

Firearm ownership and acquisition in California: findings from the 2018 California Safety and Well-being Survey

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ABSTRACT

Objective To describe the prevalence of and factors associated with firearm ownership; the types, subtypes and quantity of firearms owned; and when, where and why firearms were acquired in California.

Methods A cross-sectional analysis of a state-representative, probability-based, internet survey of California adults was conducted in September–October 2018 (n=2558; completion rate 49%). Household firearm ownership was ascertained for all respondents; personal firearm ownership was ascertained only among respondents who reported living in a home with firearms; and information on the types and quantity of firearms owned and details about recently acquired firearms came from firearm owners only.

Findings Roughly one in four (25%, 95% CI 22% to 28%) California adults live in a home with a firearm, including 4.2 million adults—14% (95% CI 13% to 16%) of the adult population—who personally own a firearm. These owners collectively own an estimated 19.9 million firearms (8.9 million handguns). Approximately half (48%, 95% CI 34% to 61%) of the firearm stock in California is owned by the 10% (95% CI 6% to 14%) of owners who own 10 or more firearms, though more than half (54%, 95% CI 47% to 62%) of owners in the state own only one or two firearms. Most (69%, 95% CI 63% to 75%) owners purchased their last firearm from a firearm retailer, usually a handgun purchased primarily for protection against people.

Conclusion This study provides the most detailed and up-to-date information available on firearm ownership and acquisition in California. Results can inform firearm violence prevention efforts and public health, safety and policy development in California and nationally.

INTRODUCTION

In 2017, nearly 40 000 people died from firearm-related injuries in the USA, the highest number in more than two decades.¹ Many more people were shot but survived. Among the states, California has a relatively low age-adjusted rate of firearm death per capita—eight per 100 000 compared with 12 per 100 000 for the USA overall—but as the most populous state in the nation, California ranks second in the absolute burden of firearm violence, with 3083 total firearm deaths in 2017, more than half of them suicides.^{1,2}

The most comprehensive and up-to-date data on the prevalence of firearm ownership, along with more detailed information such as the number of

firearms owned, reasons for ownership, and how and where firearms are acquired, comes from the 2015 National Firearms Survey (NFS). The NFS provides estimates at the national and regional levels—for example, an estimated 22% (95% CI 21% to 24%) of US adults reported that they own at least one firearm (the median owner owned two)—but the data cannot be used to generate estimates for specific states.³ The latest state-level estimates of firearm ownership, as well as information on firearm storage practices, are more than a decade old, derived from the Behavioural Risk Factor Surveillance System (BRFSS) in 2004.⁴

This is a critical gap in knowledge because rates of firearm death and injury vary widely from state to state and are related in part to state variations in rates of household and personal firearm ownership.^{1 5–7} In this study, we report state-level estimates of the prevalence of and factors associated with firearm ownership; the types, subtypes and quantity of firearms owned; and when, where and why firearms were acquired in California. To our knowledge, data with this level of detail have not been collected in California or any other state since a 1975 Field Poll (or California Poll), which focused solely on handguns.⁸

METHODS

We rely on data from the California Safety and Well-being Survey (CSaWS), a statewide internet survey designed by the University of California, Davis (UC Davis) Violence Prevention Research Programme and administered between 14 September 2018 and 12 October 2018 by Ipsos Public Affairs, LLC ('Ipsos'; formerly the GfK Group).

Participants were drawn from the Ipsos KnowledgePanel (KP), a large national online panel that includes approximately 55 000 members aged 18 years or older. KP members are randomly recruited on an ongoing basis through probability-based sampling of addresses from the Delivery Sequence File (DSF) of the US Postal Service, covering almost 100% of the US population. The DSF-based sampling frame is enhanced through disproportionate stratified sampling of Latinx households and households with at least one young adult member aged 18–24 years. Ipsos provides KP member households with access to the internet and a web-enabled device as needed.

All KP members aged 18 years and older, except those currently serving in the US Armed Forces,



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were eligible to participate in CSaWS if they were residents of California. At the time of the survey, approximately 6670 KP members were California residents. Invitations to complete the survey were sent by e-mail; automatic reminders were e-mailed to non-responders 3, 7, 12 and 19 days later. No study-specific incentives were provided for participation. Respondents could take the survey in English or Spanish.

CSaWS was approved by the Institutional Review Board at UC Davis.

Measures

Firearm ownership status was categorised using responses to two questions: 'Do you or does anyone else you live with currently own any type of gun?' and, if yes, 'Do you personally own a gun?' Respondents who endorsed both questions were classified as firearm owners ('owners'). Respondents who answered the first question affirmatively but the second question negatively were classified as non-firearm owners residing in homes with firearms ('non-owners, lives with owners'). Those who answered both questions in the negative were classified as non-firearm owners in households without firearms ('non-owners, no owners in the home'). Eighty respondents answered 'don't know' to the first question and 10 respondents refused to answer one or both of the firearm ownership questions (online supplementary appendix 1).

Respondents who owned firearms received a series of follow-up questions to identify the number of each type (handgun or long gun) and subtype (semi-automatic pistol, revolver, other handgun; semi-automatic rifle, other rifle, semi-automatic shotgun, other shotgun) of firearm they owned. Rifle owners were asked if they owned any weapons 'of the type sometimes called assault rifles, modern sporting rifles, or modern tactical rifles' and, if yes, how many.

