

# The 2018 Massachusetts Employer Health Insurance Survey

## FIELD REPORT

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## ***I. Background and Updates to the MES***

The Massachusetts Employer Survey (MES) is a critical tool for the Center for Health Information Analysis (CHIA) that contributes to its mission of monitoring the Massachusetts health care and health insurance systems, and providing reliable information and meaningful analysis for those seeking to improve health care quality, affordability, access, and outcomes.

The MES was first fielded in 2001 and has been re-administered multiple times since then, with the most recent fielding taking place in 2018. With more than 15 years of data, the MES provide a unique lens on changes in Massachusetts health insurance markets in both pre- and post-reform periods, including the implementation of the Affordable Care Act (ACA). Throughout this period, the MES has been the primary and most relied upon source of information on employer health insurance in the state, as the national employer surveys, Medical Expenditure Panel Survey, and the Kaiser Family Foundation Employer surveys have not had large enough sample sizes to make reliable estimates for Massachusetts, and do not address state-specific issues.

The 2018 questionnaire was based on previous CHIA survey instruments administered in 2001, 2003, 2005, 2007, 2009, 2010, 2011, 2014, and 2016. The central components of the survey have remained over time, though changes to the questionnaire have been documented in field reports from each of the survey years, and can be found at <http://www.chiamass.gov/massachusetts-employer-survey/>.

John Snow Inc. (JSI) and NORC at the University of Chicago implemented the 2018 MES, which included several updates to the 2016 MES:

- **Inclusion of a panel sample.** The 2018 sample retained respondents from the 2016 MES sample. The inclusion of these respondents allows for longitudinal data analysis.
- **Additional questions regarding part-time health insurance benefits.** The 2016 MES asked firms whether part-time workers were eligible for health insurance benefits at all. In recognition of the potential disparities between part-time and full-time employees, the 2018 MES asked additional questions about part-time employee eligibility and coverage.
- **Improved comparability to national data with regard to plan type information, particularly premiums, deductibles, and out-of-pocket limits.** Historically, the MES has examined four plan types – HMO, PPO, POS, and Indemnity – and treated high deductible health plans with savings options (HDHP/SO) as a type of benefit design. Given differences in HDHP/SO with regard to cost-sharing, the national Kaiser Family Foundation Employer Health Benefits Survey categorizes HDHP/SO as a separate plan type, and the 2018 MES allows for analyses to be conducted with and without HDHP/SO as a separate plan type to allow for national and historical comparability. In addition, the 2016 MES asked about cost-sharing information for the firm’s largest plan for its largest health insurance carrier only, whereas the 2018 MES collected cost-sharing information for the plan with the largest enrollment within each plan type offered at each firm.

This report describes the design of the 2018 MES survey, data collection, methods for weighting and analysis, and results.

## II. Survey Design

### Sample Design

Like the 2016 MES, the 2018 MES uses firms (e.g., CVS as an organization) rather than establishments (e.g., an individual CVS worksite) as the sampling unit. The target population for the survey contained firms, standalone and headquarters only, with establishments located in the state of Massachusetts. This includes firms fully located in the state, as well as firms headquartered outside but with establishments inside the state. We excluded federal, state, and other public employers, as well as employers with fewer than 3 employees in the state.

We used as the sample frame the Dun's Market Identifiers (DMI) business database available from Survey Sampling International (SSI). The DMI contains extensive information on U.S. firms, including business size in terms of the number of employees and the North American Industry Classification System (NAICS) that can be used to classify firms into industry sectors.

The 2018 MES defined six sampling strata, based on the following firm size categories:

- Stratum 1: employers with 3-9 employees
- Stratum 2: employers with 10-24 employees
- Stratum 3: employers with 25-49 employees
- Stratum 4: employers with 50-199 employees
- Stratum 5: employers with 200-999 employees
- Stratum 6: employers with 1,000 or more employees

Note that the last two strata in the 2016 MES, stratum six with 1,000-4,999 employees and stratum seven with 5,000 or more employees, were combined to form stratum six in the 2018 MES. For firms with headquarters in Massachusetts, firm size was defined by number of employees based in Massachusetts. For multi-state firms without a Massachusetts headquarters, firm size was defined by number of US employees. Another major change in the 2018 MES is that the sample included most 2016 MES respondents, the so-called panel sample. The purpose of retaining the panel sample is to improve survey completion rate and longitudinal data analysis. Table 1 below shows the population distribution and sample allocation of the 2018 MES. The population figures were provided by SSI.

**Table 1. 2018 MES Population Distribution and Sample Allocation.**

Firm size category	Population size	Panel sample size	Non-panel sample size	Total sample size
3-9	94,955	0	615	615
10-24	20,629	148	220	368
25- 49	6,967	134	195	329
50-199	5,110	262	280	542
200-999	1,510	169	500	669
1000+	932	65	650	715
<b>Total</b>	<b>130,103</b>	<b>778</b>	<b>2,460</b>	<b>3,238</b>

The purpose of sample stratification was to support separate estimation for subpopulations defined by firm size and to improve the precision of overall sample estimates. This stratification allowed us to apply different sampling rates to the strata through disproportional sample allocation to the strata. For example, we applied a sampling rate of 30% to the largest stratum and less than 1% to the smallest stratum.

