

Appendix A: Methodology

Overview

CMJS/SSRI utilizes innovative methods to estimate the size and characteristics of the Greater Denver Jewish community. As survey techniques have become more refined, the barriers to reaching respondents have become increasingly difficult to overcome. Researchers typically experience limitations in reaching respondents due to the proliferation of survey research, the prevalence of cell phones, and caller ID/blocking. Low-incidence populations are particularly hard to reach using the traditional method of random digit dialing (RDD) because the likelihood of reaching someone in the target population depends upon the size of that group relative to the population as a whole. To address these barriers, CMJS has utilized a research design that incorporates two innovations:

- Data from an extended sample of email-only respondents
- Use of organizational data to correct for sampling bias

The research design for the Greater Denver Jewish Community Study utilizes random sampling from an identified frame, or list, of the known population. Local Jewish organizations provided their own lists. These lists were combined with a purchased list of households within the target geographic area and were then deduplicated. The combined list constituted the sampling frame from which a primary random sample of households was drawn. Because this primary sample was a random selection from the overall frame, it is assumed to be representative of the entire frame. For that reason, data collected from the random sample were used to estimate overall population characteristics.

To supplement the primary random sample, a second sample was drawn from a frame consisting of the remaining households who had an email address. Information from these households increased the amount of data available from populations of interest and allowed for more detailed analysis of the characteristics of the community.

The Greater Denver Jewish Community Study was conducted in two phases. Phase I was conducted by Mid City Research, LLC. Phase II was conducted by CMJS/SSRI. Analysis utilized the combined data from both phases.

1. Study Phase I

Sampling Frame

Three sampling frames were used: random digit dial (RDD), consumer data list, and respondent driven sampling (RDS).

RDD was intended to produce population estimates, with a goal of approximately 200 completed surveys, split equally between landline and cellphone strata.

The consumer data list was a modified voter registration list compiled from TargetSmart. Civis Analytics designed a model to predict the likelihood of being Jewish, using machine learning to analyze the characteristics of thousands of self-identified Jews from existing surveys. The initial list included 56,156 households. After deduplicating shared phone numbers and addresses, deleting records with no phone numbers, and deleting records with a “Jewish probability” score below 0.4, the sample list included 14,926 households.

RDS was used to try to reach unaffiliated Jewish households. The RDS sample started with randomly selected “seeds” identified through contacts from organizations that typically engage less involved Jews, such as Jewish Explorers. These individuals completed their surveys and then were asked to provide the names and contact information for other Jews from their social network. Those contacts were interviewed and then asked to “nominate” three other Jewish persons from their social network.

The samples were stratified by geography, to distinguish between urban, suburban, and rural areas.

Survey Instrument and Data Collection

Mid City Research designed the survey questionnaire by using a wiki-survey, an online, crowdsourcing research tool that allowed testers to provide feedback on test questions as well as contribute new ones. They also conducted online focus groups in collaboration with 20/20 Research, with a focus on younger and intermarried Jews. The instrument was designed in consultation with community stakeholders.

Field Procedures

Social Science Research Center (SSRC) at California State University, Fullerton, performed data collection. Up to 10 callbacks per phone number were made. The survey was in the field from August-December 2018.

Transition to Phase II

At the end of the Phase I field period, there were 381 completed surveys, 734 screened out households, and 1,417 additional closed cases (e.g., refusals). The response rate was 12.1% (AAPOR 4). As there were not enough completed responses to calculate population estimates, CMJS/SSRI was hired to complete data collection and integrate Phase I data into the final study.

Recontact survey

After the transition to Phase II, it was determined that additional data would need to be collected from survey respondents from Phase I to support population estimation, analysis, and benchmarking. A short telephone survey was designed to attempt to recontact households with missing information. After reviewing the completed cases, it was determined that 212 cases needed additional information. Additional information was obtained from 123 cases. For the remaining cases, the information was treated as missing.

2. Phase II Sampling Frame

Phase II of the 2019 Greater Denver Jewish Community Study implemented a dual-mode Internet and telephone survey to reach year-round and seasonal residents of the Greater Denver area. In the

absence of an area probability or RDD frame, we built a sampling frame from the combined mailing lists of Jewish organizations in Greater Denver. The numbers and types of organizations included in the lists are shown in Table A1.

Table A1. Composition of strata

Number	Type	Number of organization lists
1	Families and young adults	7 organization lists
2	Synagogues	7 organization lists
3	Other Jewish organizations	9 organization lists
4	General organizations	5 organization lists
5	Consumer list	TargetSmart (data purchase)

In order to find any Jewish-connected households not already known to the organized Jewish community, the consumer list purchased from TargetSmart in Phase I was included in the sample. This list consisted of 50,620 households. Households that appeared solely on the consumer list, and not on any organization’s list, were assigned to stratum 5.

The organizational and purchased lists were combined, cleaned, and deduplicated to ensure that no unique household appeared on the list more than once. Households without any mailing address were removed from the sampling frame because they could not be fully identified. The combined list-based sampling frame consisted of 61,042 households.