Firearm owners were also asked to choose the one most important reason they owned each type of firearm (handgun, long gun or assault-type weapon). Response options included for protection against people, for protection against animals, for hunting, for sporting use (other than hunting), for a collection, and for some other reason.

Additionally, owners were asked several questions about the firearm they acquired most recently, including year of acquisition, whether the firearm was acquired in California (yes, no), whether they had purchased the firearm, and if yes, where they had purchased the firearm, and if no, how and from whom they had acquired the firearm.

Additional characteristics of interest included respondents' age, sex, race-ethnicity, marital status, household income, education, presence of children in the home, region and rurality of residence, political party preference, membership in or general support for a gun rights organisation, and veteran status. Respondents were also asked if they grew up in a home with a firearm, whether they carry a firearm for work, and whether they have a concealed firearm carry permit. Exact question language is provided in the supplementary materials (online supplementary appendix 2).

Analysis

We calculated weighted percentages and their corresponding 95% CI for each measure or cross-tabulation of measures using the SVY and weighting commands in Stata, version 15.1 (StataCorp LP, College Station, Texas, USA). Weighted estimates are designed to be representative of the adult population of California.

Analyses used a final weight variable provided by Ipsos. This weight combined pre-sample and study-specific post-stratification weights. The pre-sample or base weight adjusted for the probability of selection into KP and any other discrepancies between KP composition and the distribution of key demographic characteristics of the US population as reflected in the latest March supplement of the US Census Current Population Survey. The post-stratification weight, computed after all responses were collected using raking ratio adjustments (based on age, sex, race-ethnicity, Latinx origin, education, household income and language proficiency), accounted for survey non-response and over or under-representation of key demographics between respondents and the adult population of California as reflected in the 2016 American Community Survey, the most recent data available at the time of survey administration.

RESULTS

Of the 5232 eligible KP members who received an invitation to participate in CSaWS, 2558 completed the survey, yielding a 49% completion rate. The median survey completion time was 19 min. The socio-demographic characteristics of respondents are presented in the supplementary materials (online supplementary appendix 3).

Prevalence of and factors associated with firearm ownership

One in four (24.9%, 95% CI 22.4% to 27.6%) California adults reported that they or someone else in their household owned one or more firearms, including 14.4% (95% CI 12.5% to 16.4%) of California adults who reported that they themselves were a firearm owner. Extrapolating to the population of adults in California (29.5 million in 2016), we estimate there are approximately 4.2 million personal firearm owners in the state.

Most firearm owners (56.6%, 95% CI 49.2 to 63.7%) reported that they were the only firearm owner in their home; though, one in three (33.1%, 95% CI 26.5% to 40.3%) reported that they lived in a home with one other owner and one in 10 (9.8%, 95% CI 5.7% to 16.2%) reported that they lived in a home with two or more other owners. Other owners were most often spouses or partners (64.0%, 95% CI 51.3% to 75.1%) (online supplementary appendix 4).

Table 1 presents socio-demographic characteristics of respondents by firearm ownership status. Consistent with prior survey research, firearm owners in California were disproportionately older (age ≥ 60), male and non-Latinx white. The prevalence of firearm ownership among each of these subgroups was greater than 20% (online supplementary appendix 5).

Quantity and types of firearms owned

The mean number of firearms owned by firearm-owning respondents was 4.7 (SD=10.1; range: 1–150), yielding an estimated 19.9 million total firearms in the state (ie, 4.2 million owners \times 4.7 firearms/owner). The share of firearm owners with one, two to four, and five or more firearms among socio-demographic subgroups is presented in the supplementary materials (online supplementary appendix 6).

Slightly more than half (54.4%, 95% CI 47.1% to 61.5%) of firearm owners reported that they owned only one or two firearms. Combined, their firearms accounted for 15.1% (95% CI 10.3% to 19.9%) of firearms in California. Conversely, nearly half (47.5%, 95% CI 33.8% to 61.2%) of all firearms in the state were owned by the 9.6% (95% CI 6.3% to 14.4%) of owners who reported owning 10 or more firearms (figure 1).

Table 1 Respondent characteristics by firearm ownership status, 2018 California Safety and Well-being Survey (CSaWS), n=2558