The non-panel samples were selected independently from each of the six strata. Within each stratum, the firms in the universe were sorted first by 2-digit NAICS code, then by ZIP code, and then by firm size. The stratum sample was then drawn systematically to spread the sample across the sorted list. Systematic sampling from a sorted frame imposes an implicit stratification on the sample that ensures that the sample will represent employers of different industries, geographic areas, and sizes proportionally to their share in the population.

### ***Re-Screening the Panel Sample***

The panel sample was originally comprised of 778 respondents, which were those firms belonging in strata two through six. After dropping one duplicate, 777 firms remained in the panel group. An email was sent to confirm/update the contact for the 2018 MES. We did not have email addresses for 103 firms, and 61 of the emails sent bounced back. These 164 firms were then re-screened on the phone. Only 10 firms dropped out from the panel sample – 4 refusals to be screened, 5 ineligible (out of business or no employees in Massachusetts), and 1 bad phone contact – leaving 767 panel firms in the final survey sample. Table 2 below displays the results of the screening process for the panel sample.

**Table 2. Panel Sample Screening Results.**

<b>Firm size category (based on 2016 firm size)</b>	<b>Panel Firms</b>	<b>Refused screening</b>	<b>Ineligible</b>	<b>Phone issues</b>	<b>Panel survey sample</b>
3-9					
10-24	148	0	0	0	148
25- 49	134	2	0	0	132
50-199	262	2	5	0	255
200-999	169	0	0	1	168
1000+	64	0	0	0	64
<b>TOTAL</b>	<b>777</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>767</b>
<b><i>Panel firms screened out of survey = 10</i></b>					

## ***Pulling and Screening the Non-Panel Sample***

In December 2017, JSI submitted a request to SSI to pull a sample from the Dun & Bradstreet database. Below are the specifications developed by NORC and provided to SSI:

- The universe should contain all firms (standalone and headquarters only) with establishments located in the state of Massachusetts (i.e., firms fully located in MA, or headquartered outside MA but with establishments inside MA).
- Subsidiaries should be excluded from the universe.
- Franchises should be included in the universe.
- Firms with fewer than 3 employees should be excluded. For firms with headquarters in Massachusetts, firm size is defined by number of employees in Massachusetts across all sites. For firms without a Massachusetts headquarters, firm size is defined by number of employees in the United States.
- Remove the 778 panel firms from the universe before selecting the 2018 sample.
- The 2018 sample consists of 2,460 (or 3,238 when including panel firms) firms across 6 strata defined by firm size.
- The sample for each stratum should be selected independently and systematically. Within each stratum, the firms in the universe should be sorted first by 2-digit NAICS code, then by ZIP code, and then by firm size. The stratum sample should then be drawn systematically to spread the sample across the sorted list.
- Each record in the sample should include Firm Name, All Employer Contact Information (e.g. Mailing Address, Phone Number, HR Contact, Email), NAICS Code, SIC Code, Exact Total Employee Count, Franchise Status (i.e. F vs. C), and DUNS Number.

Though there were 2,460 firms in the received sample, there were 2,369 firms remaining after removing 14 duplicates and 77 public entities. We then commenced with telephone outreach and web research to screen this group.

The following questions were asked during sample screening calls to establish eligibility and identify the primary survey respondent at the firm:

1. Does your firm currently have employees in MA?
2. Is your firm part of the federal, state, or city governments?
3. Does your firm employ 3 or more employees in Massachusetts?
4. Can you provide contact information for the Health Benefits Manager (person who makes benefits decisions) for your firm?

Google and LinkedIn were the main information sources used to find names and titles of health benefits staff at each firm. If a firm was found to be out of business, had fewer than 3 employees in MA, was not currently doing business in MA, or was a government entity, then the firm was deemed ineligible.

We tracked the outcome of the sample screening efforts, including: successfully screened (deemed eligible), ineligible (out of business, government/public sector, fewer than 3 employees in MA, duplicate case), and refused to participate. Those included in the final sample for the initial outreach were those firms found eligible during the pre-calls (293), firms that listed relevant survey contact information from web research (819), and those that were called or found online (with working phone numbers) but with which we were unable to make contact and confirm eligibility (904). For phone numbers that were non-working, JSI dropped those firms from the final sample. A total of 353 non-panel firms were screened out of the survey. Among those non-panel firms that were screened out, 233 firms were ineligible (66%), 107 refused to participate in the screening (30%), and 13 were unable to be contacted due to phone issues (4%). A total of 2,016 non-panel firms remained in the sample. Table 3 summarizes the results from the screening process for the non-panel sample