3. Phase II Sample Design

Households that appeared on multiple lists were placed in the lowest-number strata for which they were eligible; for example, a household appearing on a “family and young adult” list (stratum 1) and a synagogue list (stratum 2) would be assigned to stratum 1. Households that appeared on the consumer and an organization list were assigned to the list-derived stratum; households that appeared only on the consumer list were assigned to stratum 5.

Within each of the strata, households were classified based on outcomes from Phase 1 of data collection. **Closed** cases were those that were contacted in Phase 1 and had been assigned a final disposition (e.g., completed, screened out, hard refusal). **Contacted open** cases were those that had been contacted at least once during Phase 1 but did not have a final disposition (e.g., not completed, soft refusal, voice mail). **Uncontacted** cases included all of the households added from organization lists that were not on the consumer data list, as well as cases from the consumer data list that were never called during Phase I.

Within the 5 strata, 3 substrata were created for the uncontacted, contacted open, and closed cases within that strata. Table A2 shows the strata and substrata assignments and the frame size within each.

Once the strata assignments were made, a primary sample of 13,636 total potential respondents was randomly selected from across each region/strata cell (Table A2). Of these, 8,150 cases were either uncontacted (sub-strata “a”) or not closed (sub-strata “b”) during Phase I of data collection. The sampling rate of each stratum was designed to oversample likely Jewish households and likely

households with children in order to maximize the representation of those groups within the final sample.

Concurrent to the primary sample, a backup sample of 2,580 primary-eligible households was drawn from the remainder of the sampling frame, to be used as needed to ensure the targeted number of completed sample surveys were completed. In the event that the households in the backup sample were not needed for the primary sample to reach the targeted number of completed surveys, they would be treated as part of the supplementary sample.

Following selection of the primary and backup samples, a nonprobability email-only supplement was identified. This sample frame of for the email supplement included half of the remaining households with email addresses that were not selected into the primary sample as well as households for whom address information was incomplete. In all, 14,764 of those households were selected into the email-only supplement, including 14,711 uncontacted or open cases.

Phase I of the study achieved 53 completed surveys from the RDD and RDS portion of the study. Because there was no possibility of creating appropriate survey weights for this part of the sample, these cases were counted toward as part of the nonprobability supplement.

The combination of the primary sample, backup sample, and the nonprobability supplement is referred to as the “full sample.”

Table A2. List-based sample size by strata

	Frame	Primary	Backup	Supplement
Stratum 1	7,374	1,310	300	2,032
1a) Uncontacted	5,691	800	200	1,529
1b) Contacted, open	1,473	300	100	503
1c) Contacted, closed	210	210	0	0
Stratum 2	3,496	792	300	1,281
2a) Uncontacted	2,654	500	200	846
2b) Contacted, open	750	200	100	435
2c) Contacted, closed	92	92	0	0
Stratum 3	9,693	2,237	600	5,750
3a) Uncontacted	8,322	1,700	500	5,028
3b) Contacted, open	1,234	400	100	722
3c) Contacted, closed	137	137	0	0
Stratum 4	4,833	2,299	650	1,031
4a) Uncontacted	4,378	1,900	600	1,028
4b) Contacted, open	406	350	50	3
4c) Contacted, closed	49	49	0	0
Stratum 5	35,646	3,998	1,000	4,660

5a) Uncontacted	26,089	1,000	500	3,252
5b) Contacted, open	7,506	1,000	500	1,365
5c) Contacted, closed	2,051	1,998	0	53
Total	61,042	10,636	2,850	14,764

4. Phase II Survey Instrument and Data Collection

The survey instrument for Phase II was adapted by CMJS from the Phase I instrument, in collaboration with the advisory committee convened by the Rose Community Foundation. The questions were crafted to minimize potential bias and any burden on respondents. Questions from Phase I that were determined to be unproductive were dropped from the survey. Additional questions were added to align the survey with CMJS standard procedures and to support benchmarking.

The questionnaire was divided into two parts, a screener and the survey itself. The screener section was asked of all respondents to determine eligibility. Any household in the sample was considered eligible if it contained at least one adult aged 18 or older who lived in Greater Denver for at least part of the year and considered him- or herself to be Jewish. Combining Phase I and Phase II, a total of 2,862 households in the primary sample completed the screener and of those, 1,571 were screened into the survey.

Qualifying households proceeded to the main survey, which included sections on basic sociodemographic information, engagement in Jewish life, and perceptions of various aspects of Jewish communal life in Greater Denver. In order to minimize the burden on respondents, a series of complex skip patterns (“branching”) were created to ensure that respondents were only asked questions that pertained to their specific life situation or experience. The online survey took between 25-30 minutes to complete. Respondents completing the survey over the telephone usually completed it in 25-40 minutes. However, the amount of time required to complete the survey varied depending on household composition and the degree of detail respondents were willing to offer for open-ended questions.

The survey and CATI interface were programmed by the Siena College Research Institute (SCRI). Two modes of data collection were utilized: online and telephone. The online and telephone instruments were identical – when a survey was completed over the phone, the telephone interviewer would fill out the online version.

