

Burden Report: Summary of Results for the Quarterly Survey of Plant Capacity Utilization (QPC)

1 Total Time Spent in the Web Instrument

Total time spent in the survey is the accumulation of time from the initial encounter with the web instrument to the last event. Last event doesn't necessarily mean submission because not every respondent submitted.

The total time spent is not inherently recorded within the paradata, so they need to be calculated using the time stamps. Here are the steps needed to calculate the total time spent per respondent using a dummy dataset table for illustration purposes only:

1. Sort by 'RespondentId' and 'Time' by ascending values (the paradata should already be sorted but this is done just in case)
2. Create another column called "time_spent_calculation" that takes the difference between the time of a certain row by the time of the row prior. For instance,

| RespondentId | Time | PageValue | time_spent_calculation | time_spent (seconds) |
|--------------|------------------|-----------|--|----------------------|
| 100000001 | 27OCT01:16:50:00 | Screen_1 | | |
| 100000001 | 27OCT01:16:52:00 | Screen_2 | 27OCT01:16:52:00 – 27OCT01:16:50:00 | 120 |
| 100000001 | 27OCT01:16:52:20 | Screen_3 | 27OCT01:16:52:20 – 27OCT01:16:52:00 | 20 |
| 100000002 | 28OCT01:16:51:00 | Screen_1 | | |
| 100000002 | 28OCT01:16:52:00 | Screen_2 | 28OCT01:16:52:00 – 28OCT01:16:51:00 | 60 |
| 100000002 | 28OCT01:17:30:00 | Screen_3 | 28OCT01:17:30:00 – 28OCT01:16:52:00 | 2280 |

3. Take the sum of the time spent calculation column per respondent to calculate the total time spent per respondent. For instance,

| RespondentId | time_spent_total_calculation | time_spent_total (seconds) |
|--------------|------------------------------|----------------------------|
| 100000001 | 120 + 20 | 140 |
| 100000002 | 60 + 2280 | 2340 |

4. Summary statistics such as the average and median can then be calculated

In quarter three (Q3), the average time spent in the instrument was close to four hours, and the median time spent was approximately 12 minutes. Up to 75% of respondents spent approximately 72 minutes or less. Table 1a shows the total time spent in the survey for all respondents who logged in the survey in Q3.

In quarter four (Q4), the average time spent in the instrument was also close to four hours. The median time sent was approximately 12 minutes. Up to 75% of respondents spent approximately 56 minutes or less. Table 1b shows the total time spent in the survey for all respondents who logged in the survey in Q4.

Table 1a. Total Time Spent in the Survey for the Q3 QPC Data.

| Average | Median | Min | Max |
|----------|----------|---------------------|------------------|
| 03:58:51 | 00:12:12 | Less than 5 seconds | Less than 4 days |