**Table 3. Non-Panel Sample Screening Results.**

<b>Firm size category</b>	<b>Non-panel firms</b>	<b>Refused screening</b>	<b>Ineligible</b>	<b>Phone issues</b>	<b>Unknown eligibility</b>	<b>Eligible</b>	<b>Non-panel survey sample</b>
3-9	610	35	110	5	272	188	460
10-24	219	15	20	2	70	112	182
25- 49	193	9	18	2	66	98	164
50-199	275	13	22	1	67	172	239
200-999	436	11	37	2	126	260	386
1000+	636	24	26	1	303	282	585
<b>TOTAL</b>	<b>2,369</b>	<b>107</b>	<b>233</b>	<b>13</b>	<b>904</b>	<b>1112</b>	<b>2,016</b>
		<b><i>Non-panel firms screened out of survey = 353</i></b>			<b><i>Non-panel firms screened in to survey = 2,016</i></b>		

Table 4 below displays the number of panel and non-panel firms in the sample after the screening process. The total number of firms in the final sample was 2,783.

**Table 4. Final 2018 MES Survey Sample.**

<b>Firm size category</b>	<b>Population size</b>	<b>Panel sample size</b>	<b>Non-panel sample size</b>	<b>Total sample size (panel + non-panel)</b>
3-9	86,119	0	460	460
10-24	19,577	148	182	330
25- 49	7,448	132	164	296
50-199	6,178	255	239	494
200-999	2,647	168	386	554
1000+	2,242	64	585	649
<b>Total</b>	<b>124,211</b>	<b>767</b>	<b>2,016</b>	<b>2,783</b>

## ***Survey Modalities***

JSI used a multi-method approach to data collection to offer maximum flexibility to the respondents to facilitate their response to the survey. Each firm was assigned a unique survey ID number to track sample response and firm response across three modalities:

- The online survey. The online survey was the main modality offered to the sample, and encouraged heavily relative to the 2016 MES. An online version of the survey was programmed in SurveyGizmo. The survey link and unique survey ID were included in all reminder emails, and later with the printed mail survey.
- The telephone survey. The telephone survey was offered to non-responders during the telephone follow up phase. Responses were entered into a separate SurveyGizmo instrument specifically programmed to be an interview. The sample of non-responders and call attempts was managed in CASES software (described in more detail below).
- The mail survey. A printed version of the questionnaire, each with a unique survey ID, was mailed to all remaining non-responding firms after 4 months in the field. The mail survey data was appended to the online survey data file.

## ***Data Collection Process***

The data were collected between March and August 2018.

*Initial mail outreach.* An initial invitation letter was sent to all firms in the sample. Firms with fewer than 25 employees (N=790) received a \$10 cash incentive.<sup>1</sup> The letter explained the purpose of the study and value of the survey data to the state and each participating organization. The letter also explained that after survey completion, all participating employers would receive a short benchmarking report on the findings that allows them to compare premiums, benefits, and programs to other employers in the state.

At three weeks after the initial invitation letter was mailed, JSI sent a first-class letter reminder to firms for which we had no email address or an incorrect one (N=1,176). JSI also sent a letter reminder to all non-responding firms at eight weeks after the initial mailing. These letters reminded respondents of the importance/usefulness of the information; the confidentiality of the information provided; and value to their firm to know where they stand relative to other Massachusetts firms.

*Email outreach.* One business day after the invitation letters were sent, JSI emailed all respondents for whom we had a valid email address with the same information contained in the letter. The reminder letters and emails included a link to the online survey and a personalized ID number to enter into the survey. For those firms for which there were email contacts, JSI sent multiple email reminders over the course of the 22 week data collection period.

*Paper survey mailing.* At 17 weeks a paper survey was mailed to all non-responders. This time, firms with between 25 to 199 employees received a \$10 cash incentive.

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<sup>1</sup> Based on small firm response rates from past Massachusetts Employer Surveys and other surveys in researchers' experiences, incentives were used as a way to increase likelihood of their response. These incentives were not sent to larger firms given expected response rates, and also because the incentives would be less likely to reach the person who would be filling out the survey in larger firms.



*Telephone outreach.* Eight weeks after the initial invitation letter, telephone follow up began with all non-respondents inviting them to complete the survey online or over the telephone. Professional JSI Interviewers received in-depth training by Drs. Maxwell and Mangione on the content of the survey as well the broader perspective on employer health insurance issues. JSI used the Berkeley CATI system (CASES) to manage the call sample (i.e. ensure that all respondents are called at a variety of times of the day and days of the week) and outcomes of the calls. Interviewers could override this call manager when they made a specific appointment for a call back. JSI called up to 8 times to obtain an interview as long as there was no informed refusal given. As mentioned above, a specific online telephone survey was used to interview phone respondents. In total, JSI spent over 1,600 hours conducting phone follow-up over 15 weeks and made approximately 12,000 calls.

