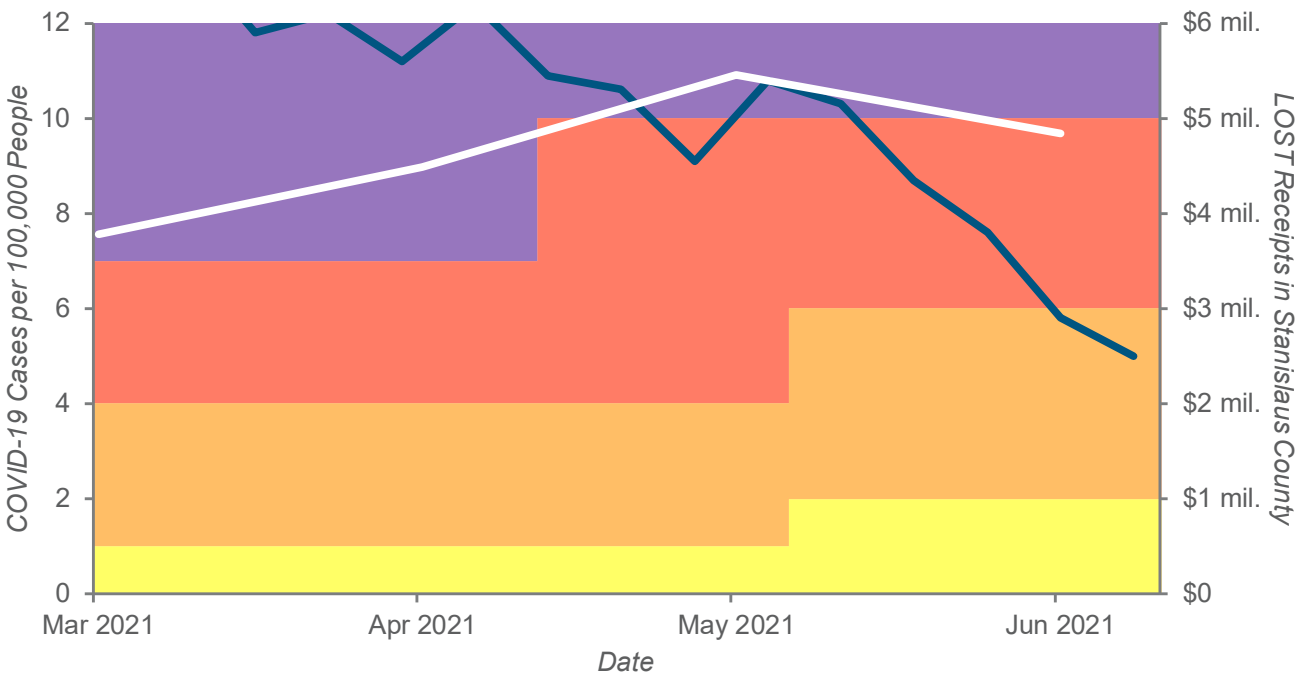
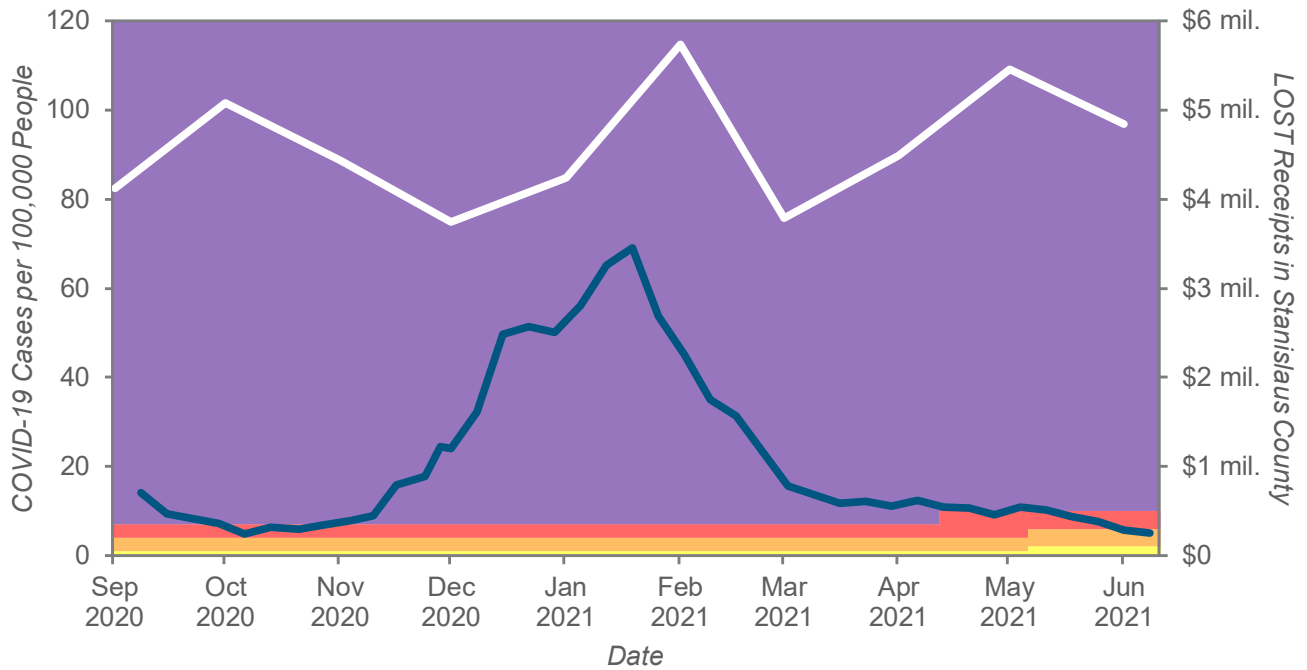
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average
 — Monthly LOST receipts

