

Valuing the Invaluable: 2019 Update

Detailed Methodology

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The recent report *Valuing the Invaluable: 2019 Update; Charting a Path Forward* estimates there were 41 million family caregivers in 2017, providing a total of 34 billion care hours during the year (an average of 16 hours per caregiver per week), for a total economic value of \$470 billion (average hourly value of \$13.81).¹

This document is divided into the following sections and provides a technical description of the methodology used to estimate the number of family caregivers, total hours of care, and economic value of family caregiving at the national and state levels:

Section I: Data Sources and Overview of Methods

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SECTION I: DATA SOURCES AND OVERVIEW OF METHODS

The estimates of numbers of caregivers and care hours in *Valuing the Invaluable* are based on a meta-analysis that synthesizes information from four nationally representative surveys of caregivers conducted between 2015 and 2018. We used additional data sources to adjust them to a common definition and to estimate the value in dollars of an hour of care. These sources are listed in tables 1, 2, and 3. Full citations are given in appendix B.

All main prevalence and hours sources have information that can be used to estimate the prevalence of family caregiving nationally (i.e., the proportion of the population who are caregivers) and the average number of hours of care provided.

Each survey has a different definition of the term *caregiving*, which is defined by the survey universe, the question that identifies caregivers, and other characteristics of the survey. As has been the case for past *Valuing the Invaluable* reports, the meta-analysis adjusts the data from multiple sources to a common definition:

- Caregiver age 18 or older
- Care recipient age 18 or older
- Providing care currently or within the past month
- Providing assistance with activities of daily living (ADLs; such as bathing or dressing); instrumental activities of daily living (IADLs; such as managing finances or transportation); or medical/nursing tasks (such as medication management or preparing special diets)
- Year of estimate (2017)

¹ Reinhard, Feinberg, Houser, Choula, and Evans (2019).

TABLE 1
Sources of Data on Caregiver Prevalence and Hours

Survey	Years	Type of Data
American Time Use Survey (ATUS)	2015-16	Summary tables
Behavioral Risk Factor Surveillance System (BRFSS)	2015-17*	Record-level
The Long-Term Care Poll (AP-NORC)	2018**	Record-level
National Study of Caregiving (NSOC)	2015	Summary tables

* Data from multiple years were reweighted to 2017 population.

** Survey was fielded in 2018 but was weighted to the 2017 population.

TABLE 2
Additional Data Sources Used to Adjust Estimates

Survey	Years	Type of Data
Behavioral Risk Factor Surveillance System	2009-10	Age factors Hours distribution State factors
Caregiving in the US	2009, 2014*	Age factors Lookback adjustment Validation adjustment
Gallup Healthways Well-Being Survey	2009-12	State factors
The Long-Term Care Poll	2017	Validation adjustment

* Survey fielded in 2014 and weighted to 2014 population but the data and accompanying report were released in 2015 and are usually cited as Caregiving in the US 2015.

TABLE 3
Data Sources for Economic Value per Hour (data year 2017 for all)

Source	Definition
Department of Labor	State minimum wage
BLS Occupational Employment Statistics	Home health aide median wage
Genworth Cost of Care Survey	Home health aide median cost

For the first four elements of the common definition, we developed adjustment factors based on detailed data on the characteristics of caregivers, care recipients, and the care relationship in various sources in table 1 and table 2 in order to convert the prevalence estimate from each source to the common definition. To derive scale factors to adjust the source data year to 2017, we assumed that the number of caregivers per person in a specific age group (i.e., potential care recipients) remained constant over the period of 2014 to 2017. See section III(b) below for more details and derivation of these adjustment factors.

SECTION II: ANALYSIS OF INDIVIDUAL DATA SOURCES

The estimates of the number of caregivers and care hours from each individual source are the building blocks of the *Valuing the Invaluable* estimates of the number of caregivers and economic value.

These estimates may be straightforward (as in the analysis of summary tables from the American Time Use Survey and National Study of Caregiving), moderately complex (as in the case of analysis of the Long Term Care Poll), or very complicated (as in the analysis of Behavioral Risk Factor Surveillance System record-level data across three data years).

Section II(a): BRFSS

The 2015–17 Behavioral Risk Factor Surveillance System (BRFSS) included an eight-question optional caregiver module. Over the three years, 45 states (including the District of Columbia) fielded the module at least once, and 7 states fielded it multiple times. The 6 states that did not field the survey at all were Delaware, Massachusetts, New Hampshire, North Carolina, Vermont, and Washington. State utilization of the caregiver module is shown in table 4.