### III. Data Collection Results

Table 5 shows the final screened sample size and response rate per size stratum. Response rate was calculated as a ratio: the numerator is the number of completed surveys, and the denominator is the total sample size minus the number of ineligible firms. Partially completed survey responses were used and counted as completed surveys as long as the respondent answered whether the firm offered insurance, how many employees were eligible, and how many employees were enrolled in the firm’s health insurance plans. The reported refusals and ineligibles below were outcomes during the data collection phase, thus they are used in calculating the final response rate. We did not re-count the ineligibles and refusals that developed in the screening phase, nor did we use them in the final response rate calculation.

The overall response rate was 43%, which is somewhat higher than the 37% response rate in 2016 MES which did not include a panel sample. The response rate varied by size, with the lowest response rates among the 3-9 size category (30%) and over 1,000 employee size category (26%). All of the other size categories had response rates in the range between 48% and 58%. The vast majority of surveys were collected online (92%), followed by paper (5%) and phone (2%).

**Table 5. Final Sample Size and Response Rates.**

Firm Size	Survey Sample	Completed Online	Completed Paper	Completed Telephone	Refused Survey	Ineligible	Target Completes	Total Completes	Response Rate
3 - 9	460	92 (9%)	5 (9%)	4 (15%)	51 (15%)	125 (42%)	96 (9%)	101 (9%)	30%
10 - 24	330	136 (14%)	8 (15%)	6 (40%)	33 (10%)	30 (10%)	148 (14%)	150 (14%)	50%
25 - 49	296	134 (13%)	2 (4%)	2 (13%)	36 (11%)	21 (7%)	146 (14%)	138 (13%)	51%
50 - 199	494	257 (26%)	16 (30%)	0 (0%)	58 (17%)	27 (9%)	250 (24%)	273 (26%)	58%
200 - 999	554	231 (23%)	13 (25%)	2 (13%)	66 (20%)	45 (15%)	225 (22%)	246 (23%)	48%
1000+	649	146 (15%)	9 (17%)	1 (7%)	89 (27%)	50 (17%)	176 (17%)	156 (15%)	26%
<b>Total</b>	<b>2,783</b>	<b>996</b>	<b>53</b>	<b>15</b>	<b>333</b>	<b>298</b>	<b>1,041</b>	<b>1,064</b>	<b>43%</b>

*The percentages in the table are based on column totals.*

During the data collection phase, 333 of the 2,783 firms in the sample (12%) refused to participate in the survey. A total of 298 firms were ineligible (11%).

## ***IV. Weighting and Imputation Methods***

As discussed earlier, the 2018 MES is a firm-based survey. A final analysis (firm) weight is assigned to each responding firm to support firm level analysis. In addition to the firm weight, we also computed employee weight, part-time employee weight, covered employee weight, eligible employee weight, and eligible part-time employee weight to support various employee level analyses. The employee level weights are derived directly from the firm level weight. This section describes the procedures for calculating the firm level weights and the associated employee level weights. In addition, to control for potential item nonresponse bias, we imputed the missing data on a selected set of survey variables.

We also computed two sets of plan specific weights. For each firm, each plan specific weight is equal to the product of the covered employee weight and the percentage of covered employees enrolled in the plan type. For certain tabulations, we elected to use different plan type classifications. We computed one set of plan weights that mirrors the plan type definitions used in the national Kaiser Family Foundation (KFF) survey of employer health benefits. KFF defines high deductible health plans with a savings option such as a health savings account (HDHP/SO) as a distinct plan type. This set of weights allows for MES comparisons to national figures. We also computed a second set of plan weights that does not consider HDHP/SO enrollment to be a distinct plan type, but defines it as an HMO, PPO, POS, etc. This latter approach is consistent with the plan type definitions used in past MES surveys and will facilitate longitudinal comparisons to historic Massachusetts data.

### ***Procedures for Computing Firm-Level Weights***

The final weights are developed through a series of weighting steps. The purpose of weighting steps is to reduce potential bias due to unequal selection probabilities, nonresponse, and frame coverage issues. The final weight per firm may be interpreted as the number of firms in the target population that each responding firm represents. Other types of final weights may be interpreted in a similar way. Since all the other weights are derived from the firm weight, our description focuses on the calculation of the firm weight. These were the steps used to develop the final firm weight:

1. Base Weight Computation
2. Nonresponse Adjustments
3. Post-stratification Adjustments
4. Weight Trimming

### ***Stratum Reassignments***

Prior to base weight computation, some firms were reassigned to different stratum. In the course of developing the weights for the survey, it was determined that reported firm size was not always consistent with the sampling strata. Stratification errors are expected because the number of employees can change for many reasons, and as such the Dun & Bradstreet database does not always have accurate employee count per firm. To correct for this error, which can result in extremely large weights, we re-assigned some firms to a different stratum based on reported firm size and recomputed the base weight after reassignments. For strata reassignments, we used the following rules based on the weight distribution per stratum before reassignments:

- For stratum 1, if the employee count is greater than 100;
- For stratum 2, if the employee count is greater than 150;
- For stratum 3, if the employee count is greater than 200;
- For stratum 4, if the employee count is greater than 7200;

Firms exceeding the threshold were reassigned to a stratum that is consistent with their reported number of employees.