Characteristic (% total sample)	Owners, n=429 % (95% CI)	Non-owners	
		Lives with owners, n=242 % (95% CI)	No owners in the home, n=1797 % (95% CI)
Total*	14.4 (12.5 to 16.4)	10.5 (8.7 to 12.6)	71.0 (68.2 to 73.7)
Age			
18–29 (18.2%)	6.5 (3.0 to 13.4)	31.6 (22.1 to 43.0)	17.9 (14.7 to 21.7)
30–44 (27.5%)	17.5 (12.5 to 24.0)	22.0 (15.3 to 30.6)	30.2 (26.7 to 33.9)
45–59 (27.0%)	33.2 (26.4 to 40.7)	23.0 (16.3 to 31.5)	26.5 (23.5 to 29.8)
≥60 (27.4%)	42.9 (36.3 to 49.8)	23.4 (17.6 to 30.3)	25.4 (22.7 to 28.1)
Sex			
Male (47.8%)	72.9 (66.8 to 78.3)	27.0 (18.0 to 38.4)	45.4 (41.6 to 49.2)
Female (52.2%)	27.1 (21.7 to 33.2)	73.0 (61.6 to 82.0)	54.6 (50.8 to 58.4)
Race/ethnicity			
Non-Latinx white (42.8%)	64.1 (56.3 to 71.2)	55.0 (45.1 to 64.6)	36.8 (33.6 to 40.1)
Latinx (33.3%)	20.4 (14.6 to 27.8)	24.7 (16.8 to 34.7)	37.0 (33.2 to 41.0)
Non-Latinx black (5.5%)	4.4 (2.0 to 9.3)	6.4 (3.0 to 13.3)	5.6 (4.2 to 7.6)
Other (16.0%)	9.1 (5.1 to 15.7)	8.5 (4.2 to 16.6)	18.5 (15.6 to 21.9)
Multiracial (2.4%)	2.1 (0.9 to 4.9)	5.4 (2.1 to 13.3)	2.0 (1.3 to 3.1)
RUCA category†			
Urban (91.5%)	83.6 (78.4 to 87.7)	87.5 (79.6 to 92.6)	93.5 (91.4 to 95.1)
Sub-Urban (6.5%)	11.1 (7.6 to 15.9)	8.6 (4.8 to 15.0)	5.5 (4.0 to 7.5)
Large Rural Town (1.2%)	2.8 (1.5 to 5.3)	3.0 (0.7 to 12.0)	0.6 (0.3 to 1.3)
Small Town/Isolated Rural (0.8%)	2.6 (1.5 to 4.7)	0.9 (0.3 to 3.0)	0.4 (0.2 to 0.7)
Education			
Less than high school (9.2%)	2.7 (0.8 to 8.5)	2.5 (1.0 to 6.2)	11.4 (8.8 to 14.7)
High school (25.1%)	23.0 (16.8 to 30.6)	33.5 (23.9 to 44.7)	23.6 (20.2 to 27.3)
Some college (32.5%)	42.2 (35.4 to 49.4)	38.8 (30.0 to 48.3)	29.8 (26.6 to 33.3)
Bachelor's degree (18.4%)	18.7 (14.2 to 24.4)	15.0 (10.6 to 20.9)	19.2 (16.7 to 21.8)
Advanced degree (14.7%)	13.4 (9.9 to 17.8)	10.2 (6.7 to 15.2)	16.0 (13.8 to 18.6)
Income			
Less than \$25 000 (13.0%)	5.3 (3.2 to 8.6)	12.0 (6.3 to 21.7)	14.3 (12.0 to 16.9)
\$25 000–\$59 000 (24.6%)	21.9 (16.9 to 27.9)	18.1 (12.6 to 25.3)	25.8 (22.5 to 29.3)
\$60 000–\$99 000 (22.7%)	19.8 (15.6 to 24.8)	25.2 (17.2 to 35.2)	22.6 (19.6 to 25.8)
More than \$100 000 (39.6%)	53.0 (46.0 to 60.0)	44.7 (35.4 to 54.4)	37.4 (33.8 to 41.1)
Marital status			
Married or living with partner (61.4%)	71.2 (64.1 to 77.4)	63.1 (52.6 to 72.5)	59.5 (55.7 to 63.2)
Widowed (3.8%)	3.8 (2.4 to 5.9)	2.0 (0.8 to 4.9)	4.2 (3.2 to 5.5)
Divorced or separated (9.7%)	13.0 (9.0 to 18.6)	6.6 (3.0 to 13.9)	9.4 (7.7 to 11.4)
Never married (25.2%)	12.0 (7.5 to 18.5)	28.3 (19.4 to 39.2)	26.9 (23.5 to 30.7)
Children under 18 in home			
Yes (29.3%)	18.3 (13.1 to 24.9)	33.0 (24.3 to 42.9)	31.6 (28.1 to 35.3)
No (70.7%)	81.8 (75.2 to 86.9)	67.0 (57.1 to 75.7)	68.4 (64.7 to 71.9)
Political affiliation			
Republican (19.0%)	38.2 (31.6 to 45.4)	23.9 (16.8 to 32.9)	14.3 (12.2 to 16.8)
Democrat (39.5%)	28.4 (22.2 to 35.6)	36.0 (27.6 to 45.3)	43.8 (40.1 to 47.5)
No preference (34.2%)	27.5 (21.5 to 34.4)	32.0 (23.2 to 42.2)	35.5 (31.9 to 39.3)
Other (6.1%)	5.6 (3.5 to 8.9)	8.0 (3.7 to 16.4)	5.7 (4.3 to 7.5)
Grew up in a household with a firearm			
Yes (33.4%)	70.9 (64.2 to 76.7)	46.6 (37.1 to 56.3)	24.9 (22.0 to 28.0)
No (59.4%)	25.8 (20.2 to 32.4)	44.9 (35.6 to 54.6)	69.9 (66.5 to 73.1)
Don't know (6.0%)	3.2 (1.7 to 5.7)	8.4 (4.0 to 16.8)	4.4 (3.0 to 6.4)
Member or generally supportive of NRA or other firearm rights organisation			
Yes (19.2%)	49.7 (42.5 to 56.8)	26.5 (18.9 to 35.8)	11.4 (9.3 to 14.0)
No (75.7%)	49.6 (42.5 to 56.8)	66.8 (56.9 to 75.4)	83.6 (80.6 to 86.3)
Military veteran			
Yes (8.8%)	29.2 (23.4 to 35.8)	0.5 (0.2 to 1.9)	5.8 (4.6 to 7.4)
No (91.2%)	70.8 (64.2 to 76.6)	99.5 (98.1 to 99.9)	94.2 (92.6 to 95.4)