We considered those respondents who answered “yes” or “Caregiving recipient died in past 30 days” to the caregiving question (see appendix A for

TABLE 4
States Fielding Optional BRFSS Caregiver Module, by Year

2015	2016	2017
Alabama	Arizona	Alaska
Florida	Arkansas	Hawaii
Hawaii	California	Kansas
Idaho	Colorado	Maryland
Illinois	Connecticut	Michigan
Indiana	District of Columbia	New Jersey
Iowa	Georgia	New Mexico
Kentucky	Minnesota	New York
Louisiana	Missouri	Oklahoma
Maine	Montana	Oregon
Maryland	Nevada	Rhode Island
Mississippi	New Jersey	Utah
Nebraska	New York	
New Jersey	North Dakota	
New York	Ohio	
Oregon	Oregon	
Pennsylvania	South Dakota	
South Carolina	Tennessee	
Tennessee	Texas	
Utah	Utah	
Virginia		
West Virginia		
Wisconsin		
Wyoming		

Note: States in bold fielded the module in multiple years.

wording) to be caregivers, those respondents who answered “no” or “don’t know” to be noncaregivers, and those respondents who refused to answer the question to be missing at random. The percentage who refused was 0.3 percent or less in all states except for California, where it was about 15 percent.

In order to analyze the data across multiple years of the survey, we reweighted the sample to the 2017 state population, by sex (male/not male)² and six age

2 Sex was not reported (refused) for a small number of respondents (less than 0.1 percent). These nonresponses were grouped with females for the reweighting calculation.

groups (18–24, 25–34, 35–44, 45–54, 55–64, 65 and older). For states that fielded the module only once between 2015 and 2017, each record was reweighted according to the following equation:

$$Wt_{new} = Wt_{original} * \frac{Pop_{age,state,sex,2017}}{Pop_{age,state,sex,year}} \quad (1)$$

where

- $Wt_{original}$ is the population weight in the BRFSS microdata; and
- $Pop_{age,state,sex,year}$ is the weighted population in the BRFSS data set for a particular age group, state, sex, and the data year that the module was fielded.

For states that fielded the module more than once, the reweighting is given by

$$Wt_{new} = Wt_{original} * \frac{N_{state,year}}{\sum_{years} N_{state,year}} * \frac{Pop_{age,state,sex,2017}}{Pop_{age,state,sex,year}} \quad (2)$$

where

- $Wt_{original}$ is the population weight in the BRFSS microdata;
- $N_{state,year}$ is the unweighted sample size that were asked the caregiving question in the state in that data year; and
- $Pop_{age,state,sex,year}$ is the weighted population in the BRFSS data set for a particular age group, state, sex, and data year that the module was fielded.

Summing across all years that the caregiver module was fielded weights to the 2017 state population; the relative contribution of each year is proportional to the sample size in that year.

For the purpose of *Valuing the Invaluable*, we did not directly use the individual state estimates of the number of caregivers; instead, the state estimates and national (45 state) estimates were used to develop the state factors F_{state} (see section III(a) below) that partition the national estimate of the number of caregivers between the states.

The total number of caregivers in the 45 states, reweighted to 2017, was about 42.1 million.

Including estimates for the other 6 states, based on the 45-state prevalence and state factors from the previous *Valuing the Invaluable* report, the US total across all 51 states was approximately 46.1 million.

The caregiver module also contains a question about the number of hours of care per week. Responses were ordinal categorical: up to 8 hours; 9 to 19 hours; 20 to 39 hours; 40 hours or more. We used data from the 2009–10 BRFSS caregiver module to estimate the average number of hours in each category (in this earlier module, the number of hours was directly coded). For this calculation, we capped the number of hours per week at 98 (14 hours per day); however, some respondents reported as many as 168 hours per week (24 hours per day).

Response Category	Number of Hours/Week	Average Hours/Week (2009–2010 BRFSS)
Up to 8 hours	0–8	3.80
9–19 hours	9–19	12.32
20–39 hours	20–39	24.9
40 hours or more	40–168	70.6

About 6 percent of caregivers did not give an interval of number of hours (“don’t know” or refused to answer). These responses were considered to be missing at random.

In theory, it is possible to estimate the average number of hours for each of the 45 states that fielded the module; however, the variance of the state estimates is significant. Only 3 of the 45 states had an average number of hours that differed from the national average (19.9 hours per week) at a 0.05 level of significance. In the absence of any state differences, we would expect 2 to 3 states to show statistically significant differences in the sample purely by chance.

Using a Bonferroni correction for classwise control of type I error (significance level of $0.0011 = 0.05/45$), only 2 of 45 states had an average number of hours that differed from the national average. Thus, the

only state inferences about average hours that are supported by data are that Minnesota and Nebraska are lower than the national average. However, because 43 of 45 states did not differ statistically from the national average, the national average number of hours per week was used for all states, including Minnesota and Nebraska.

Section II(b): All Other Data Sources

We easily derived the national estimates of the number of caregivers and average number of hours per caregiver per week from summary tables based on the 2015–16 American Time Use Survey (ATUS) and 2015 National Study of Caregiving (NSOC). Full citations of the reports containing these summary tables can be found in appendix B.