## ***Base Weight***

The base weight compensated for firms on the frame not selected into the sample. We calculated it as the inverse of the selection probability for each firm. For the 2018 survey, the sample had two components: panel firms (most 2016 MES respondents) and a new sample selected from the 2018 sampling frame. The panel consisted of the 778 firms with 10 or more total employees (there were no panel firms from stratum 1). Each panel firm was selected into the 2018 sample with certainty.

For firms selected into the sample in stratum 1, their selection probability was the ratio of the sample size to the population size, and their base weight was the inverse of the selection probability.

The inclusion of the panel firms meant that firms in stratum 2-7 had multiple chances of getting selected into the 2018 sample. For these firms, the final probability of selection was the sum of three terms:

- Prob(sampled and responded in 2016);
- Prob(sampled but did not respond in 2016, and sampled in 2018);
- Prob(not sampled in 2016 but sampled in 2018);

The 2018 frame was an updated firm listing provided by Dun & Bradstreet that excluded the panel firms. The conditional probability of selection per firm on the non-panel frame was dependent on firm size, while the probability of selection into the 2016 sample and their response rate were available from the 2016 survey.

The base weight was then calculated as the inverse of the final selection probability per firm. Because the response rate from the 2016 survey was computed in cells determined by both firm size and industry group (see “Nonresponse Adjustments” below), base weights for the 2018 survey, which used these 2016 response rates in their computation varied not only by firm size, but also by industry group.

## ***Nonresponse Adjustments***

The nonresponse adjustments compensated for sample firms that failed to respond to the survey.

We used a weighting class method to compute the nonresponse adjustments, where the weighting classes were defined by firm size and industry.

For firm size, we used the following classification:

<i>Firm Size Category</i>	<i>Number of Employees Nationwide</i>
1	3 – 9
2	10 – 24
3	25 – 49
4	50 – 199
5	200 – 999
6	1000 +

For industry, we used the following classification:

<i>Industry Category</i>	<i>SIC Code Range</i>	<i>Description</i>
1	0001-4999	Agriculture, Forestry, Fishing, Mining, Construction, Manufacturing, Transportation, Public Utilities
2	5000-6999	Wholesale Trade, Retail Trade, Finance, Insurance, Real Estate
3	7000-7999 and 8100-8999	Lodging and non-Health Related Services
4	8000-8099	Health Services

The nonresponse weighting classes were formed by the cross-classification of firms by these two groupings. Within each weighting class, the nonresponse adjustment factor was calculated as the ratio of the total weight over all sample firms to the total weight over all responding firms. We then computed the nonresponse weight as the product of the nonresponse adjustment factor and the base weight.

### ***Poststratification Adjustments***

The purpose of post-stratification adjustment was to align the weighted sample distribution to external benchmarks that are considered more accurate or more up-to-date than the sampling frame. For post-stratification, we used as benchmarks the Census Bureau’s Statistics of U.S. Businesses (2015), which provides counts of firms by national size and industry:<sup>2</sup>

[https://www2.census.gov/programs-surveys/susb/tables/2015/us\\_state\\_naicssector\\_large\\_emplsize\\_2015.xlsx](https://www2.census.gov/programs-surveys/susb/tables/2015/us_state_naicssector_large_emplsize_2015.xlsx)

<sup>2</sup> Because the smallest size category is defined differently for the MES than in the Census controls, frame counts provided by DUNS were used for post-stratification adjustment. The smallest size category provided in these census totals is firms with 0-9 employees. Therefore, adjustments were needed to derive the benchmark count for 3-9 employees.

As this tabulation shows industry classification according to NAICS code and our frame data shows industry according to SIC code, we needed to use a crosswalk to determine the appropriate NAICS code for each SIC code. The crosswalk we used is this:

[http://www.census.gov/eos/www/naics/concordances/2002\\_NAICS\\_to\\_1987\\_SIC.xls](http://www.census.gov/eos/www/naics/concordances/2002_NAICS_to_1987_SIC.xls)

When the crosswalk mapped a single SIC code to multiple NAICS codes, we arbitrarily assigned the lowest of the NAICS codes shown for that SIC.

Like the nonresponse adjustments, the post-stratification adjustments were also performed cell-wise, with cells defined by crossing firm size and industry. However, because the Census Bureau control totals were provided for 0-9 employees, we estimated the appropriate 3-9 employee count by applying the ratio of 3-9 employee counts to 0-9 employee counts by industry group according to frame data tabulated for us by SSI to the 0-9 employee counts provided by Census.