Continued

Table 1 Continued

Characteristic (% total sample)	Owners, n=429 % (95% CI)	Non-owners	
		Lives with owners, n=242 % (95% CI)	No owners in the home, n=1797 % (95% CI)
Carries a firearm for work			
Yes (1.8%)	6.1 (3.4 to 10.7)	3.2 (0.7 to 13.9)	0.8 (0.3 to 2.0)
No (97.5%)	93.6 (89.1 to 96.4)	96.9 (86.1 to 99.4)	99.1 (98.0 to 99.6)
Has a CCW permit			
Yes (3.0%)	15.2 (10.7 to 21.0)	2.5 (0.4 to 15.3)	0.7 (0.2 to 1.9)
No (95.7%)	83.7 (77.8 to 88.3)	96.8 (86.7 to 99.3)	98.8 (97.6 to 99.4)

*Row does not sum to 100% because some respondents reported not knowing whether there were firearms in their home or refused to answer this question.

†Rurality of residential census tract was determined using a four-tier consolidation of Rural-Urban Commuting Area Codes (RUCAs) according to the Washington State 'Guidelines for Using Rural-Urban Classification Systems for Public Health Assessment', available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.359.4369&rep=rep1&type=pdf>.

CCW, carrying a concealed weapon; NRA, National Rifle Association.

Owners of multiple firearms generally owned both handguns and long guns. Overall, approximately half of owners reported that they owned both handguns and long guns (49.0%, 95% CI 41.8% to 56.2%), while 7.6% (95% CI 4.5% to 12.4%) reported owning multiple handguns only and 4.6% (95% CI 2.2% to 9.3%) reported owning multiple long guns only. Nearly one-quarter (23.2%; 95% CI 18.1% to 29.2%) of owners reported owning one handgun only, and 13.9% (95% CI 9.6% to 19.8%) reported owning one long gun only (figure 2). On average, owners reported that they owned 2.6 (SD=3.8, range: 1–50) handguns and 3.8 (SD=8.0, range 1–100) long guns.

A slight majority (55.3%, 95% CI 50.74% to 59.77%) of the total number of firearms in California were described by respondents as long guns. The remaining 44.8% (95% CI 40.23% to 49.26%) were handguns. Most of the long guns were described as rifles and most of the handguns were described as semi-automatic pistols (figure 3). Assault-type weapons were a relatively small share of the long guns (8.9%, 95% CI 3.8% to 14.0%); the vast majority (80.3%, 95% CI 64.2% to 96.5%) of these were owned by owners with 10 or more firearms (online supplementary appendix 7).

When, where and why firearms are acquired

More than half of firearm owners (56.1%, 95% CI 48.7% to 63.3%) reported that they had acquired their most recent (or only) firearm more than 5 years ago (table 2). Overall and within each time period, handguns were more often the type of firearm last acquired; this difference was most pronounced for firearms acquired within the past 2 years (ie, of guns acquired within the past 2 years, 61.5% were handguns and 38.1% were long guns; of those acquired more than 5 years ago, 53.5% were handguns and 44.8% were long guns). The vast majority (82.1%, 95% CI 75.8% to 87.1%) of owners reported that they had acquired their most recent firearm in California, regardless of time since acquisition.

Overall, most (69.4%, 95% CI 62.9% to 75.2%) owners purchased their last firearm rather than acquiring it through other means, though this was less true more than 5 years ago (59.3%, 95% CI 50.6% to 67.3%) compared with within the past 2 years (82.8%, 95% CI 70.6% to 90.7%). The vast majority of these purchases (86.3%, 95% CI 77.5% to 91.9%) were from a retailer, such as a gun store, sporting goods store or pawn shop. The remainder were purchased from private parties, such as family members or friends.

Of the 29.9% (95% CI 24.1% to 36.4%) of owners who did not purchase their last firearm, most (54.4%, 95% CI 42.6%

to 65.6%) reported that they had inherited it, 27.7% (95% CI 18.6% to 39.1%) got it as a gift, 4.5% (95% CI 1.7% to 11.5%) traded for it, and 13.1% (95% CI 6.2% to 25.7%) got it in some other way. Four in five (79.1%, 95% CI 70.0% to 86.0%) of these non-purchased transfers involved a family member; 10.4% (95% CI 5.7% to 18.0%) involved a friend, coworker or acquaintance; and 8.4% (95% CI 4.4% to 15.4%) involved someone else.

Reasons for ownership varied by type of firearm (table 3). More than half (56.7%, 95% CI 48.6% to 64.5%) of handgun owners reported that they owned handguns primarily for protection against people. This rationale was especially common among owners of one handgun only (online supplementary appendix 8). Primary reasons for long gun ownership were more varied. Sporting use (other than hunting) was cited most commonly (34.2%, 95% CI 25.9% to 43.6%), followed by hunting (19.0%, 95% CI 12.4% to 28.0%), protection against people (17.6%, 95% CI 11.3% to 26.2%) and collecting (16.4%, 95% CI 10.5% to 24.7%). Sporting use was also cited most often as the primary reason for ownership of assault-type weapons (45.8%, 95% CI 26.6% to 66.3%), followed by protection against people (35.9%, 95% CI 19.2% to 57.0%).