Record-level data were analyzed from the 2018 Long-Term Care Poll. Current caregivers were identified by a response of “yes” to question Q14. Current caregivers also estimated the number of hours of care per week (question Q16_1). Responses were ordinal categorical: 5 hours or less; more than 5 but less than 10 hours; or 10 hours or more. We used data from the 2009–10 BRFSS caregiver module to estimate the average number of hours in each category; as above, this calculation capped the hours per week at 98 for those responses that indicated a higher number.

Response Category	Number of Hours/Week	Average Hours/Week (2009–10 BRFSS)
5 hours per week or less	0–5	2.92
More than 5 hours per week but less than 10 hours per week	6–9	7.09
10 hours per week or more	10–168	34.90

Survey respondents who did not answer Q14 were considered not to be caregivers. Respondents who did not answer question Q16_1 were considered to be missing at random.

SECTION III: DETAILED CALCULATIONS OF VALUING THE INVALUABLE ESTIMATES

The analysis produces consistent state and national estimates of the number of family caregivers, total care hours, and economic value of caregiving.

The **number of caregivers** in each state can be expressed as

$$NC_{state} = C * F_{state} * \sum_{ages} R_{age} * Pop_{state,age} \quad (3)$$

where

- C is a scale factor so that the number of caregivers nationally matches the weighted average of the data sources in table 1, adjusted to the common definition (see section III(c) for more detail);
- F_{state} is a state-specific scale factor to account for variation in the age-adjusted prevalence of caregiving across states;
- R_{age} is an age-specific scale factor (based on the age group of the care recipient: the older the person, the more likely he or she is to be a care recipient); and
- Pop_{state,age} is the state population in each age group.

The economic value of caregiving in each state in 2017 (52 weeks) was calculated by the following equation:

$$EV_{state} = H * 52 * NC_{state} * VPH_{state} \quad (4)$$

where

- H is the number of hours per caregiver per week (a single national estimate was used for all states); and
- VPH_{state} is the economic value per hour in the state.

The national average value per hour (VPH) was calculated by dividing the national total economic value (EV; computed by summing across all states) by the national number of caregivers (NC) and their average hours during the year (H * 52):

$$VPH = \frac{EV}{H * 52 * NC} \quad (5)$$

The rest of this detailed methodology document explains the following:

- The age- and state-specific scale factors R_{age} and F_{state}
- The adjustment factors to align each data source with the common definition
- The estimate of the number of caregivers nationally and the scale factor (C)
- The national hours per week estimate (H)
- The state-level value per hour estimates (VPH_{state})

All of these are necessary to compute the *Valuing the Invaluable* state and national estimates.

Section III(a): Age- and State-Specific Factors

Age- and state-specific scale factors account for the differing likelihood of being a care recipient for different age groups (the older the person, the more likely he or she is to be a care recipient) and for variation in the age-adjusted prevalence of caregiving between states. These scale factors are assumed to be constant between 2009 and 2017, so the only time-varying quantity that affects the

number of caregivers from year to year is the state population by age group ($Pop_{state,age}$).

Age-Specific Scale Factors (R_{age})

Two sources with detailed data on care recipient age in 2009 (BRFSS and *Caregiving in the US 2009*) were used to estimate the distribution of primary caregivers by the age group of the care recipient, using five age groups: 18 to 44, 45 to 64, 65 to 74, 75 to 84, and 85 and older. The most recent year for which multiple sources were available to describe the age distribution of care recipients is 2009. The estimate was computed as the average of the two distributions (see table 5).

We then compared the estimated percentage of caregivers (from table 5) with the age distribution of the Census Bureau’s 2009 resident population estimates to calculate the relative prevalence of caregivers by age of primary care recipient (see table 6).

To interpret the relative prevalence amounts in table 6, there are approximately seven times as many caregivers of people 65–74 per person age

TABLE 5
Distribution of Caregivers by Age of Primary Care Recipient, 2009

Data Source	Age of Primary Care Recipient				
	18-44	45-64	65-74	75-84	85+
BRFSS	11.8%	24.0%	17.5%	26.0%	20.8%
Caregiving in the US	14.0%	17.6%	16.7%	26.6%	25.1%
Average (percentage of caregivers, $CR\%_{age}$)	12.9%	20.8%	17.1%	26.3%	22.9%

TABLE 6
Relative Prevalence of Caregivers by Age of Primary Care Recipient, 2009

	Age of Primary Care Recipient				
	18-44	45-64	65-74	75-84	85+
Percentage of caregivers ($CR\%_{age}$)	12.9%	20.8%	17.1%	26.3%	22.9%
Percentage of adult population ($Pop\%_{age}$)	48.5%	34.5%	9.1%	5.6%	2.3%
Relative prevalence of caregivers by recipient's age, compared with caregivers of recipients ages 18-44 (R_{age})	1.00	2.27	7.04	17.70	37.40

65 to 74 as there are caregivers of people 18–44 per person age 18–44.