The survey instrument is presented in the form of a codebook in Appendix D.

5. Phase II Field Procedures

Prenotification letters were mailed to the primary sample of 8,150 uncontacted (sub-strata “a”) and open-case (sub-strata “b”) households on June 3, 2019. These letters explained the purpose of the survey and provided each household with a unique link to complete the survey independently online. Households for which one or more e-mail addresses were available also received these letters electronically on June 11, 2019. A sample of the prenotification letter is shown in Appendix E. A

survey invitation was sent to one email address for each household. If email messages “bounced” or were undeliverable, another email address from the same household was substituted if available.

Starting on June 11, households that had not completed the survey were contacted by telephone. The primary goal of telephone contact was to administer the survey over the phone if the respondent was unable or unwilling to complete the survey online, or if the respondent simply preferred to complete the survey over the phone. If the respondent was unwilling to complete the survey over the phone at the time of the call, he or she was asked for a better time to be called again or for an email address to re-send the link to the survey online. Systematic respondent selection did not take place. The first adult reached in the household was interviewed. Calling began on June 11, 2019, starting with the households for which phone numbers were available but email addresses were not. Calling concluded on July 16, 2019. Ten email reminders were sent for all non-completed surveys during the field period.

Data collection was conducted and supervised by Siena, who was responsible for selecting and training callers, supervising and monitoring calling, tracking dispositions, and sending email reminders. Interviewers and supervisors were trained in survey procedures for this specific project, including the study’s sponsor, target population, and eligibility criteria; the survey instrument; pronunciation of Hebrew and Yiddish words; and entering open-ended responses.

In addition to survey-specific training, interviewers also receive general training in telephone procedures and interviewing techniques. Only interviewers who had undergone this basic training worked on the project. Interviewers were provided with paper sheets with frequently asked questions and pronunciation guides, names of Jewish organizations and congregations, and background information on selected concepts.

Callers made up to six attempts to reach all households in the primary sample who did not complete the survey online in response to email requests or who did not have email addresses. Callers offered to conduct survey interviews over the telephone or, if requested, to send the household members their unique link to complete the survey online at their convenience.

Households were contacted repeatedly at different days and times to determine whether available contact information was correct. Households whose available contact information was confirmed to be outdated, who had no contact information, and those for whom the status was uncertain were searched in online public records databases to find updated information. CMJS research assistants searched for additional contact information and added phone numbers to the calling list as they were identified.

The supplementary sample was conducted as an email-only survey that was not accompanied by prenotification letters or phone calls. The survey instrument for the email sample was identical to the one used for the primary sample. Email invitations were sent to the 14,711 households in the backup and supplementary samples on June 12, 2019, with 10 reminders on for non-completed surveys during the field period.

At the conclusion of data collection, the backup sample was folded into the supplementary sample, yielding a total supplementary sample of 17,614.

Data collection ended on July 22, 2019. A cleaned dataset was prepared by SCRI.

6. Data Outcomes

In the overall primary sample, 2,862 households completed the screener, with 1,303 screening in and 1,291 screening out (Table A3). The Phase II response rate was 42.0% for the primary sample (AAPOR RR4). For the combined list-based sample (primary plus supplement), 4,373 households completed the screener, and of those, 2,850 were screened into the full survey (Table A4). The overall response rate was 21.0% (AAPOR RR4). Of the final achieved sample, 381 cases were collected during Phase I and 2,126 were collected during Phase II.

The response rate for Phase II does not account for Phase I. It is likely that response was higher than expected because of the refusals and unreachable cases that had already been identified in the prior phase.

Table A3. Outcome rates by strata for overall primary sample (AAPOR)

Strata	Sample Size	Screened In	Screened Out	Response Rate 4	Refusal Rate 2	Cooperation Rate 1	Contact Rate 2
Stratum 1	1,310	359	78	42.8%	35.1%	60.0%	71.4%
1a) Uncontacted	800	159	38	n/a	n/a	n/a	n/a
1b) Contacted, open	300	75	7	n/a	n/a	n/a	n/a
1c) Contacted, closed	210	125	33	n/a	n/a	n/a	n/a
Stratum 2	792	254	35	43.3%	32.1%	63.6%	68.2%
2a) Uncontacted	500	160	22	n/a	n/a	n/a	n/a
2b) Contacted, open	200	59	8	n/a	n/a	n/a	n/a
2c) Contacted, closed	92	35	5	n/a	n/a	n/a	n/a
Stratum 3	2,237	472	135	34.5%	46.2%	49.5%	69.6%
3a) Uncontacted	1,700	333	105	n/a	n/a	n/a	n/a
3b) Contacted, open	400	96	6	n/a	n/a	n/a	n/a
3c) Contacted, closed	137	43	24	n/a	n/a	n/a	n/a
Stratum 4	2,299	244	232	23.2%	58.4%	37.2%	62.5%
4a) Uncontacted	1,900	176	208	n/a	n/a	n/a	n/a
4b) Contacted, open	350	59	8	n/a	n/a	n/a	n/a
4c) Contacted, closed	49	9	16	n/a	n/a	n/a	n/a
Stratum 5	3,998	242	811	59.0%	17.4%	79.7%	74.0%
5a) Uncontacted	1,000	54	103	n/a	n/a	n/a	n/a
5b) Contacted, open	1,000	62	58	n/a	n/a	n/a	n/a
5c) Contacted, closed	1,998	126	650	n/a	n/a	n/a	n/a
Total	10,636	1,571	1,291	42.0%	23.2%	62%	67.8%