**Adjusted Firm Size Category=1: 3 - 19**

<b>Adjusted Industry Category</b>	<b>2018 Firm Weight</b>
Natural Resources, Mining, Constr. and Utilities	4,422
Manufacturing	2,314
Trade, Transportation, and Warehousing	9,182
Information, Finance, and Prof. and Business Svcs.	8,437
Education and Health Services	7,163
Leisure, Hospitality, and Other Svcs.	13,743
<b>Subtotal</b>	<b>45,261</b>

**Adjusted Firm Size Category=2: 20 - 99**

<b>Adjusted Industry Category</b>	<b>2018 Firm Weight</b>
Natural Resources, Mining, Constr. and Utilities	971
Manufacturing	1,254
Trade, Transportation, and Warehousing	2,314
Information, Finance, and Prof. and Business Svcs.	3,170
Education and Health Services	1,994
Leisure, Hospitality, and Other Svcs.	3,751
<b>Subtotal</b>	<b>13,454</b>

**Adjusted Firm Size Category=3: 100 - 499**

<b>Adjusted Industry Category</b>	<b>2018 Firm Weight</b>
Natural Resources, Mining, Constr. and Utilities	152
Manufacturing	345
Trade, Transportation, and Warehousing	789
Information, Finance, and Prof. and Business Svcs.	1,453
Education and Health Services	770
Leisure, Hospitality, and Other Svcs.	428
<b>Subtotal</b>	<b>3,937</b>

**Adjusted Firm Size Category=4: 500+**

<b>Adjusted Industry Category</b>	<b>2018 Firm Weight</b>
Natural Resources, Mining, Constr. and Utilities	118
Manufacturing	348
Trade, Transportation, and Warehousing	1,162
Information, Finance, and Prof. and Business Svcs.	1,998
Education and Health Services	383
Leisure, Hospitality, and Other Svcs.	373
<b>Subtotal</b>	<b>4,382</b>

**Total 2018 Firm Weights**

<b>Adjusted Firm Size Category</b>	<b>2018 Firm Weight</b>
1: 3 - 9	45,261
2: 20 - 99	13,454
3: 100 - 499	3,937
4: 500+	4,382
<b>Total</b>	<b>67,035<sup>3</sup></b>

### ***Weight Trimming***

Finally, we trimmed outlier weights in order to reduce their influence on sample estimates. Within each size class defined by firm size stratum, we defined outlier weights as those that were greater than the median plus six times of the interquartile range of the weight distribution. We trimmed weights exceeding this level down to it. Then, for each of the size classes, we redistributed

<sup>3</sup> Summing firm size category weights do not add to total due to rounding.

the trimmed weight amounts back to the responding firms within the size class by inflating the post-stratified firm weight by the ratio of the sum of pre-trimmed weights to the sum of post trimmed weights, and this yielded final firm weight.

With the firm level weight, we then computed the employee weight as the product of final firm weight and the reported or imputed number<sup>4</sup> of Massachusetts-based employees, the covered employee weight as the product of final firm weight and the reported or imputed number of covered Massachusetts employees, and the eligible employee weight as the product of the final firm weight and the reported or imputed number of coverage-eligible employees. A set of part-time employee/eligible employee level weights were also created to conduct analyses among only part-time employees. The part-time employee weight was computed as the product of the final firm weight and the reported or imputed number of Massachusetts part-time employees, and the part-time eligible employee weight as the product of the final firm weight and the reported or imputed number of coverage-eligible part-time employees.

Table 6 displays the distribution of firms by size and industry in the 2018 survey. It presents how the firm counts changed as a result of the firm level weights.