We calculated relative prevalence of caregivers by recipient’s age using recipients ages 18 to 44 as the reference group. Specifically, it was calculated by

$$R_{age} = \frac{\left(\frac{CR\%_{age}}{Pop\%_{age}}\right)}{\left(\frac{CR\%_{18-44}}{Pop\%_{18-44}}\right)} \quad (6)$$

State-Specific Scale Factors (F_{state})

State prevalence estimates differ from national prevalence estimates for two reasons:

1. State populations have different age distributions. All else being equal, a state with an older population, especially the 75 to 84 and 85 and older age groups, will have a higher prevalence of caregivers (that is, a higher percentage of people in the state will be caregivers).
2. States may have different prevalences even after accounting for the difference in the age distribution of the population. It is beyond the scope of *Valuing the Invaluable* to explain the reasons for this variation, but differences in age-specific disability rates (i.e., the proportion of people of a specific age who have disabilities) appear to be a key driver.

Because the age distribution is explicitly taken into account in the *Valuing the Invaluable* calculations, the state-specific scale factors (F_{state}) are designed to reflect only the second reason for the variation in prevalence.

Only one of the data sources in table 1 (BRFSS) could be used to estimate state prevalence. Over the three years of 2015 to 2017, 45 states (including the District of Columbia) fielded the caregiving module at least once, with several states fielding it multiple times. This leaves 6 states entirely without recent data to estimate state-level prevalence.

In order to have some information about state prevalence for all states, the state factors from the

previous *Valuing the Invaluable* report, based on five surveys between 2009 and 2012 with state-specific data, were also utilized.³ For each state, the state factor (F_{state}) is the average of a state factor calculated for the 2015–17 BRFSS data (F_{state,brfss}) and a state factor derived from the previous *Valuing the Invaluable* report (F_{state,v2015}).

F_{state,v2015} is given by the following equation:

$$F_{state,v2015} = \frac{(\sum_{ages} (R_{age} * Pop_{us,age})) * F_{state,v2015}}{\sum_{states} ((\sum_{ages} (R_{age} * Pop_{state,age})) * F_{state,v2015})} \quad (7)$$

where

- R_{age} is the age-specific scale factor from table 6;
- Pop_{state,age} and Pop_{us,age} are the 2017 US Census Bureau resident population estimates for the specified age group; and
- F_{state,v2015} is the value from Houser (2015), table 4.

Similarly, F_{state,brfss} is given by the following equation:

$$F_{state,brfss} = \frac{(\sum_{ages} (R_{age} * Pop_{us,age})) * F_{state,brfss}}{\sum_{states} ((\sum_{ages} (R_{age} * Pop_{state,age})) * F_{state,brfss})} \quad (8)$$

where F_{state,brfss} = F_{state,v2015} for the 6 states that did not field the caregiver module. For all other states, F_{state,brfss} is the ratio of the number of caregivers in the state, estimated directly from the microdata, divided by the predicted number of caregivers using the age-adjusted prevalence estimates from all 45 states:

$$F_{state,brfss} = \frac{Prev_{state,brfss,18+} * Pop_{state,18+}}{Prev_{45,brfss,18+} * Pop_{45,18+} * \sum_{ages} \left(\frac{R_{age} * Pop_{state,age}}{\sum_{ages} R_{age} * Pop_{45,age}}\right)} \quad (9)$$

where

- Prev_{state,source,18+} and Prev_{45,source,18+} are the unadjusted caregiving prevalence estimates for all adults ages 18 and older for an individual state, and for the 45 states that fielded the caregiving module, taken together;

³ See Houser (2015) for more detail on how these were calculated.

- $Pop_{state,age}$ and $Pop_{45,age}$ are the 2017 US Census Bureau resident population estimates for the specified age group; and
- R_{age} is the age-specific scale factor from table 6.

The final state factors (F_{state}) are given by

$$F_{state} = \frac{F_{state,brfss} + F_{state,v2015}}{2} \quad (10)$$

The values for the state factors can be found in table 7.

To interpret these state factors, the age-adjusted prevalence of caregivers in Alabama is approximately 23 percent higher than the national average—in other words, even if Alabama had the same age distribution as the nation, Alabama would have a 23 percent higher caregiver prevalence than the nation because of factors other than differences in age distribution.