DISCUSSION

An extensive body of evidence has shown that the presence of a firearm in the home increases risk for firearm death and injury, particularly unintentional shootings (often involving a friend or family member), completed suicide, and female homicide victimisation.⁹ Yet detailed and up-to-date information related to firearm ownership—basic data that could be used to inform effective policies and interventions aimed at reducing firearm death and injury—is almost completely lacking, especially at the state level. Using state-representative, population-based survey data for California, this study provides estimates of the prevalence of and factors associated with firearm ownership, and characterises the types and quantity of firearms owned and aspects of their acquisition.

Findings indicate that approximately one in four California adults own or live in a home with someone else who owns firearms, an increase from the most recent prior estimate of household firearm prevalence of 19.5% (95% CI 18.0% to 21.0%) based on the 2002 California BRFSS (the California BRFSS did not ask about household firearm prevalence in 2004).^{4 10} The share of adults who personally own firearms—a subset of household firearm prevalence—is 14% in the state, amounting to roughly 4.2 million California adults.

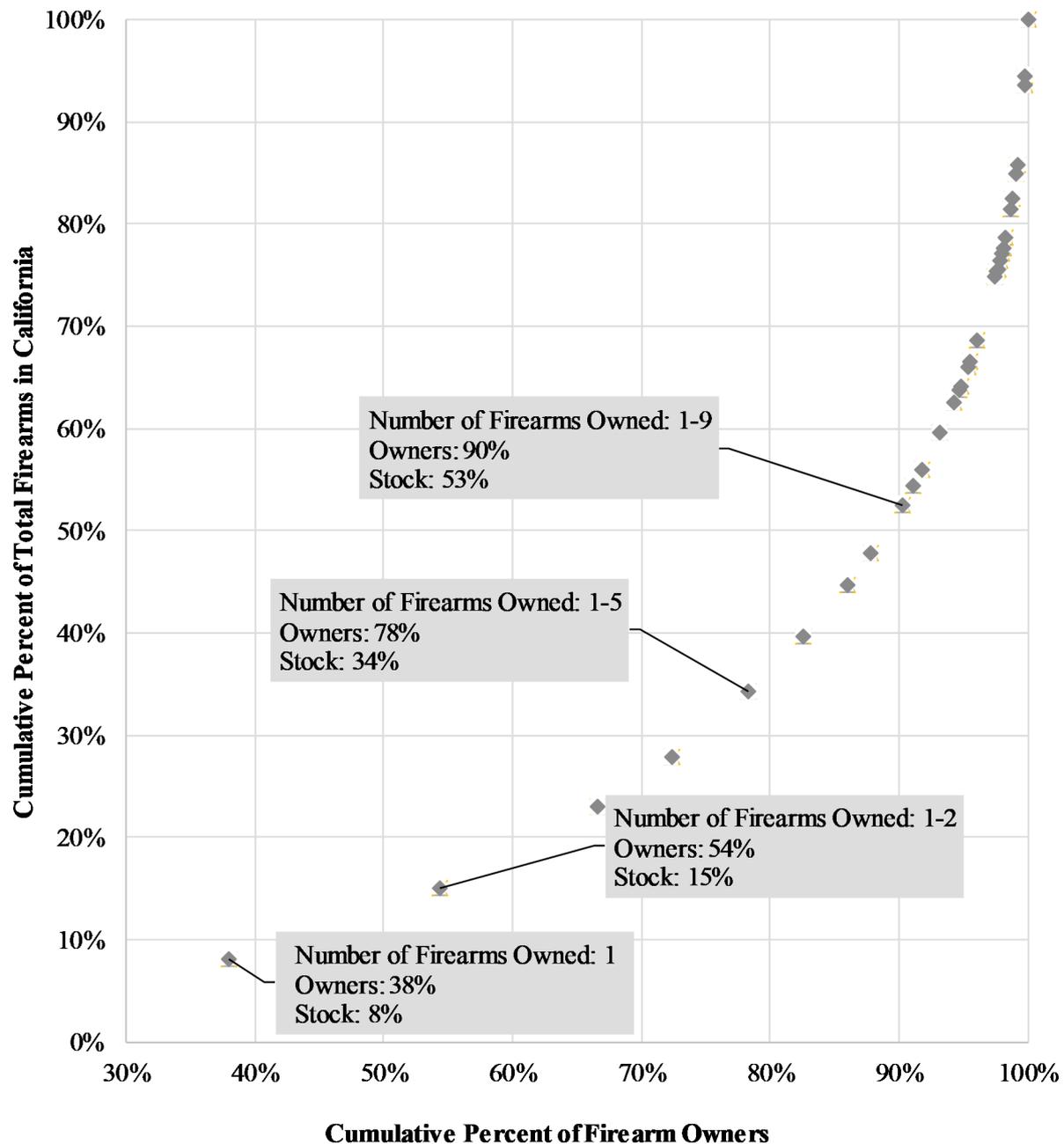


Figure 1 Cumulative distribution of California firearms, 2018 California Safety and Well-being Survey (CSaWS).