Table A4. Overall outcome rates by sample type

Strata	Sample Size	Screened In	Screened Out	Response Rate 4	Refusal Rate 2	Cooperate Rate 1	Contact Rate 2
Primary	10,636	1,571	1,291	42.0%	23.2%	62%	67.8%
Supplement	17,614	1,279	232	8.4%	7.8%	51.9%	16.2%
Total	28,250	2,850	1,523	21.0%	13.7%	59%	35.6%

Sixty-eight respondents were initially screened into the survey but after inspection of responses were determined to include no Jewish adults or that the adults were Messianic Jews and therefore ineligible for the survey.¹ An additional 275 respondents screened into the survey but did not supply sufficient household demographic information, and so were not included in analyses. The final sample consisted of 2,507 households (Table A5).

Table A5. Greater Denver by sample type

	Primary	Supplement	Total
Eligible households	1,303	1,204	2,507
Completes	1,266	1,150	2,416
Partials	37	54	91
Ineligible households	1,559	307	1,866
Screen out	1,291	232	1,523
Incomplete	227	48	275
Reclassified screened out	41	27	68
Total	2,862	1,511	4,373

7. SSRI Data Synthesis for Population Estimates

Since 2005, the American Jewish Population Project (AJPP) at the Steinhardt Social Research Institute (SSRI) has identified and collected hundreds of nationally representative surveys of the US population to produce estimates of the Jewish population in the continental United States, its states, metropolitan areas, and counties (or groups of counties). These estimates provide an independent, external reference for the basic demographic profile of the Jewish population. This population profile serves as a point of reference for the community as a whole and for those who conduct targeted surveys of the population and have no frame of reference for evaluating the representativeness of their survey sample. Details of the methods are reported elsewhere.²

The data synthesis method demonstrates how an auxiliary data source can be constructed to provide independent, census-like estimates of the size and characteristics of the adult Jewish by religion (JBR) population in the U.S. at the county level.³ These estimates of the adult JBR population may then be used to generate new post-stratification weights. These new post-stratification weights are then applied to the targeted study of the Jewish population.

Summary of Data

The full sample of surveys in the AJPP database spans the years 2000 to 2018, with an additional sample of surveys from 1988 to 1992, for more than 900 independent samples and a total combined sample size of more than 1.4 million respondents, of whom over 34,000 identify as Jewish by religion. Samples include those conducted as part of a series, such as the American National Election Studies⁴, the survey of Religion and Public Life conducted annually by the Pew Forum on Religion and Public Life, and the Cooperative Congressional Election Study (CCES)⁵. In addition, the sample includes surveys conducted regularly by major news organizations (CBS, New York Times). Where a single survey may have included multiple sampling methods or frames (e.g., landline versus cellphone), each is treated as a separate independent sample, with unique identifiers to indicate series membership.⁶ For surveys that included oversamples, only the representative portion of the samples were included in the analyses unless the oversamples were of groups estimated directly in the population models – for example, age or race – in which case the oversample contributed only to estimation of that particular group.

All of the surveys in the sample provide data on those who identify as Jewish by religion (JBR), which is the largest proportion of the Jewish population and therefore serves as the baseline group for generating population estimates. A smaller number of surveys include assessment of religious upbringing or parents' religious/ethnic identification, or non-religious Jewish identification (for instance, “Do you consider yourself Jewish?”) in addition to current religious affiliation.⁷ Often the religious identification question is asked as “What is your religion? Is it Protestant, Roman Catholic, Jewish, something else, or no religion?” Nearly all include Jewish as one of the discrete options. An increasing number of surveys provide no discrete options, asking simply, “What is your religion, if any?”, and record all self-generated responses to the question. Question wording is recorded to examine whether there are differences in Jewish population estimates across the surveys. Most of the surveys specifically included a “no religion” option (none, non-religious, atheist, or agnostic). Recent research has suggested that the inclusion of none as a specific option increases the proportion of those who identify as “no religion.”⁸ Given that a substantial proportion (up to 25%) of the national Jewish population might identify as no religion when asked about religion, this aspect of question wording was recorded. This is to see if (1) such question wording is associated with lower estimates of Jewish identification by religion, and (2) if higher proportions identifying as “no religion” are associated with lower estimated proportions of Jewish identification overall.

The present report is based on a target analysis of the Greater Denver area which included the following counties in Colorado: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson. The analysis included data from a subset of 137 national samples that were conducted between the years 2012 and 2018. The subset sample included 2,129 respondents from the Greater Denver area of whom 56 identify as Jewish by religion.