Section III(b): Adjusting Sources to a Common Definition

The definition of caregivers in a data source may differ from the common definition in many ways: *caregiver age 18 or older*, *care recipient age 18 or older*, *providing assistance with ADLs or IADLs*, and *providing care currently or within the past month*. Four ways in which sources may differ follow directly from the definition:

- Care recipient age different than 18 or older
- No validation that caregiver provides ADL, IADL, or medical/nursing assistance
- Lookback period other than currently or past month
- Population totals different than US Census Bureau resident population estimates

It is possible, using sources with detailed data on the care relationship, to rigorously estimate adjustment factors to account for differences from

TABLE 7

Table of State Factors, F_{state}

State	State Factor	State	State Factor	State	State Factor
Alabama	1.23	Kentucky	1.14	North Dakota	0.71
Alaska	1.20	Louisiana	1.23	Ohio	0.98
Arizona	0.95	Maine	0.91	Oklahoma	1.11
Arkansas	1.19	Maryland	1.06	Oregon	0.85
California	1.02	Massachusetts	0.92	Pennsylvania	0.87
Colorado	0.98	Michigan	1.00	Rhode Island	0.92
Connecticut	0.93	Minnesota	0.91	South Carolina	1.14
Delaware	0.98	Mississippi	1.31	South Dakota	0.70
District of Columbia	1.08	Missouri	0.91	Tennessee	1.19
Florida	0.90	Montana	0.80	Texas	1.18
Georgia	1.13	Nebraska	0.98	Utah	1.23
Hawaii	0.77	Nevada	0.96	Vermont	0.84
Idaho	1.01	New Hampshire	0.96	Virginia	1.02
Illinois	0.92	New Jersey	0.92	Washington	0.97
Indiana	1.03	New Mexico	1.02	West Virginia	1.09
Iowa	0.71	New York	0.95	Wisconsin	0.76
Kansas	0.90	North Carolina	1.05	Wyoming	1.04

the common definition. These adjustment factors are described in detail later in this section.

In addition, sources may differ from the common definition in other ways, including the following:

- How caregivers are identified (self-identified v. identified by care recipients)
- Wording of the question that identifies caregivers (used to determine prevalence)
- Survey mode (e.g., phone, Internet) and question placement

We do not adjust for these differences because of a lack of detailed data to estimate an adjustment factor with any degree of confidence. The specific questions from the surveys that were used to determine prevalence are contained in appendix A.

Care Recipient Population Adjustment (R)

The common definition considers all caregivers of adults (ages 18 and older). Some surveys consider care for only the older population, typically ages 65 and older, or consider care for all ages, including care recipients younger than 18. Prevalence estimates for such sources must be adjusted up or down to match the common definition.

In BRFSS, care recipients may be of any age. The caregiver module in 2015–17 did not have any information about the age of the care recipient; however, the previous version of the module, in 2009–10, did have a question about the age of the care recipient, and 5.4 percent of care recipients were younger than 18 in the five states that fielded the module in 2009–10. Therefore, a single adjustment factor of 0.946 was applied to adjust the BRFSS estimate to ages 18 and older only.

Two sources limited care recipients to ages 65 and older:

- The National Study of Caregiving (NSOC) interviews caregivers who are identified by care recipients in response to a survey of people ages 65 and older. In addition, the NSOC generalizes to the Medicare population ages 65 and older, which is not exactly the same as the total population ages 65 and older.

- The American Time Use Survey (ATUS) does not limit the care recipient age in an absolute manner; however, the caregiver question requires that care be for a condition related to aging and therefore results in a significant undercount of caregivers with younger care recipients. To minimize this nonresponse bias, the ATUS estimates used in this analysis are for caregivers of people ages 65 and older only.

Based on the age factors (R_{age} , table 6 above) and the US Census Bureau population estimates, the percentage of adult care recipients who were ages 65 and older was 68.4 percent in 2014, rising to 69.8 percent in 2017. Therefore, an adjustment factor of $1.453 = 1/0.688$ was applied to data from the NSOC (2015) and $1.448 = (1/0.688 + 1/0.693)/2$ for the ATUS (2015–16).

In addition, a Medicare factor of $1.043 = 1/0.959$ was applied to the NSOC. In the 2015 American Community Survey, about 95.9 percent of people ages 65 and older were covered by Medicare.⁴

Analysis of the 2014 *Caregiving in the US* surveys and the 2009–10 BRFSS also found the average number of hours to be nearly the same between caregivers of people ages 65 and older and caregivers of people ages 18 to 64. The same adjustment factors are therefore applied in estimating both the number of caregivers and total care hours.

Validation Adjustment (V)

The common definition requires that caregivers provide ADL, IADL, or medical/nursing assistance to the care recipient. In surveys that ask an initial caregiving question and later follow up with questions about the type of assistance provided, some people who answer generally that they are caregivers do not report that they provide any such assistance.

We consider the prevalence estimates in the ATUS (validated by time diary data) and NSOC (caregivers identified by care recipient as helping with ADLs and IADLs) to be self-validated.