Our estimate of personal firearm ownership in California is notably lower than the 22% (95% CI 21% to 24%) estimate for the USA as a whole based on the 2015 NFS.³ Differences in the age and ethno-racial composition of California, which is generally younger and more diverse than the country overall, along with the state's relatively more restrictive regulations on firearm ownership and use, likely contribute to this difference. For example, non-Latinx whites, who make up approximately 70% of the US population but only about half the population of California, are more likely than other racial-ethnic groups to own firearms.

In California and the USA, many firearms are owned by a relatively small number of firearm owners. Firearm ownership in California, however, appears to be slightly more concentrated than it is nationally: in California, owners of 10 or more firearms (10% of California firearm owners and 1% of the state population of adults) own nearly half of all firearms in the state

(approximately 10 million firearms), whereas in the country overall, owners of 10 or more firearms (8% of US firearm owners and 3% of the US adult population) own approximately 39% of all firearms.³

Other research by the authors has demonstrated the existence of distinct typologies of firearm ownership based in part on the number and types of firearms owned, with owners of five or more firearms, including assault-type weapons, more likely to store at least one firearm loaded and unlocked, to own high-capacity magazines, and to have carried a loaded handgun for self-protection in the past 30 days.¹¹ Future research will examine the extent to which these patterns of ownership may be associated with other risk factors for firearm death and injury.

Of note, however, is that the majority (54%) of firearm owners in California—and the nation—report owning only one or two firearms. These owners are generally younger, more ethno-racially diverse, and are more often women. Overall,

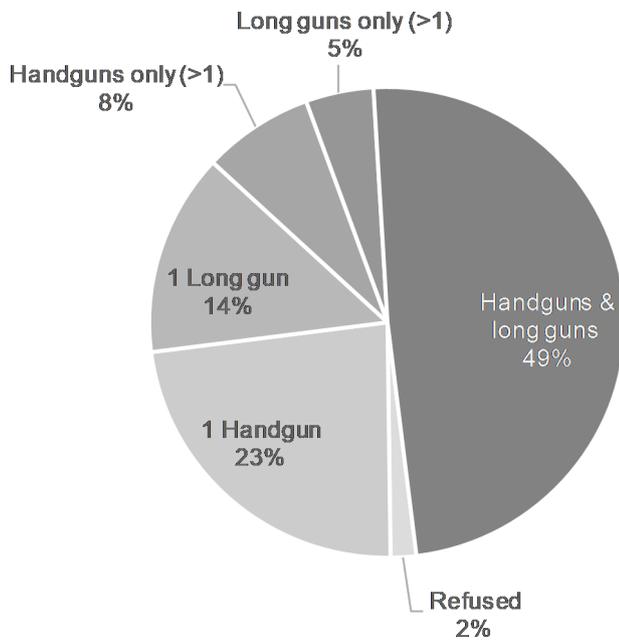


Figure 2 Personal firearm ownership in California, by number and type of firearm, 2018 California Safety and Well-being Survey (CSaWS).

approximately 43% of California firearm owners reported that they live in a home with at least one additional firearm owner. To our knowledge, we are the first to ask firearm owners about whether other household members own firearms. Whether these other firearm owners, most of whom are spouses, jointly own household guns or own firearms themselves is unclear; though, studies have shown that the presence of firearms can make domestic violence disputes more deadly.¹²

We find that the most recently acquired firearm among firearm owners is usually a handgun, particularly when the firearm was acquired within the past 2 years. Primary motivations for owning handguns and long guns are distinct, with protection against people cited most commonly for handguns, and sporting use and hunting cited most commonly for long guns. Together, these findings may signal a shift in the underlying drivers of contemporary firearm ownership from participation in hunting and other recreational activities to a perceived need for self-protection, similar to patterns observed at the national level,³ and suggest that efforts aimed at reducing firearm death and injury may need to address self-protection as a primary driver

of ownership, along with misperceptions about the benefits and risks of having a firearm in the home.^{3 13}

The means by which firearms are acquired also seem to be shifting in more recent years, with firearms acquired within 2 years of the survey, compared with those acquired earlier, more often purchased and, when purchased, more likely to have been obtained from a retailer. Future research will examine the likelihood that these purchases, along with other types of firearm transfers, involve background checks, which are required at the point of transfer for any firearm in California and have been associated with reductions in firearm violence among those individuals directly affected.^{14–16}

Limitations

As with all survey research, non-response error and social desirability bias are concerns in this study, particularly with respect to questions about firearm ownership. However, some comparison studies have suggested that answering questions via computer enhances cognitive performance and reduces social desirability bias relative to oral interviewing by telephone.^{17 18} Further, in our survey, less than 1% of respondents refused to answer our initial question about household firearm ownership, and fewer than one-tenth of 1% refused to answer the subsequent question about individual firearm ownership. Panel members who agreed to participate in our survey also may be systematically different than those who chose not to participate. In general, non-responders tended to be younger, female, Latinx, less educated, with lower income, and to live in a home with children compared with respondents to our survey. In addition, we are unable to report comparable estimates at lower levels of aggregation within the state (eg, cities or counties) due to the sampling design and weighting techniques used in this study. Finally, our total sample size is relatively small and heavily weighted, restricting our analyses primarily to descriptive statistics and limiting subgroup analyses.