Modeling

The full model specification included random effects for demographics and county. Demographic variables include age (18-24; 25-34; 35-44; 45-54; 55-64; 65+), race/ethnicity (Non-Hispanic White; Other), sex (Male/Female), and educational attainment (Non-College / College). These variables mirror the categories used in the national data synthesis model.

Greater Denver Jewish Population Estimates

Results from the model provide overall population estimates as well as estimates of the distribution of Jews by demographic groupings (age, race, county, etc.) for the combined counties in the greater Denver area.

The overall estimate of the adult population who identify as Jewish by religion in the Greater Denver area is 48,000 (95% CI: 35,400 to 62,000) corresponding to 2.0 % (95% CI: 1.5% to 2.6%) of the adult population in the same area. Distributions within the Jewish population varied by age, education and race. Thirty-one percent of the Jewish by religion adults in the Greater Denver area live in Denver county. The estimate of the adult population who identify as Jewish by religion in this county is 14,800 (95% CI: 8,500 to 22,200) corresponding to 2.7% (95% CI: 1.5% to 4.0%) of the adult population in the same area.

Table A6: 2018 Greater Denver Population Estimates for Jewish Adults by Age, Education, and Race

	All Adults ^a		Jewish Adults ^b				
	Pop.	Pct. Within	Percentage of all Adults (CI)		Pop.	CI: Low	CI: Hi
ALL	2,439,549		2.0	(1.5,2.6)	48,000	35,400	62,000
Denver	559,510	0.23	2.7	(1.5,4.0)	14,800	8,500	22,200
Age							
18-24 years	51,947	0.09	2.5	(0.9,5.2) !	1,300	500	2,700
25-34 years	164,218	0.29	1.9	(0.7,3.6) !	3,100	1,100	5,800
35-44 years	112,182	0.20	2.5	(1.0,4.7) !	2,800	1,100	5,200
45-54 years	80,262	0.14	2.3	(1.0,4.3) !	1,900	800	3,500
55-64 years	68,969	0.12	3.3	(1.7,5.8) !	2,300	1,200	4,100
65+ years	81,932	0.15	4.3	(2.2,6.9)	3,400	1,800	5,600
Education							
Non-College	313,312	0.56	0.9	(0.3,1.6) !	2,700	1,100	4,900
College Grad	246,197	0.44	5	(2.9,7.6)	12,100	6,900	18,300
Race							
White, non-Hispanic	337,133	0.60	3.8	(2.2,5.8)	12,700	7,200	19,500
Other non-Hispanic	222,377	0.40	0.9	(0.3,1.9) !	2,100	600	4,200
Outlying Denver	1,880,039	0.77	1.8	(1.2,2.4)	33,300	22,700	45,200
Age							
18-24 years	209,577	0.11	1.5	(0.6,3.0) !	3,100	1,200	6,300
25-34 years	363,832	0.19	1.0	(0.4,1.8) !	3,600	1,300	6,500
35-44 years	347,480	0.18	1.5	(0.7,2.7) !	5,300	2,400	9,200
45-54 years	328,235	0.17	1.6	(0.7,2.6) !	5,200	2,400	8,800
55-64 years	309,243	0.16	2.3	(1.3,3.7)	7,000	4,000	11,300
65+ years	321,672	0.17	2.9	(1.8,4.3)	9,000	5,700	13,400
Education							
Non-College	1,131,547	0.60	0.6	(0.3,1.2) !	7,400	3,400	13,300
College Grad	748,492	0.40	3.5	(2.4,4.8)	25,900	17,800	35,200
Race							

White, non-Hispanic	1,380,717	0.73	2.2 (1.5,2.9)	30,000	21,000	40,500
Other non-Hispanic	499,322	0.27	0.7 (0.2,1.4) !	3,300	1,000	6,600

Notes:

a) Source: Census Population Estimates Program, 2018. Adjustment for education made using ACS 2017 and adjustment for household population made using 2010 Census.

b) 'Jewish Adults' Includes adults who identify their religion as Jewish.

c) Denver County

d) Adams, Arapahoe, Boulder, Broomfield, Douglas, and Jefferson counties in Colorado

!) Coefficient of Variation larger than 30, Interpret data with caution.

Estimating the number of JNRs (Jews of no religion)

The next step in estimating the size of the adult Jewish population was to estimate the number of adult JNRs. Estimates of the number of JNRs are not directly available from the data synthesis and must be approximated from other sources. We used a ratio of JNRs to JBRs derived from the Pew study of American Jews.

The resulting target estimates for JBR and JNR adults are show in Table A8. The resulting proportion of JNRs to total Jewish adults was 0.37.

Table A8: JBR and JNR targets for postestimation

	JBR Adults	JNR Adults	Total
Denver County	14,786	8,680	23,466
Other Counties	33,255	19,522	52,777

8. Weighting

Overview of weighting procedures used

The purpose of developing survey weights for the sample is to adjust the survey data so that they will represent the population from which they were drawn. This is done in two ways: base weights, which are based on sample design, and poststratification weights, which are adjustments to external benchmarks.