4 US Census Bureau (2016).

The 2017 Long-Term Caregiving Poll (also an AP-NORC survey) contained a question that asked about 23 caregiving tasks. Of caregivers who answered this question, 97.3 percent indicated that they performed at least one task. This proportion, 0.973, was used as the validation adjustment for the 2018 Long-Term Care Poll estimates.

For the BRFSS estimates, this proportion was averaged with the valid percentage in the 2014 *Caregiving in the US* survey (92.8 percent)⁵ for a validation adjustment of 0.951.

Lookback Period Adjustment (L)

The common definition requires that caregivers be currently providing care or have provided care within the past month. Most caregivers do not provide care every day, so a “current caregiver” need not have provided care the previous day or even within the past week. We consider “currently providing care” and “providing care within the past month” to be approximately equivalent. For sources with lookback periods greater than one month (typically one year), the prevalence estimates need to be adjusted downward to account for former caregivers who have provided care within the lookback period but are not currently doing so.

The two *Caregiving in the US* surveys use a one-year lookback period, but caregivers are also asked if they are currently providing care (68.2 percent in 2009 and 55.8 percent in 2014; average of 62 percent).

The prevalence estimates reported in *Valuing the Invaluable* reflect only current caregivers.

The ATUS uses a three- to four-month lookback period (depending on when in the month the respondent was surveyed). An adjustment factor of 0.79 ($= 0.62^{0.5}$) was applied to adjust to the common definition. This intermediate value (0.79) reflects the fact that people may have been caregivers in the past year but not in the past three to four months. The intermediate factor was chosen so that the same proportion of caregivers are “lost” when the lookback period is shortened from one year to three to four months as when the period is shortened from three to four months to one month.

Total Population Adjustment (P)

Analysis of all four data sources produced estimates of the total number of caregivers—that is, some estimate of the total US adult population was used within the original source.

For three of the four sources, this population did not exactly match the US Census Bureau population estimate (in the other, the total population could be readily estimated from the summary tables). The population estimates and adjustment factors are shown in table 8.

Data Year Adjustment (D)

To calculate the data year adjustment factor, we set a “baseline” of 40 million caregivers in 2014. This choice was arbitrary and does not affect the final estimates in any way. For 2014, the baseline

TABLE 8
Population Estimates and Adjustment Factors

Source	Year	18+ Population (source)	18+ Population (Census)	Adjustment Factor
ATUS	2015–16	243,570,100	248,579,293	1.021
BRFSS	2017*	252,784,180	252,063,800	0.997
AP-NORC	2017**	246,324,986	252,063,800	1.023

* Data from 2015–17 but were reweighted to 2017 population.

** Data from 2018 but weighted to 2017 population.

number of caregivers in each state and primary care recipient age group is given by

$$BaseNC_{state,age,2014} = (40 \text{ million}) * \frac{F_{state} * R_{age} * Pop_{state,age,2014}}{\sum_{ages} (R_{age} * Pop_{us,age,2014})} \quad (11)$$

where

- F_{state} is the state-specific scale factor from table 6;
- R_{age} is the age-specific scale factor from table 5; and
- $Pop_{state,age,2014}$ is the US Census Bureau resident population estimate.

For subsequent years, the baseline number of caregivers in each state and age group is given by

$$BaseNC_{state,age,year} = (40 \text{ million}) * \frac{F_{state} * R_{age} * Pop_{state,age,year}}{\sum_{ages} (R_{age} * Pop_{us,age,2014})} \quad (12)$$

This equation is the same as for the 2014 baseline except for the state population by age group estimates in the numerator. National baseline estimates for 2015–17 were computed by summing across all states and age groups.

The national baseline estimates, as well as “data year” scale factors to convert a given data year to 2017, are given in table 9. The interpretation of these scale values is that the number of caregivers in 2017 would be 4 percent higher than in 2015.

Section III(c): Number of Caregivers

Table 10 (see next page) shows the unadjusted number of caregivers from each source, the adjustments made to align with the common definition, and the adjusted number of caregivers for 2017.

For use in the *Valuing the Invaluable* state and national estimates, a weighted average of sources was computed as follows: BRFSS (3x weight); ATUS, AP-NORC, and NSOC (1x weight each year). The BRFSS was given greater weight, equal to one-half of the total estimate, because of its robust sample size (a total of 66,788 caregivers and 316,158 total interviews). In comparison, the AP-NORC had 312 current caregivers (1,945 total interviews); the ATUS had approximately 3,400 caregivers (21,000 total interviews); and the NSOC surveyed 2,204 caregivers.

Section III(d): Hours of Care

Table 11 shows the hours per week estimates for each source, as well as the adjusted number of caregivers (from table 10) and the total number of care hours per year (a simple calculation from the number of caregivers and hours per caregiver per week). We calculate a weighted average of the total number of care hours (adjusted for caregiving definition and data year) using the same weights as those used to estimate the total number of caregivers above.