Figure A-23. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Sonoma County

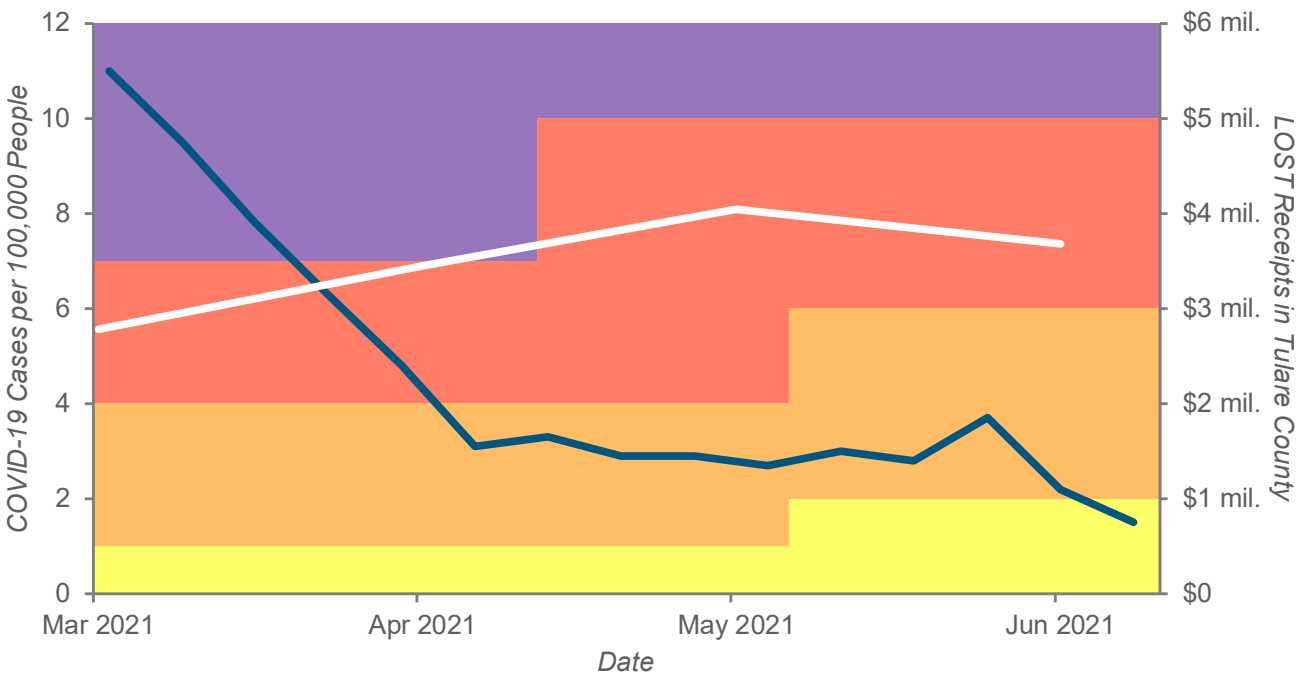
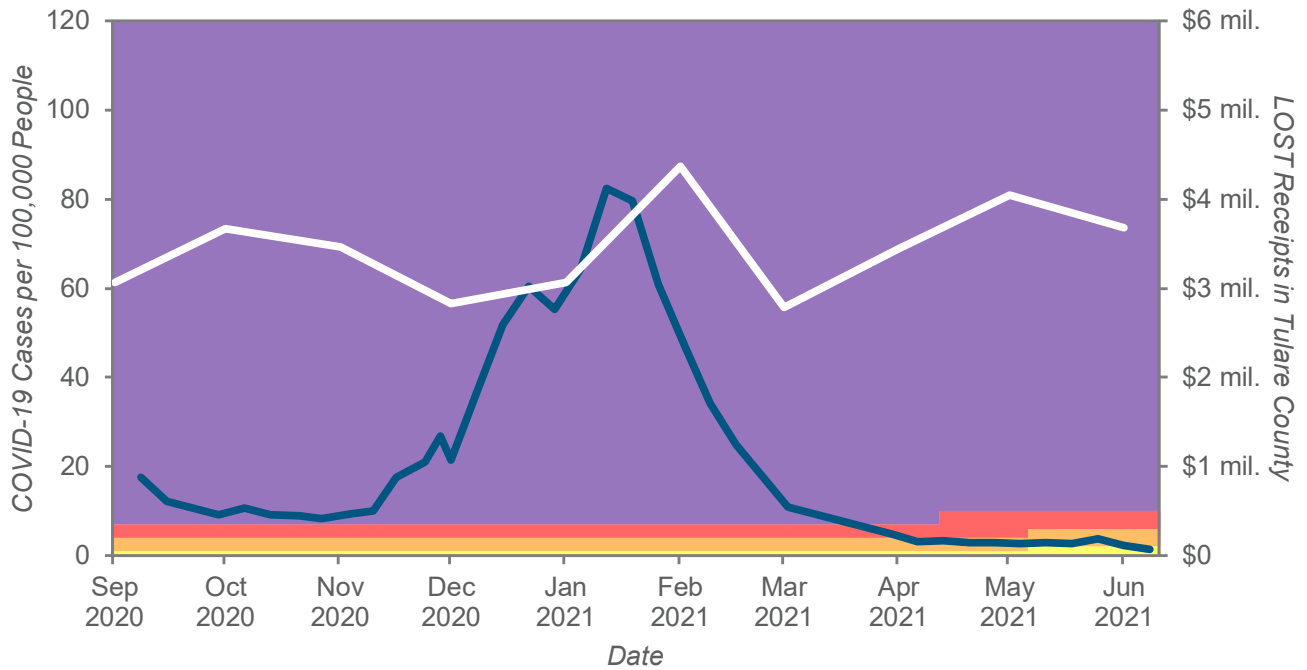
Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average
 — Monthly LOST receipts

Figure A-24. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Stanislaus County

Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021



— COVID-19 cases, 7-day rolling average — Monthly LOST receipts

Figure A-25. COVID-19 Case Rates, Tiered Restrictions, and LOST Receipts in Tulare County

Data sources: California Department of Public Health, 2021a, 2021b; CDTFA, 2021; Ibarra and Becker, 2021; and Capital Public Radio, 2021