Source: U.S. Census Bureau, Q3 QPC Paradata

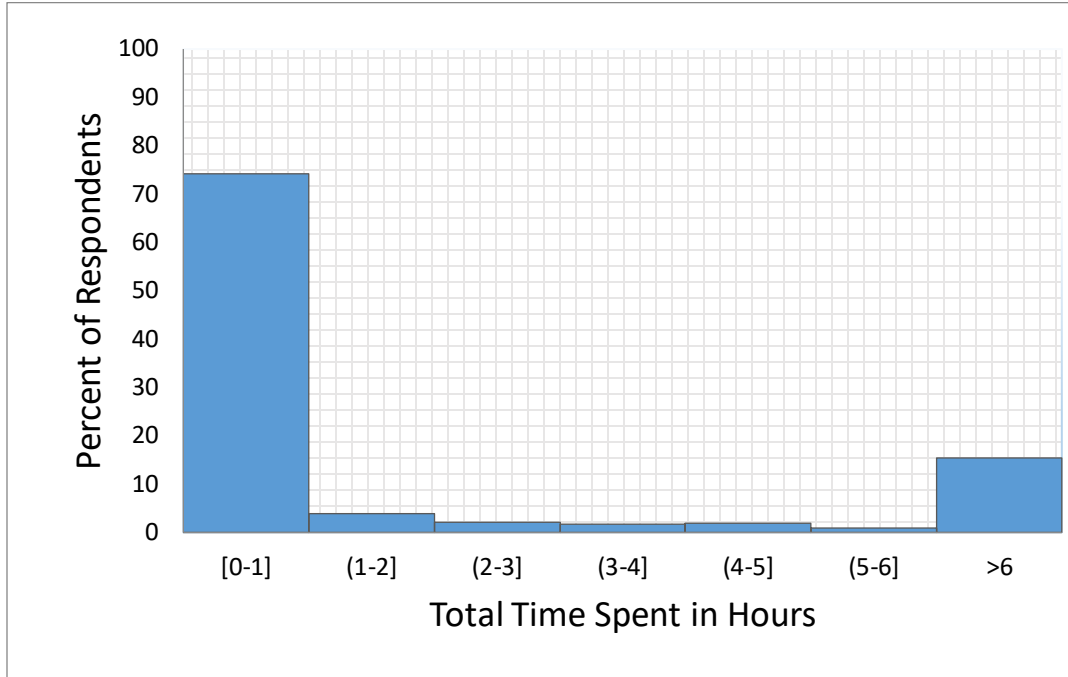
Table 1b. Total Time Spent in the Survey for the Q4 QPC Data.

| Average | Median | Min | Max |
|----------|----------|---------------------|------------------|
| 03:42:05 | 00:11:59 | Less than 5 seconds | Less than 5 days |

Source: U.S. Census Bureau, Q4 QPC Paradata

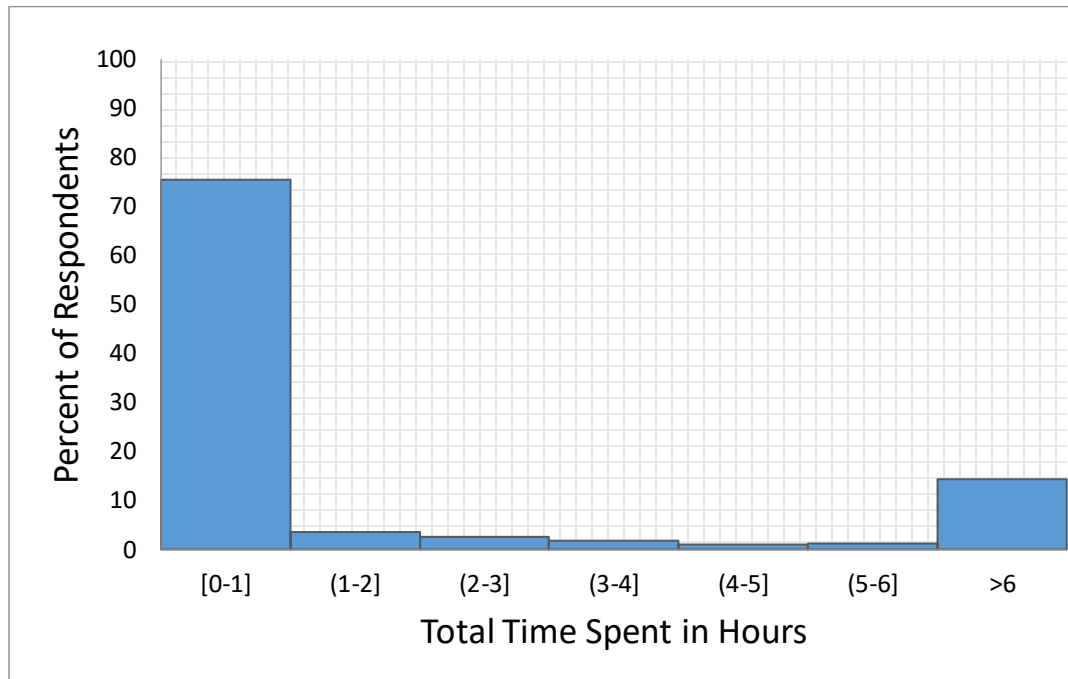
Figures 1a and 1b show the total time spent in the survey for Q3 and Q4.