For base weights, the data are adjusted to match the sampling frame by calculating the strata-specific probabilities of selection into the sample and rates of response. By selectively adjusting weights upward (for respondents from strata in which households were less likely to be selected or to respond) and downward (for respondents from strata in which households were more likely to be selected or to respond), the resulting weights adjust the data to match the frame from which they were drawn.

Poststratification, the second phase of weighting, adjusts the data to match known population parameters. In this case, the known parameters that were utilized were the Enhanced RDD estimates of the JBR adult population and their age distribution, and the JNR estimate, as described in the previous section. The number of children currently enrolled in Jewish day schools and part-time schools and the number of synagogue members are provided by local organizations. After

applying the base weights, the sample is adjusted again to match these parameters. This step yields the primary sample weights for households and respondents.

The weighted primary sample was used to estimate the size of the adult population for multiple categories of religious identity as well as the distribution of Jewish denominational affiliation.

For the supplemental sample, base weights were calculated for the email portion of the frame based on differential probability of selection and response. After applying base weights, poststratification weights were calculated to adjust the full sample to the JBR and age estimates from data synthesis, the number of children in day school, as well as the JNR estimate and denominational affiliation calculated from the primary sample.

At the end of the process, a datafile was created with one record per household. In this file, each record has four weights:

- 1) wtprimhh: the weight of the household for the primary sample
- 2) wtfllhh: the weight of the household for the full sample
- 3) wtprimresp: the respondent's individual weight for the primary sample
- 4) wtfllresp: the respondent's individual weight for the full sample

Design and base weights

Base weights were calculated separately for the primary sample and the full sample. Base weights are calculated as the product of the design weight (inverse of the probability of selection into the sample) and the nonresponse weight (inverse of the probability of responding after being selected into the sample).

For the primary sample, data were weighted separately within each sub-stratum by the probability of selection into the sample (design weights) and nonresponse. To calculate the design weight, the preliminary frame size was adjusted to account for the presumed ineligibility of a proportion of the households in the sample frame. Ineligible households identified during the data collection period of the survey are those households that are found to be duplicates, deceased, or infirm.

The adjusted frame size for each stratum was calculated as:

$$\text{Adjusted frame size} = \text{Frame size} \times (\text{Number eligible households} \div \text{Number selected households})$$

The design weight for each stratum was calculated as:

$$\text{Design weight} = \text{Adjusted frame size} \div \text{Number eligible households}$$

Respondents were those who partially or fully completed the survey. Partial surveys were those in which the screening data were completed (whether the respondent was screened in or out). The nonresponse weight for each stratum was calculated as:

$$\text{Nonresponse weight} = \text{Number eligible households} \div \text{Number respondent households}$$

The base weight is calculated by multiplying the design weight by the nonresponse weight:

Base weight = Design weight × Nonresponse weight

Poststratification

In order to adjust the sample to account for the known population of Jews in Greater Denver, the process of poststratification was used.⁹

In order to adjust to the number of JBR adults, the survey data were reviewed based on responses to religion questions for each adult in the household. Each adult received a preliminary designation of Jewish by religion (JBR), Jewish not be religion (JNR), Jews of multiple religions (JMR), Jewish background (JB), Jewish affinity (JA), or not Jewish. All households with no JBR, JNR, or JMR adults were classified as non-Jewish and reclassified as screened out of the sample.

The first stage of the poststratification was conducted on an individual rather than a household level.¹⁰ The file was converted to an individual-level file with one record created for each adult in the household. The weights of the individual records initially were set at the weights of the household record, resulting in a total weight that added up to the number of individuals rather than the number of households.

The individual records were poststratified to match the JBR and JNR counts based on their county of residence (i.e., Denver vs. other counties). Individuals in the data file who were JNR or JMR were adjusted to the JNR estimates. Characteristics of JNRs, and all of non-Jewish adults, were derived from the base weights.

The result of this step were *interim individual* poststratification weights for each individual adult. Because further poststratification weights were conducted at the household level, the *interim individual weights* were converted to preliminary household weights by taking the mean of all of the individual poststratified weights for all adults in the household for the respondent record.¹¹ All records for non-respondents were dropped.

Poststratifying to known parameters

The second stage of postestimation applied to households rather than individuals. At this stage, we further poststratified the sample using known parameters of the Jewish community: day school enrollment, part-time school enrollment, pre-school enrollment, synagogue membership, and donating to a local Jewish federation. To make use of these numbers, the education enrollment numbers needed to be converted to a number of households that they each represented.

Local schools provided estimates of 937 children enrolled in Jewish day schools, 1,500 in Jewish part-time schools for grades K-8, and 506 children in Jewish early childhood centers. To use this estimate for individual adult weights, we estimated the number of households that this represented and the number of adults in those households.

For each household, we categorized it as a day school household if any children were enrolled in day school and a part-time household if any children were enrolled in part-time school. We coded synagogue households if they were members of an Orthodox, Conservative, Reform, or other denomination “brick and mortar” synagogue.