Dividing the total number of care hours by the total number of caregivers from table 8 yields an average of 836 hours per caregiver per year, or

TABLE 9
Baseline Prevalence Estimates and Data Year Scale Factors

Data Year	Baseline No. of Caregivers	Percentage of 2014	Scale Factor to Convert to 2017
2014	40,000,000	100.0%	1.060
2015	40,778,747	101.9%	1.040
2015–16 (combined)	41,174,050	102.9%	1.030
2016	41,569,354	103.9%	1.020
2017	42,391,845	106.0%	1.000

TABLE 10
National Prevalence Estimates, All Sources: Unadjusted and Adjusted

Source	Year	Unadjusted No. of Caregivers (millions)	Adjustments Required*	Adjusted No. of Caregivers for 2017 (millions)
ATUS	2015-16	39.9	R1, L, P, D	47.8
BRFSS	2015-17	46.1	R2, V, P	41.3
AP-NORC	2018	39.2	V, P	39.1
NSOC	2015	21.6	R2, M, D	34.0
Weighted Average, Adjusted to 2017				41

* R1 = care recipient population adjustment ages 65 and older to 18 and older (1.45); R2 = care recipient population adjustment all ages to 18 and older (0.946); M = Medicare adjustment (1.043); V = validation adjustment (0.951 or 0.973); L = lookback period adjustment (0.79); P = population adjustment (1.02 or 0.997); D = data year adjustment (1.03 or 1.04).

TABLE 11
National Hours of Care Estimates, per Week and Adjusted Total per Year

Source	Adjusted No. of Caregivers for 2017 (millions)	Average Hours per Caregiver per Week	Adjusted No. of Care Hours for 2017 (billions)
ATUS	47.8	5.2	13.0
BRFSS	41.3	19.9	42.7
AP-NORC	39.1	16.8	34.1
NSOC	34.0	16.8	29.8
Weighted Average, Adjusted to 2017			34

about 16 hours per week. This is used as the factor H in the *Valuing the Invaluable* state and national estimates (equations 2 and 3).

Section III(e): Economic Value per Hour

As in the previous *Valuing the Invaluable* report, the economic value per hour at the state level is estimated as the average of the state minimum

wage, state home health aide median wage, and state median hourly cost of hiring a home care worker (see appendix B for sources). Table 12 contains state estimates of the economic value per hour for 2017. They range from \$10.57 in Louisiana to \$18.01 in Alaska. The national average value per hour (equation 5) is \$13.81.

TABLE 12
Estimated Economic Value per Hour, by State, 2017

State	Value/ Hour	State	Value/ Hour	State	Value/ Hour
Alabama	\$11.15	Kentucky	\$12.65	North Dakota	\$17.20
Alaska	\$18.01	Louisiana	\$10.57	Ohio	\$13.22
Arizona	\$14.50	Maine	\$14.83	Oklahoma	\$13.08
Arkansas	\$12.14	Maryland	\$14.53	Oregon	\$15.23
California	\$16.02	Massachusetts	\$17.10	Pennsylvania	\$13.67
Colorado	\$15.07	Michigan	\$13.66	Rhode Island	\$15.76
Connecticut	\$15.27	Minnesota	\$16.02	South Carolina	\$12.42
Delaware	\$14.67	Mississippi	\$11.93	South Dakota	\$15.60
District of Columbia	\$15.03	Missouri	\$13.16	Tennessee	\$12.12
Florida	\$13.02	Montana	\$14.75	Texas	\$12.10
Georgia	\$12.32	Nebraska	\$14.60	Utah	\$13.75
Hawaii	\$15.95	Nevada	\$14.01	Vermont	\$16.16
Idaho	\$13.17	New Hampshire	\$15.67	Virginia	\$12.81
Illinois	\$13.98	New Jersey	\$14.18	Washington	\$16.73
Indiana	\$13.08	New Mexico	\$12.95	West Virginia	\$12.01
Iowa	\$14.77	New York	\$14.94	Wisconsin	\$14.10
Kansas	\$13.27	North Carolina	\$11.74	Wyoming	\$15.90

SECTION IV: APPENDICES**Appendix A: Caregiving Prevalence Question Wording**

Each of the four data sources used a different question to identify caregivers (and in one survey, caregivers did not self-identify but were identified by the care recipient for follow-up). Below are the wordings of the prevalence question in each of the source surveys.

American Time Use Survey (2015–16)

The next set of questions are about times you may have recently spent assisting or caring for an adult who needed help because of a condition related to aging. For example, as people grow older, it sometimes becomes difficult for them to perform various activities without help—such as grooming, driving, managing the household, taking medication, or other common activities. Care may be provided in your home, their home, or at a care facility.

Not including financial assistance or help you provided as part of your paid job, since the 1st of [reference month three months prior to interview date], have you provided any care or assistance for an adult who needed help because of a condition related to aging?