Figure 1a. Histogram of Total Time Spent in the Survey for the Q3 QPC Paradata.



Source: U.S. Census Bureau, Q3 QPC Paradata

Figure 1b. Histogram of Total Time Spent in the Survey for the Q4 QPC Paradata.

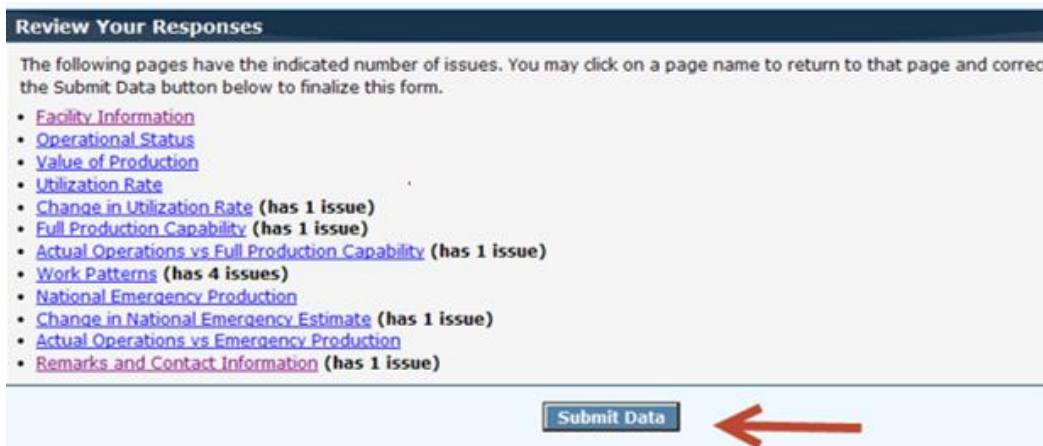


Source: U.S. Census Bureau, Q4 QPC Paradata

2 Completion Time

Completion occurs when the respondent selects the final ‘Submit Data’ button as shown in Figure 2. Completion time is defined as the time between a respondent’s initial contact with the survey questionnaire and final submission. While completing the questionnaire or partially completing the questionnaire, the respondent may have multiple contacts and (one or more) submissions over the course of hours or days. Respondents may also answer some questions, leave others blank, and fail to formally submit the data. Only respondents who formally submit the questionnaire will have a completion time calculated. Establishments that filled out some questions but did not select the submit button will not have a calculated completion time because the questionnaire is considered incomplete.

Figure 2. Review Screen from the QPC.



Submission occurs in the paradata when the variables ‘PageValue’ and ‘Type’ are first equal to ‘welcome’ and ‘entry’ respectively. Same day completion excludes multiple submissions over the course of several days. We analyzed the keystroke data that comes before the first instance of a respondent selecting ‘Submit Data’ to calculate the completion time.

2.1 Completion Time for Those Who Completed the Survey on the Same Day

In quarter 3, of the respondents who submitted the survey regardless of duration, 76% of them submitted the survey in one day. These respondents had an average completion time of 20 minutes, and a median time of 8 minutes.

In quarter 4, of the respondents who submitted the survey regardless of duration, 78% of them submitted the survey in one day. These respondents also had an average completion time of 20 minutes, and a median time of 8 minutes.

Table 2a and Table 2b show the elapsed time between the initial encounter with the instrument and the first submission in Hours: Minutes: Seconds, for those submissions captured in one sitting.