For households that had any children in school we estimated:

Mean (weighted) day school (DS) students per DS household
Mean (weighted) part-time school (PT) students per PT household
Mean (weighted) early childhood school (EC) students per EC household

To estimate households, we used the following formula:

DS household count = (DS students total ÷ mean DS students per household)
PT household count = (PT students total ÷ mean PT students per household)
EC household count = (EC students total ÷ mean EC students per household)

For synagogue households, membership estimates provided by the synagogues in the region indicated that there were 8,080 member units.

The last stage of the poststratification of the primary sample was to adjust the number of households to match the early childhood households, day school households, part-time school households, and synagogue households. The results of this step yielded the *primary household weight*.

Respondent weights

Weights for individual respondents, *primary respondent weights*, were created for analysis of individual level characteristics. Respondents were poststratified to represent all adults in the population.

Using the *primary household weights*, estimates were generated for the total number of adults for the following parameters:

- Jewish type (JBR, JNR, JMR) or non-Jewish
- Age, gender, race, and college education
- Jewish denomination (Orthodox, Conservative, Reform, Other, None)
- Adults in day school household
- Adults in part-time school household
- Adults in early childhood school household
- Adults in synagogue household
- Geography

The starting weight for the respondent poststratification was the *interim individual weight* for the respondent. This was poststratified using the parameters listed above to yield the *primary respondent weight*.

Weights for the full sample

For the full sample, base weights were calculated differently than for the primary sample but the poststratification processes were similar. The full sample was a combination of the primary and supplementary (email-only) samples. All list-based households in the frame were eligible to be selected into the primary sample, but only households with email addresses could be selected into the supplement. Furthermore, households in the supplement received a lower level of effort than did those in the primary, resulting in different probabilities of response.

The full frame was divided conceptually into an email and a non-email frame (the list-based frame). All households from the list-based frame with email addresses were assigned into the email frame. For households without email addresses, the base weight was calculated identically to the way it was for the primary sample.

For households with email addresses, households were considered to have been selected into the full sample if they were in the primary or the supplement.

Base weights for primary and supplement

The design weight for each email stratum was calculated as:

$$\begin{aligned} \text{Design weight} &= \\ & \text{Email frame size} \div (\text{Primary email sample} + \text{Supplement email sample}) \end{aligned}$$

The probability of response depended on the level of effort so was different for primary and supplement subsets.

$$\begin{aligned} \text{Nonresponse weight, email primary} &= \\ & \text{Primary email sample} \div \text{Primary email respondents} \end{aligned}$$

$$\begin{aligned} \text{Nonresponse weight, email supplement} &= \\ & \text{Supplement email sample} \div \text{Supplement email respondents} \end{aligned}$$

The base weight is calculated by multiplying the design weight by the nonresponse weight:

$$\begin{aligned} \text{Base weight} &= \\ & \text{Design weight} \times \text{Nonresponse weight} \end{aligned}$$

Poststratification of full sample

Poststratification of the full sample was conducted in the same way as for the primary sample, as described above. However, all poststratification targets for the full sample were the estimates generated from the primary sample only.

9. Final Population Estimates

Precise Population Estimates with Confidence Intervals

Population numbers presented in the report were rounded so as to avoid overprecision – that is, the misleading implication that our estimates are correct down to the single digit.

The precise population estimates with 95% confidence intervals are shown in Table A10. For example, the best estimate of the total Jewish population is 90,800 people. Given the size of the sample and possible sampling and non-response error, we can be 95% confident that the true value lies somewhere between 83,200 people and 98,300 people.

Table A10. Population Estimates with Confidence Intervals Shown

	Estimate	Lower bound	Upper bound
Total Jews	90,800	83,200	98,300
Adults	109,500	100,100	118,900
Jewish	72,900	67,300	78,500
Non-Jewish	36,500	31,500	41,600
Children	25,400	20,600	30,300
Jewish	17,900	14,000	21,700
Non-Jewish	7,500	4,300	10,600
Total people	134,900	122,900	146,900
Total households	51,100	47,500	54,800

10. Analysis

All analyses were completed using statistical software Stata, version 15. Unless otherwise noted, all analyses were restricted to Jewish households (in which at least one adult was Jewish) as well as individual Jewish adults and Jewish children who were specifically identified by respondents as being Jewish. Analyses of characteristics of the entire population were based only on the primary sample with appropriate weights applied. All analyses of subgroups or subsets of the population were conducted using the full sample with appropriate weights applied.

11. Margin of Error

Many studies report a margin of error instead of reporting confidence intervals. The margin of error is the 95% confidence interval that would be expected if ALL survey respondents had answered a question; if there were only two response choices; if about half gave each response; and if the survey design had used a simple random sample. Given these conditions, the margin of error is dependent solely on the sample size and population size. Furthermore, the margin of error is only applicable to percentages, not to totals or means.

In our sample, with 1,303 respondents in the primary sample and an estimated population of 90,800, the margin of error would have been $\pm 2.7\%$ if we had used a simple random sample. Using our stratified random sample design increases the margin of error to about $\pm 2.695\%$.