Behavioral Risk Factor Surveillance System (2015–17)

People may provide regular care or assistance to a friend or family member who has a health problem, long-term illness, or disability.

During the past 30 days, did you provide regular care or assistance to a friend or family member who has a health problem or disability?

The Long-Term Care Poll (2018)

Some people need ongoing living assistance as they get older. This assistance can be help with things like keeping house, cooking, bathing, getting dressed, getting around, paying bills, remembering to take medicine, or just having someone check in to see that everything is okay. This help can happen at your own home, in a family member's home, in a nursing home, or in a senior community. And, it can be provided by a family member, a friend, a volunteer, or a health care professional.

Are you currently providing ongoing living assistance on a regular basis to a family member or close friend or not?

National Study of Caregiving (2015)

Caregivers are identified by care recipients in the 2015 National Health and Aging Trends survey, as helping with individual ADLs and IADLs, for example:

In the last month, did anyone ever help you eat, for instance, by cutting up food or feeding you?

In the last month, did anyone ever help you shower?

In the last month, did anyone ever help you use the toilet?

In the last month, did anyone ever help you get dressed, for instance, by getting clothing over your head, helping with clothing behind your back like a belt, or helping you put on socks or shoes?

Persons so identified by any of these questions (not limited to the above four), and not being paid for providing care, are eligible to be included in the National Study of Caregiving.

Appendix B: References for Data Sources**Data Sources for Estimates of the Number of Caregivers and Care Hours**

Source	Citation
American Time Use Survey	Bureau of Labor Statistics. 2017. "Unpaid Eldercare in the United States 2015–2016 Summary." http://www.bls.gov/news.release/elcare.nr0.htm .
Behavioral Risk Factor Surveillance System	AARP Public Policy Institute. 2019. Unpublished analysis of data from the 2015–2017 Behavioral Risk Factor Surveillance System. https://www.cdc.gov/brfss/data_documentation/index.htm .
The Long-Term Care Poll	AARP Public Policy Institute. 2019. Unpublished analysis of data from the AP-NORC Center's 2018 Long-Term Care Poll, Long-Term Care in America: Increasing Access to Care. https://www.longtermcarepoll.org/project/long-term-care-in-america-increasing-access-to-care/ .
National Study of Caregiving	Winnie Chi et al. 2019. <i>Community-Dwelling Older Adults with Dementia and Their Caregivers: Key Indicators from the National Health and Aging Trends Study</i> . Washington, DC: Assistant Secretary for Planning and Evaluation, Department of Health and Human Services. https://aspe.hhs.gov/system/files/pdf/260371/DemChartbook.pdf .

Note: All online sources were accessed June 2019.

Additional Data Sources Used to Adjust Estimates

Source	Citation
Behavioral Risk Factor Surveillance System	AARP Public Policy Institute. 2019. Unpublished analysis of data from the 2009–2010 Behavioral Risk Factor Surveillance System. https://www.cdc.gov/brfss/data_documentation/index.htm .
Caregiving in the US	AARP Public Policy Institute. 2019. Unpublished analysis of <i>Caregiving in the US 2009 and 2015</i> survey data. https://www.caregiving.org/research/open-data/ .
Gallup Healthways Well-Being Survey	MIT AgeLab. 2015. Unpublished analysis of the 2009–2012 Gallup Healthways Well-Being Survey data.
The Long-Term Caregiving Poll	AARP Public Policy Institute. 2019. Unpublished analysis of data from the AP-NORC Center's 2017 Long-Term Caregiving Poll, Long-Term Caregiving: The Types of Care Older Americans Provide and the Impact on Work and Family. https://www.longtermcarepoll.org/project/long-term-caregiving-the-types-of-care-older-americans-provide-and-the-impact-on-work-and-family/ .

Note: All online sources were accessed June 2019.

Data Sources for Estimates of the Economic Value per Hour

	Citation
State Minimum Wage	Department of Labor, Wage and Hour Division. "Changes in Basic Minimum Wages in Non-Farm Employment under State Law: Selected Years 1968 to 2018." https://www.dol.gov/whd/state/stateMinWageHis.htm .
Home Health Aide Median Wage	Bureau of Labor Statistics. Occupational Employment Statistics, May 2017 Data, occupation code 31-1011 Home Health Aides. http://www.bls.gov/oes/tables.htm .
Home Care Worker Cost	Genworth Financial. 2017. Genworth 2017 Cost of Care Survey.

Note: All online sources were accessed June 2019.

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- US Census Bureau. 2016. 2015 American Community Survey 1-Year Estimates, Table C27006: MEDICARE COVERAGE BY SEX BY AGE.
- US Census Bureau, Population Division. 2012. Intercensal Estimates of the Resident Population by Sex and Age for States: April 1, 2000 to July 1, 2010.
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