Table 2a. Elapsed Time between Initial Contact with the Web Instrument and Submission for One Day with the Q3 QPC Data.

| Average | Median | Min | Max |
|----------|----------|--------------------|--------------------|
| 00:20:18 | 00:08:22 | Less than 1 minute | Less than 10 hours |

Source: U.S. Census Bureau, Q3 QPC Paradata

Table 2b. Elapsed Time between Initial Contact with the Web Instrument and Submission for One Day with the Q4 QPC Data.

| Average | Median | Min | Max |
|----------|----------|--------------------|--------------------|
| 00:20:09 | 00:08:06 | Less than 1 minute | Less than 10 hours |

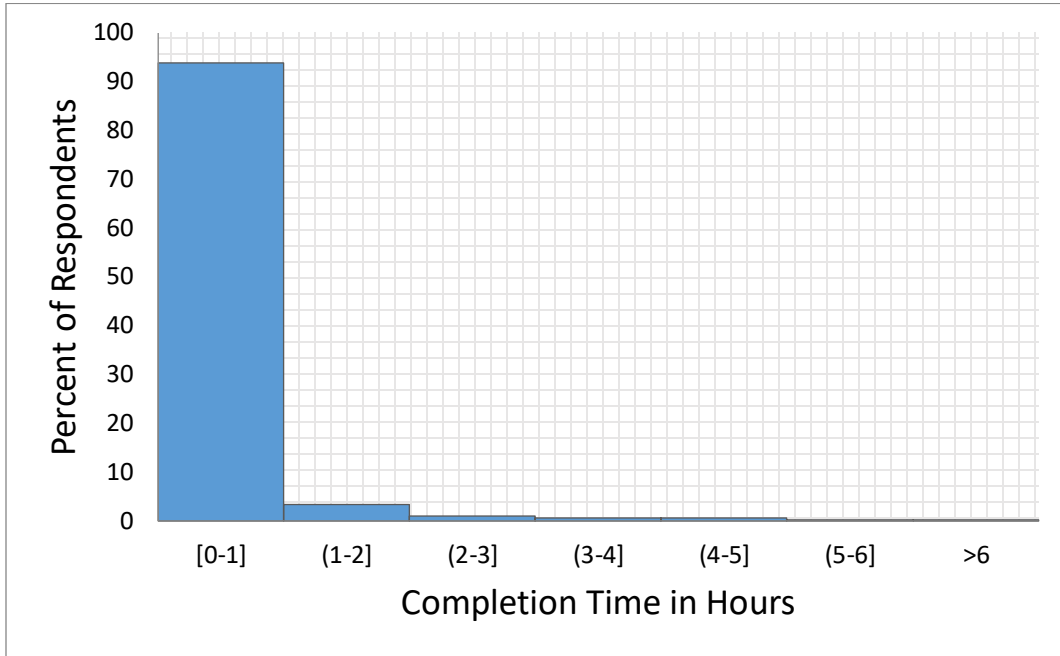
Source: U.S. Census Bureau, Q4 QPC Paradata

Below are the steps needed to calculate the completion time:

1. Subset the data by removing the respondents who never submitted the survey
2. Subset the data by removing the respondents that spent more than one day on the survey
3. Obtain the time of first login & time of first submission
4. Create a dataset with only rows of the first submission & first login per respondent
5. Add a column that provides the time difference between the first submission & the first login
6. Take the sum of the time differences by respondent
7. Calculate the mean and median using the sum of the time differences