12. Bias and Limitations

Every effort to create a representative sample was made in order to prevent bias or, where bias was unavoidable, to identify and reduce it. Nevertheless, some groups are particularly likely to be underrepresented in the sample. Most significant among these are unaffiliated Jews (including new residents and intermarried families) and young adult Jews. Young adult Jews are also likely undercounted for other reasons. Young adults in general are notoriously difficult to reach for telephone surveys, in part due to the increasing rate of cell phone-only households and in part because they tend to move more frequently than older adults; both conditions render young adults harder to track.

Newcomers who are not known to the community are very likely undercounted, though they may have appeared on the ethnic names list. Interfaith families may also be underrepresented to the extent that they are unaffiliated and reside in households with directory listings that do not fit the selected ethnic name parameters.

13. Qualitative Coding

The survey included open-ended questions about personal experiences with antisemitism, aspects of Jewish life in which respondents or members of their households were unable to participate due to health issues or financial difficulties, the strengths and gaps within the Jewish community, and ideas for which facilities and programs respondents would like to see offered by the Jewish community. Responses were coded by CMJS/SSRI staff and student research assistants, with at least two researchers coding each question.

Coders were trained to ensure intercoder reliability, stability, and accuracy. Their work was reviewed on an ongoing basis for quality control. Difficult cases were marked for review by supervisors.

Coding was conducted both deductively and inductively. For each question, coders were given a set of categories to look for in the responses; these categories were based on those used for similar questions from previous studies. However, coders were also instructed to watch for emerging patterns. When a coder believed that a new pattern of responses existed within the data, they reviewed their findings with a supervisor who decided whether the new pattern warranted a new code. When a new code was created, the coders reviewed previously coded entries to check whether the new code would apply to them.

¹ Messianic Jews claim Jewish identity, but their claim is typically rejected by the vast majority of the Jewish community. Respondents who identified as Messianic Jews in this study were treated as non-Jews.

² Saxe, L., & Tighe, E. (2013). Estimating and understanding the Jewish population in the United States. *Contemporary Jewry*, 33, 43-62; Tighe, E., Livert, D., Barnett, M., & Saxe, L. (2010). Cross-survey analysis to estimate low-incidence religious groups. *Sociological Methods & Research*, 39, 56-82; Tighe, E., Saxe, L., Kadushin, C., Magidin de Kramer, R., Nursahedov, B., Aronson, J., & Cherny, L. (2011). *Estimating the Jewish population of the United States: 2000-2010*. Waltham, MA: Steinhardt Social Research Institute, Brandeis University; Tighe, E., Saxe, L., Magidin de Kramer, R., & Parmer, D. (2013). *American Jewish population estimates: 2012*. Waltham, MA: Steinhardt Social Research Institute, Brandeis University.

³ Tighe et al., *American Jewish population estimates: 2012*. Saxe, Leonard & Tighe, Elizabeth & Boxer, Matthew. (2014). Measuring the Size and Characteristics of American Jewry: A New Paradigm to Understand an Ancient People. Magidin de Kramer, R., Tighe, E., Saxe, L., & Parmer, D. (2018). Assessing the Validity of Data Synthesis Methods to Estimate Religious Populations. *Journal for the Scientific Study of Religion*, 57(2), 206-220.

⁴ The American National Election Studies (ANES). ANES 2012 Time Series Study. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2016-05-17. <https://doi.org/10.3886/ICPSR35157.v1>.

⁵ Brian Schaffner; Stephen Ansolabehere; Sam Luks, 2017, "CCES Common Content, 2016", <https://doi.org/10.7910/DVN/GDF6Z0>, Harvard Dataverse.

⁶ Series identification is included in the dataset to be able to examine differences across surveys that can be accounted for by survey series.

⁷ Currently there are too few surveys of representative samples of all U.S. adults that include alternative methods of Jewish identification. Thus, the present analyses focus on the JBR population only.

⁸ Putnam, R.D., & Campbell, D.E. (2010). *American grace: How religion divides and unites us*. New York: Simon & Schuster.

⁹ Poststratification was conducted in Stata using the ipfraking command See Kolenikov, S. 2014. Calibrating survey data using iterative proportional fitting (raking).” *The Stata Journal* 14(1), 22-59.

¹⁰ For a discussion of the challenges of simultaneously poststratifying at the individual and household level, see Kolenikov, S., and Hammer, H. 2015. Simultaneous Raking of Survey Weights at Multiple Levels. *Survey Methods: Insights from the Field*, Special issue: ‘Weighting: Practical Issues and ‘How to’ Approach. Retrieved from <http://surveyinsights.org/?p=5099>. DOI:10.13094/SMIF-2015-00010. Multiple approaches were compared to identify the one with consistent results.

¹¹ Multiple approaches were compared for this conversion, and the mean weight was determined to be most reliable. See Kolenikov, S., and Hammer, H. 2015. Simultaneous Raking of Survey Weights at Multiple Levels. *Survey Methods: Insights from the Field*, Special issue: ‘Weighting: Practical Issues and ‘How to’ Approach. Retrieved from <http://surveyinsights.org/?p=5099>. DOI:10.13094/SMIF-2015-00010