CONCLUSION

Our findings provide a basis for better understanding firearm ownership and acquisition and related injury prevention efforts in California. In contrast to the nation overall, California has lower prevalence of firearm ownership but similar socio-demographic patterns of ownership, similar motivations for ownership, and similar trends in acquisition. This work complements ongoing efforts by the authors and others to document the epidemiology of firearm-related death and injury,¹⁹ with

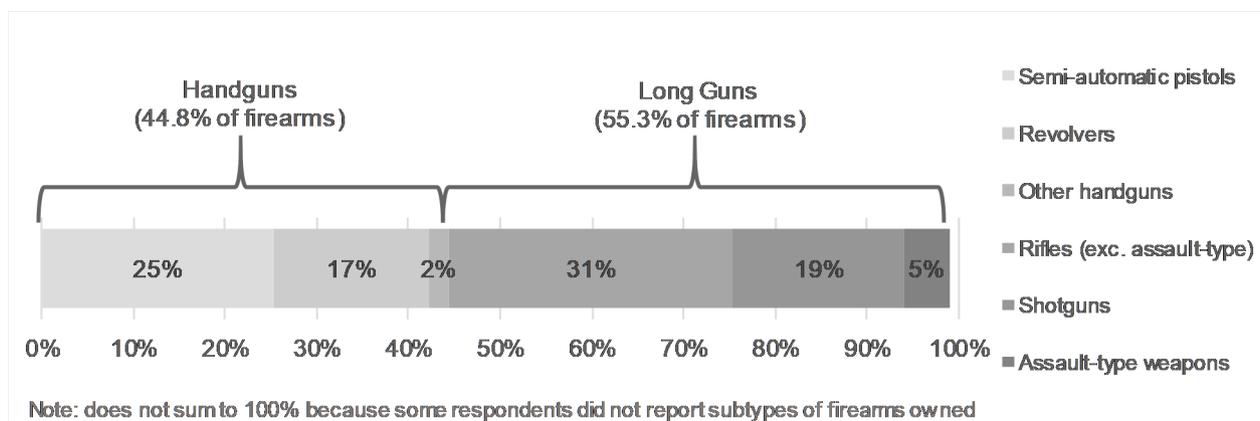


Figure 3 Share of firearms in California, by type and subtype of firearm, 2018 California Safety and Well-being Survey (CSaWS).

Table 2 Time since most recent firearm acquisition among firearm owners, by firearm type and characteristics of the acquisition, 2018 California Safety and Well-being Survey (CSaWS), n=429

	Within 2 years, n=98 % (95% CI)	2 to 5 years, n=50 % (95% CI)	More than 5 years, n=275 % (95% CI)	Total
T*	33.0 (26.0 to 40.9)	10.3 (7.1 to 14.8)	56.1 (48.7 to 63.3)	
Firearm type				
Handgun	61.5 (46.4 to 74.6)	56.9 (37.5 to 74.4)	53.5 (44.7 to 62.1)	56.3 (49.0, 63.4)
Long gun	38.1 (25.0 to 53.2)	43.1 (25.6 to 62.5)	44.8 (36.2 to 53.7)	42.2 (35.1, 49.5)
Where acquired				
California	84.6 (68.7 to 93.2)	89.3 (76.5 to 95.6)	80.1 (72.3 to 86.1)	82.1 (75.8, 87.1)
Outside California	15.4 (6.8 to 31.3)	10.7 (4.4 to 23.5)	19.7 (13.7 to 27.6)	17.2 (12.3, 23.6)
How acquired				
Purchased	82.8 (70.6 to 90.7)	85.2 (71.2 to 93.0)	59.3 (50.6 to 67.3)	69.4 (62.9, 75.2)
Gun store	65.4 (48.4 to 79.2)	29.8 (16.5 to 47.9)	42.0 (31.5 to 53.2)	49.7 (40.7, 58.7)
Sporting goods store	18.7 (9.8 to 32.7)	32.9 (17.8 to 52.6)	35.2 (24.1 to 48.2)	28.4 (21.0, 37.2)
Other store/individual retailer	5.9 (2.1 to 15.7)	13.0 (3.6 to 37.4)	8.9 (4.6 to 16.3)	8.2 (4.9, 13.4)
Private party	10.0 (2.6 to 32.0)	24.2 (7.9 to 54.4)	14.0 (7.9 to 23.6)	13.7 (8.0, 22.4)
Non-purchased transfer	17.2 (9.4 to 29.4)	14.8 (7.0 to 28.8)	40.4 (32.4 to 49.0)	29.9 (24.1, 36.4)
Inheritance	28.1 (11.7 to 53.6)	33.1 (10.2 to 68.3)	61.8 (48.7 to 73.4)	54.4 (42.6, 65.6)
Gift	39.2 (16.5 to 67.7)	30.0 (7.3 to 70.0)	24.5 (14.9 to 37.7)	27.7 (18.6, 39.1)
Trade	–	8.6 (1.1 to 43.8)	5.3 (1.8 to 14.5)	4.5 (1.7, 11.5)
Other	32.7 (9.2 to 70.1)	28.4 (7.2 to 67.0)	7.7 (3.4 to 16.4)	13.1 (6.2, 25.7)

*Row does not sum to 100% because some respondents reported not knowing when they acquired their last firearm or refused to answer this question.

foundational data on which future research and sound firearm violence prevention policies and interventions can be based, in California and nationally.