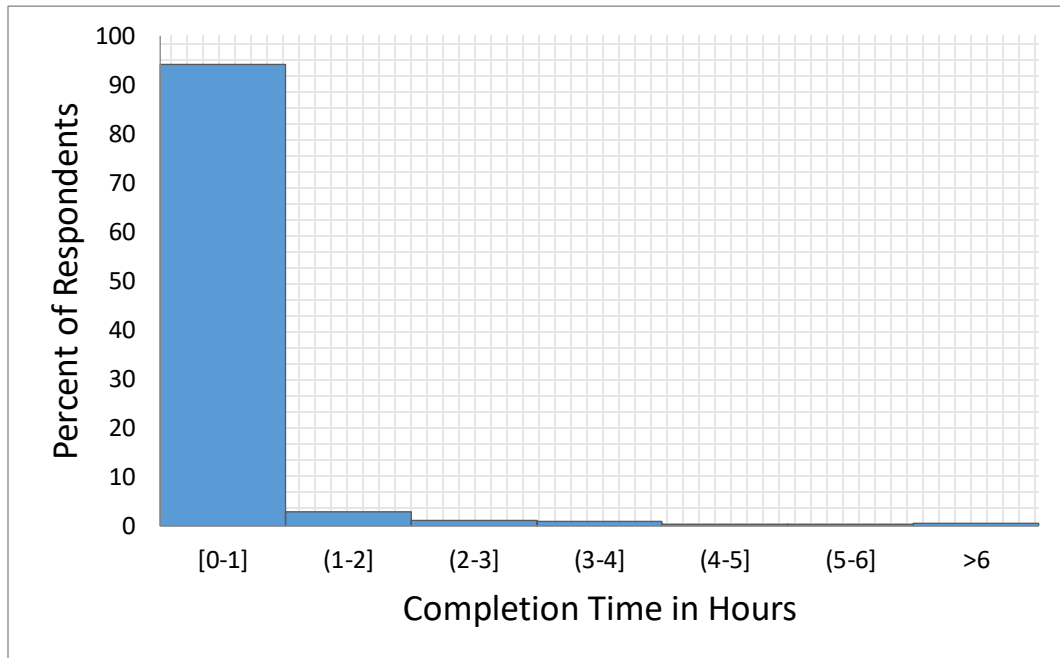
Figures 3a and 3b show the total time spent in the survey on one day for the Centurion respondent IDs in Q3 and Q4.

Figure 3a. Histogram of Survey Completion Time for Those Who Submitted on the Same Day for the Q3 Data.



Source: U.S. Census Bureau, Q3 QPC Paradata

Figure 3b. Histogram of Survey Completion Time for Those Who Submitted on the Same Day for the Q4 Data



Source: U.S. Census Bureau, Q4 QPC Paradata

2.2 Completion Time for those Who Completed the Survey in More than One Day

In quarter 3, of the respondents who submitted the survey regardless of duration, 24% of them finished the survey in more than one day. In quarter 4, of the respondents who submitted the survey regardless of duration, 22% of them finished the survey in more than one day. Note that, we included this scenario in our analysis (Table 2c and Table 2d); however, the results are not reliable since we have no evidence to support the respondents worked on the survey during the time they were off the survey instrument.

Table 2c. Elapsed Time between Initial Contact with the Web Instrument and First Submission for More than One Day with Q3 QPC Data.

| Average | Median | Min | Max |
|------------------|------------------|---------------------|-------------------|
| 17 days 17:17:55 | 16 days 01:42:11 | Less than 2 minutes | Less than 80 days |

Source: U.S. Census Bureau, Q3 QPC Paradata

Table 2d. Elapsed Time between Initial Contact with the Web Instrument and First Submission for More than One Day with Q4 QPC Data.

| Average | Median | Min | Max |
|------------------|-----------------|--------------------|-------------------|
| 15 days 09:12:00 | 9 days 00:10:04 | Less than 1 minute | Less than 75 days |