**Table 6. Distribution of Firms by Size and Industry, 2018.**

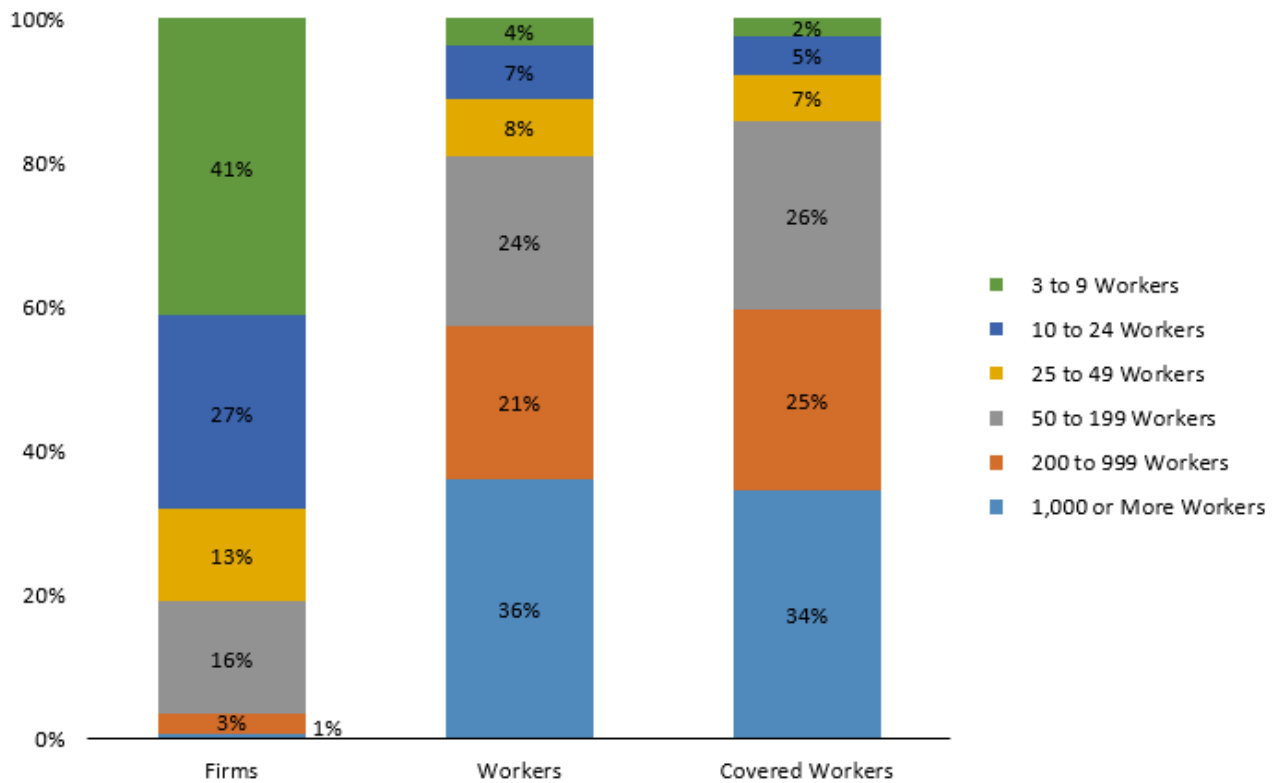
	<b>Firms</b>		
	<b>Firms that Completed Survey</b>	<b>Weighted Count</b>	<b>Weighted Percent of Total</b>
<b>All</b>	1,064	67,035	100.0%
<b>Firm Size</b>			
3-9 Workers	111	27,628	41.2%
10-24 Workers	187	18,038	26.9%
25-49 Workers	158	8,595	12.8%
50-199 Workers	319	10,410	15.5%
200-999 Workers	211	1,936	2.9%
1,000 or More Workers	78	428	0.6%
<b>Firm Industry (OSHA Classification)</b>			
Agriculture, Forestry and Fishing	8	1,292	1.9%
Construction	59	5,499	8.2%
Manufacturing	162	4,241	6.3%
Transportation, Communications, Electric, Gas and Sanitary Services	46	2,430	3.6%
Wholesale Trade	82	3,915	5.8%
Retail Trade	107	12,815	19.1%
Finance, Insurance and Real Estate	93	4,717	7.0%
Services	507	32,126	47.9%

<sup>4</sup> Generally, we used the reported number unless it violated one of our edit checks, in which case it was imputed according our imputation methodology.



The distribution of firms, number of employees, and covered employees by firm size for the MES 2018 analyses can be seen in Exhibit 1 and Table 7.

**Exhibit 1. Distribution of Firms, Number of Employees, and Covered Employees by MA-based Firm Size.**



**Table 7. Distribution of Firms, Number of Employees, and Covered Employees by Firm Size.**

Number of Employees	Firms		
	Percent of Firms	Percent of Workers	Percent of Covered Workers
<b>Firm Size</b>			
3-9 Workers	41.2	3.7	2.4
10-24 Workers	26.9	7.4	5.4
25-49 Workers	12.8	7.9	6.5
50-199 Workers	15.5	23.6	26.2
200-999 Workers	2.9	21.2	25.1
1,000 or More Workers	0.6	36.1	34.4

## ***Imputation***

Item nonresponse occurs when a responding firm failed to provide valid data for some questionnaire items. To control for item nonresponse bias, we imputed the missing data on a select set of survey variables. Firms that only complete a small portion of the survey (terminated before question 15) were removed from the final dataset and as such their responses were not imputed.

In addition to item missing data, we also imputed logically inconsistent responses and extreme outlier responses. In these cases, the original responses were discarded and the missing data were imputed. Logically inconsistent responses were those that were internally inconsistent with other responses from the same firm, e.g., reported employee contribution for health insurance exceeding the total cost of the reported premium. Extreme outliers were identified through close examination of frequency distributions and comparing them to previous survey responses, in an effort to identify possible data entry errors. For example, if a deductible for single coverage exceeded \$8,000 annually for any plan type other than a high deductible plan with a savings option, it was imputed. We excluded from the imputation process a small number of outlier cases where the ratio of the number of workers covered by health insurance to the number eligible is less than 35% for firms with 200 or more employees (n=46). **In addition to exclusion from imputation, these same firms were excluded from all tabulations derived from employee counts.** Missing data due to legitimate skip patterns in the questionnaire were not considered item nonresponse and were not imputed.