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REFERENCES

- 1 National Center for Injury Prevention and Control. *Web-Based injury statistics query and reporting system (WISQARS): centers for disease control and prevention*. National Center for Injury Prevention and Control, 2017.
- 2 EpiCenter. *California injury data online*. California Department of Public Health, 2017.
- 3 Azrael D, Hepburn L, Hemenway D, et al. The stock and flow of U.S. firearms: results from the 2015 national firearms survey. *RSF* 2017;3:38–57.
- 4 Okoro CA, Nelson DE, Mercy JA, et al. Prevalence of household firearms and firearm-storage practices in the 50 states and the district of Columbia: findings from the behavioral risk factor surveillance system, 2002. *Pediatrics* 2005;116:e370–6.
- 5 Riddell CA, Harper S, Cerdá M, et al. Comparison of rates of firearm and Nonfirearm homicide and suicide in black and white non-Hispanic men, by U.S. state homicide and suicide rates in black versus white non-Hispanic men. *Annals of Internal Medicine* 2018;168:712–20.
- 6 Kalesan B, Mobily ME, Keiser O, et al. Firearm legislation and firearm mortality in the USA: a cross-sectional, state-level study. *The Lancet* 2016;387:1847–55.
- 7 Kalesan B, Vasan S, Mobily ME, et al. State-Specific, racial and ethnic heterogeneity in trends of firearm-related fatality rates in the USA from 2000 to 2010. *BMJ Open* 2014;4:e005628.
- 8 California POLL 75-04. UCData Archive 1975.
- 9 Hemenway D. Risks and benefits of a gun in the home. *Am J Lifestyle Med* 2011;5:502–11.

Table 3 Primary reasons for firearm ownership among firearm owners, by firearm type, 2018 California Safety and Well-being Survey (CSaWS), n=429

	Handguns, n=340 % (95% CI)	Long guns, n=277* % (95% CI)	Assault-type weapons, n=36 % (95% CI)
For protection against people	56.7 (48.6 to 64.5)	17.6 (11.3 to 26.2)	35.9 (19.2 to 57.0)
For protection against animals	5.0 (2.4 to 10.0)	3.1 (1.7 to 5.6)	–
For hunting	0.1 (0.0 to 0.9)	19.0 (12.4 to 28.0)	3.6 (0.8 to 14.9)
For sporting use (other than hunting)	18.0 (12.8 to 24.6)	34.2 (25.9 to 43.6)	45.8 (26.6 to 66.3)
For a collection	8.4 (4.3 to 15.7)	16.4 (10.5 to 24.7)	9.8 (3.1 to 27.2)
Inheritance	1.4 (0.7 to 2.8)	5.5 (3.0 to 9.9)	–
For some other reason	10.4 (6.2 to 16.8)	4.1 (2.3 to 7.1)	5.0 (1.4 to 15.6)

*Excludes assault-type weapons.

What is already known on this subject

- ▶ The presence of a firearm in the home has been associated with increased risk for firearm death and injury.
- ▶ Basic information on the prevalence of firearm ownership and related topics is often not available.
- ▶ The most comprehensive and up-to-date estimates come from the 2015 National Firearms Survey (NFS), but those data cannot be used to generate estimates for specific states.

What this study adds

- ▶ State-representative, population-based estimates of the prevalence of and factors associated with firearm ownership and acquisition in California.
- ▶ Basic data on firearm ownership and acquisition can inform future research and firearm violence prevention policies and interventions.

- 10 Miller M, Barber C, White RA, *et al*. Firearms and suicide in the United States: is risk independent of underlying suicidal behavior? *Am J Epidemiol* 2013;178:946–55.
- 11 Schleimer JP, Kravitz-Wirtz N, Pallin R, *et al*. Firearm ownership in California: a latent class analysis. *Inj Prev* 2020;26:456–62.
- 12 Campbell JC, Webster D, Koziol-McLain J, *et al*. Risk factors for femicide in abusive relationships: results from a multisite case control study. *Am J Public Health* 2003;93:1089–97.
- 13 Conner A, Azrael D, Miller M. Public opinion about the relationship between firearm availability and suicide: results from a national survey. *Ann Intern Med* 2018;168:153–5.
- 14 Wintemute GJ, Wright MA, Drake CM, *et al*. Subsequent criminal activity among violent misdemeanants who seek to purchase handguns: risk factors and effectiveness of denying handgun purchase. *JAMA* 2001;285:1019–26.
- 15 Wright MA, Wintemute GJ, Rivara FP. Effectiveness of denial of handgun purchase to persons believed to be at high risk for firearm violence. *Am J Public Health* 1999;89:88–90.
- 16 Swanson J, Norko M, Lin H-J, *et al*. Implementation and effectiveness of Connecticut's risk-based gun removal law: does it prevent suicides? *Law Contemp Prob* 2017;80:179–208.
- 17 Chang L, Krosnick J. National surveys via RDD telephone interviewing versus the Internet: comparing sample representativeness and response quality. *Public Opin Q* 2009;73:641–78.
- 18 Kreuter F, Presser S, Tourangeau R. Social desirability bias in cati, IVR, and web surveys: the effects of mode and question sensitivity. *Public Opin Q* 2008;72:847–65.
- 19 Pear VA, Castillo-Carniglia A, Kagawa RMC, *et al*. Firearm mortality in California, 2000–2015: the epidemiologic importance of within-state variation. *Ann Epidemiol* 2018;28:309–15.