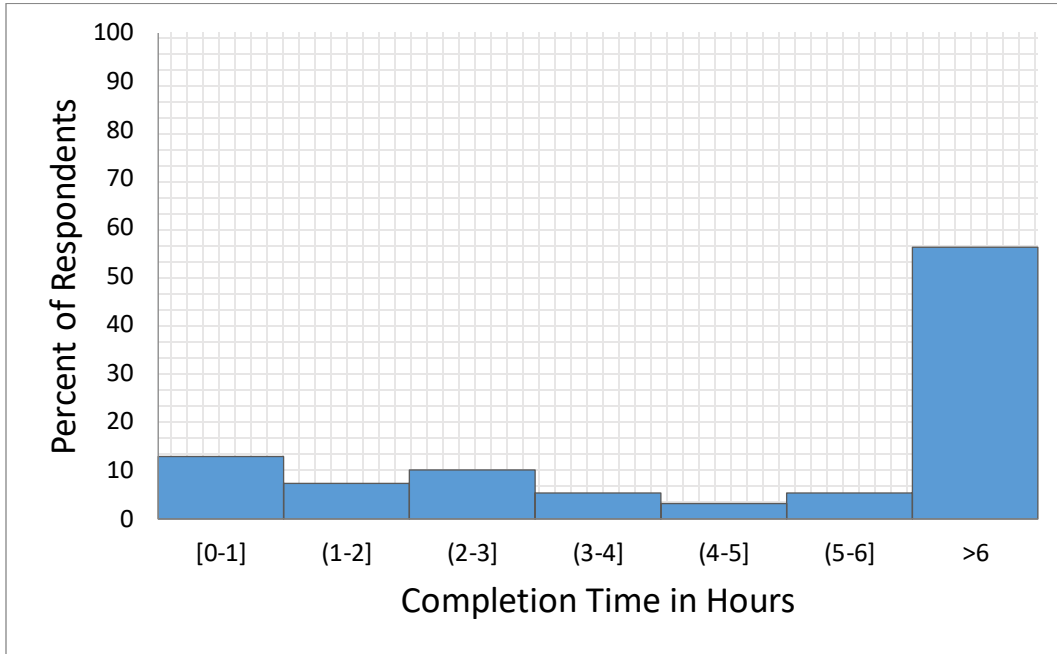
Source: U.S. Census Bureau, Q4 QPC Paradata

These completion times are calculated as follows:

1. Subset the data by removing the respondents who submitted the survey in one day
2. Subset the data by removing the respondents who did not submit the survey
3. Create a dataset with only rows of the first submission & first login per respondent
4. Add a column that provides the time difference between the first submission & the first login
5. Take the sum of the time differences by respondent
6. Calculate the mean and median using the sum of the time differences

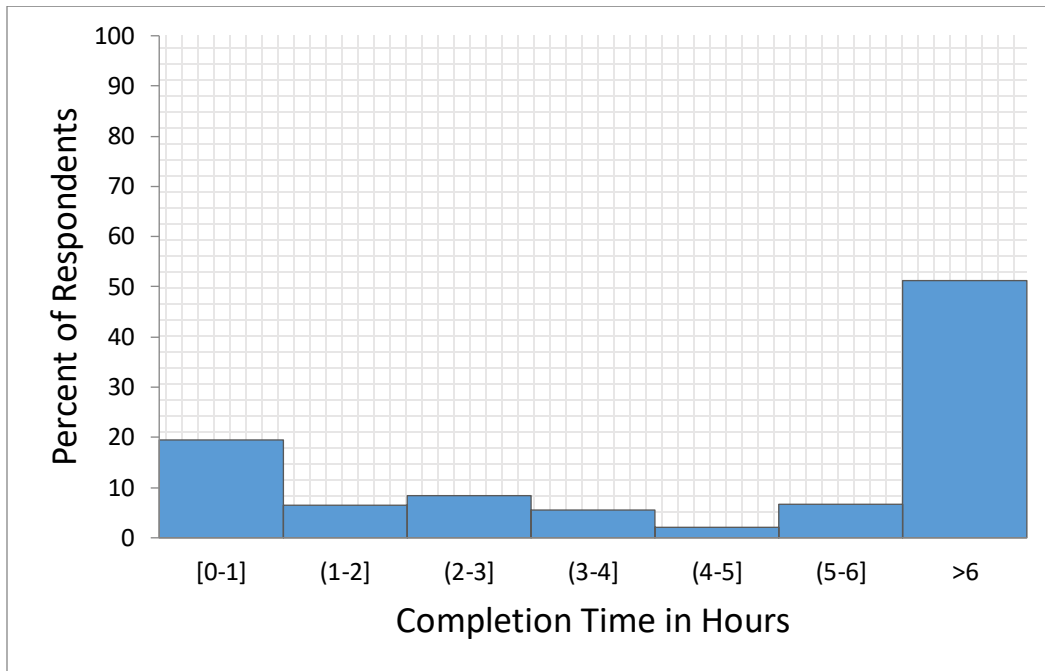
Figure 4a and 4b shows the total time spent in the survey on any number of days for the Centurion respondent IDs in Q3 and Q4.