Imputation is the process of replacing missing data with substituted values. We used the hot deck imputation method for this study. Using hot deck imputation, missing data on a responding unit was replaced with reported data from a “similar” unit called a donor. For each imputation variable, the donor was identified in two general steps. First, group the respondent data by the following classification variables to locate eligible donors (i.e., eligible donors must share the same values for the classification variables):

1. Industry
2. US size category based on US-based employees
3. Massachusetts size category

For each imputation, there may have been additional criteria required of a donor, disqualifying if not met, such as having responded to a feeder question. In cases where there was no donor available within the imputation cell, we repeated this procedure after removing the least important (the highest numbered from above list) classification variable remaining, until we found at least one eligible donor for each recipient.

Second, the responding firm that was closest to the firm with missing data was designated as the donor, where proximity was the absolute difference between the potential donor firm weight and the recipient firm weight. In cases where more than one potential donor (i.e., within the same imputation cell) had exactly the same distance, we selected randomly among them.

For each variable imputed, the imputation status was indicated by the variable prefixed with “*ImpFlag*.” For each respondent, if this field was left blank, then the corresponding data for the variable was not imputed. Otherwise, the value levels (showing level of stratification) displayed designated within the *ImpFlag* variable were as follows:

1. Industry only
2. Industry and US size category based on US-based employees
3. Industry, US size category based on US-based employees, Massachusetts size category

Note that we started with level 3, and only if we did not find enough (at least 3) donors in the cell did we move up to level 2, and finally to level 1.

We imputed sixteen variables as part of the analysis, listed below:

1. Number of employees in Massachusetts who are considered part-time (less than 30 hours a week)
2. Whether firm offers health insurance to part-time employees
3. Whether firm offers an HMO plan with an HRA
4. Whether firm offers a PPO plan with an HRA
5. Whether firm offers an HMO plan with an HSA
6. Whether firm offers a POS plan with an HSA
7. Whether firm offers a PPO plan with an HSA
8. Whether firm offers an indemnity plan with an HSA
9. Number of Massachusetts employees enrolled in an HMO plan
10. Number of Massachusetts employees enrolled in a PPO plan
11. Number of Massachusetts employees enrolled in a POS plan
12. Number of Massachusetts employees enrolled in an indemnity plan
13. Percent of Massachusetts employees enrolled in an HMO plan with an HRA
14. Percent of Massachusetts employees enrolled in an POS plan with an HRA
15. Percent of Massachusetts employees enrolled in an PPO plan with an HRA
16. Percent of Massachusetts employees enrolled in an PPO plan with an HSA

## V. Analysis

The analyses were conducted using the statistical computing package SAS. The firm size classification for these analyses was based on firms' self-reported number of employees in Massachusetts. Reported measures were checked to ensure internal consistency between question responses. In a few cases where an internal consistency could not be resolved or imputed values significantly alter the overall estimates, we made the analytic decision to assign a missing value.

In some cases, the analytical approach for the 2018 MES data differed from past MES data analyses (e.g. means using eligible employee weights vs. medians using establishment weights for take-up rate). Table 8 summarizes the weight used for specific variables.

**Table 8. Summary of Weights Used in 2018 MES Firm-Based Analysis.**

<i>Survey Weight</i>	<i>Analyses Using Weight</i>	<i>Reasoning Behind Weight</i>
Firm Weight	<ul style="list-style-type: none"> <li>• Offer Rate</li> <li>• Reasons for Offering or Not Offering Insurance</li> <li>• Cost Control Strategies</li> <li>• Ways to Purchase Insurance</li> <li>• Use of Health Connector</li> </ul>	Firm-level weighting was used when the decision-making power rests with the firm rather than the employee. Since the decisions made by a firm apply to all employees, weighting by the size of the firm as a whole for these variables is most appropriate.
Employee Weight	<ul style="list-style-type: none"> <li>• Eligibility Rate</li> <li>• Coverage Rate</li> </ul>	Employee-level weighting was used for analyses that apply to all employees regardless of whether they enroll in insurance or not, such as how many employees are eligible or covered by health insurance. While the firm makes the decision to offer insurance, it is the <u>individual employee who is eligible or covered.</u>
Covered Employee Weight	<ul style="list-style-type: none"> <li>• Premiums</li> <li>• Cost-sharing</li> <li>• Enrollment by Carrier</li> <li>• Enrollment by Product Type</li> </ul>	Covered employee-level weighting was used for analyses that apply only to individuals that enroll in the employer's plan. Individuals that do not enroll in a plan are not subject to a plan's premium or cost-sharing requirements, so it is not appropriate to include them in <u>analyses for these variables.</u>
Eligible Employee Weight	<ul style="list-style-type: none"> <li>• Take-up Rate</li> </ul>	Eligible employee-level weighting was used for only one analysis: take-up rate. Here, the decision about whether or not to enroll in insurance can only be made by those who are eligible to enroll. Thus, we would not want to include all employees, since not all have the <u>ability to decide whether or not to enroll.</u>

Where there are comparisons to national data, the national estimates come from the 2018 Kaiser Family Foundation and Health Research & Educational Trust Employer Health Benefits Survey (<https://www.kff.org/health-costs/report/2018-employer-health-benefits-survey/>).