

# Analysis Using Ratio Estimators Approach

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## Instructions on How to Obtain the Data

1. The data set used in this analysis can be downloaded from IPUMS USA. Type the following link into your search engine, to access the home page: <https://usa.ipums.org/usa/index.shtml>
2. From here, click on the 'Get Data' button, under 'CREATE YOUR CUSTOM DATA SET'.
3. This will redirect you to another page. Here, select the following fields: For HOUSEHOLD, choose 'GEOGRAPHIC' and then select 'STATEICP'. For PERSON, choose 'DEMOGRAPHIC' and then select 'SEX'. At this point, you should have 2 variables in your 'DATA CART', located on the top right corner of the webpage.
4. Then, click 'SELECT SAMPLES', in the top left corner of the webpage. This should re-direct you to the SELECT SAMPLES page, with 'USA SAMPLES' choices. De-select default preferences, and ensure that only 'ACS' in the 2022 row has been selected.
5. Then scroll all the way to the bottom, and click 'SUBMIT SAMPLE SELECTIONS'.
6. Then select 'VIEW CART' and 'CREATE DATA EXTRACT'
7. From here, you will see a summary of your extract request. To download the data into a csv file format, click 'CHANGE' under the 'DATA FORMAT' row.
8. Finally, submit extract and download the data when it becomes available.

## A Brief Overview of the Ratio Estimators Approach

The ratio estimators approach is used to estimate the total number of respondents in each state by leveraging known values from one region in this case, California. The method works by calculating the ratio of respondents with doctoral degrees to the total number of respondents in California, then applying this ratio to other states. The idea is to estimate the total number of respondents by assuming similar patterns between the proportion of doctoral degree holders and the total population in each state.

## Estimates and Actual Number of Respondents

Below is a table showing the estimated total number of respondents based on the ratio estimators approach and the actual total number of respondents in each state.

Table 1. Estimated and actual respondents

# A tibble: 51 x 4

	STATEICP	Doctoral_Respondents	Estimated_Total_Respond~1	Actual_Total_Respond~2
	<dbl>	<int>	<dbl>	<int>
1	1	600	37043.	37369
2	2	165	10187.	14523
3	3	2014	124340.	73077
4	4	244	15064.	14077
5	5	177	10928.	10401
6	6	131	8088.	6860
7	11	152	9384.	9641
8	12	1438	88779.	93166
9	13	2829	174656.	203891
10	14	1620	100015.	132605
11	21	1457	89952.	128046
12	22	620	38277.	69843
13	23	991	61182.	101512
14	24	1213	74888.	120666
15	25	513	31672.	61967
16	31	258	15928.	33586
17	32	321	19818.	29940
18	33	572	35314.	58984
19	34	621	38339.	64551
20	35	153	9446.	19989
21	36	60	3704.	8107
22	37	71	4383.	9296
23	40	1531	94521.	88761
24	41	460	28399.	51580
25	42	251	15496.	31288
26	43	2731	168606.	217799
27	44	1451	89582.	109349
28	45	450	27782.	45040
29	46	263	16237.	29796
30	47	1421	87729.	109230
31	48	647	39944.	54651
32	49	3216	198549.	292919
33	51	448	27659.	46605

34	52	1608	99274.	62442
35	53	281	17348.	39445
36	54	841	51922.	72374
37	56	159	9816.	18135
38	61	896	55317.	74153
39	62	1031	63652.	59841
40	63	175	10804.	19884
41	64	113	6976.	11116
42	65	282	17410.	30749
43	66	350	21608.	20243
44	67	428	26424.	35537
45	68	72	4445.	5962
46	71	6336	391171	391171
47	72	647	39944.	43708
48	73	1195	73777.	80818
49	81	51	3149.	6972
50	82	214	13212.	14995
51	98	311	19200.	6718

# i abbreviated names: 1: Estimated\_Total\_Respondents,  
# 2: Actual\_Total\_Respondents

## Explanation of why they are different

The reason why the actual results were different from estimates could be because the educational status can vary significantly between states due to differences in access to higher education institutions, state-level policies, and job market demands. The ratio estimators approach in this study assumes that the education level does not vary across states. Another reason might be due to socio-economic factors, such as income inequality, poor access to quality education and a cultural emphasis on higher education, which can vary greatly by state.