Figure 4a. Histogram of Completion Time in the Survey on More than One Day for the Q3 QPC Paradata.



Source: U.S. Census Bureau, Q3 QPC Paradata

Figure 4b. Histogram of Completion Time in the Survey on More than One Day for the Q4 QPC Paradata.



Source: U.S. Census Bureau, Q4 QPC Paradata

3 Conclusion

Table 3 below combines summary statistics for the analysis of time in the web instrument and completion times for quarter 3 and quarter 4.

Table 3. Summary Statistics for all 3 Prior Sections

| Quarter 3 | Mean | Median | Min | Max |
|--|------------------|------------------|---------------------|--------------------|
| Interacted with the survey instrument | 03:58:51 | 00:12:12 | Less than 5 seconds | Less than 4 days |
| Completed the survey in one day | 00:20:18 | 00:08:22 | Less than 1 minute | Less than 10 hours |
| Completed the survey in multiple days | 17 days 17:17:55 | 16 days 01:42:11 | Less than 2 minutes | Less than 80 days |
| Quarter 4 | Mean | Median | Min | Max |
| Interacted with the survey instrument | 03:42:05 | 00:11:59 | Less than 5 seconds | Less than 5 days |
| Completed the survey in one day | 00:20:09 | 00:08:06 | Less than 1 minute | Less than 10 hours |
| Completed the survey in multiple days | 15 days 09:12:00 | 9 days 00:10:04 | Less than 1 minute | Less than 75 days |

To calculate the completion time for the QPC, we encountered a series of methodological issues. This study requires more analysis to account for the outlier times. The min and max times are unrealistically short or long (i.e., finishing the survey in a minute or less and taking more than an entire day). The current method of taking the difference of an action with the action prior creates large outliers when the respondent works on the survey in multiple sessions or days. As such, the mean and median for section 2.2 (respondents who spent multiple days on the survey) are massive. Adjusting for the outlier time difference values could solve this issue.

It is well established that some survey respondents take shortcuts when answering survey questions, providing responses that are acceptable but not optimal. Thus, when survey respondents cut corners, it has been called “survey satisficing”. Existing research suggests that speeding can be detected by identifying respondents who complete the survey in less than 60% of the median completion time. Further investigation is needed to establish an acceptable completion speed or what constitutes a response that is “too fast.”

Overall, we feel confident in the case of those who completed the survey on the same day, the average may be worth a more careful consideration compared to the other two sections. The skewed nature of the data provides credibility to the median, but in the case of same-day respondents, the average may factor in time necessary for completion of those who required additional time for research and survey navigation. The average time, 20 minutes, is reasonable

unlike the averages in other sections that are above 3 hours or 15 days. Additionally, due to the high same-day submission rate (over 76% of those who submitted the survey in one day in both quarters), 20 minutes is our finding for the recommended completion time.

The Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data used to produce this product (Data Management System (DMS) number: P-6000374, Disclosure Review Board (DRB) approval number: CBDRB-FY22-ESMD011-002).