

# Reflection exercise 4

October 3, 2024

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How many respondents were there in each state (stateicp) that had a doctoral degree as their highest educational attainment (EDUC)? . . . . .

Laplace to estimator. Given 391,171 California Respondents use estimator to find number of participants for all states. . . . .

Different between estimator and non estimator . . . . .

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## Question 1

How many respondents were there in each state (stateicp) that had a doctoral degree as their highest educational attainment (EDUC)?

Table 1: Number of Respondents and Proportion of Doctors Per State

State ICP	Respondent Count	Doctor Count	Doctor Proportion
1	37369	600	0.0160561
2	14523	165	0.0113613
3	73077	2014	0.0275600
4	14077	244	0.0173332
5	10401	177	0.0170176
6	6860	131	0.0190962
11	9641	152	0.0157660
12	93166	1438	0.0154348
13	203891	2829	0.0138751
14	132605	1620	0.0122167
21	128046	1457	0.0113787

State ICP	Respondent Count	Doctor Count	Doctor Proportion
22	69843	620	0.0088771
23	101512	991	0.0097624
24	120666	1213	0.0100525
25	61967	513	0.0082786
31	33586	258	0.0076818
32	29940	321	0.0107214
33	58984	572	0.0096975
34	64551	621	0.0096203
35	19989	153	0.0076542
36	8107	60	0.0074010
37	9296	71	0.0076377
40	88761	1531	0.0172486
41	51580	460	0.0089182
42	31288	251	0.0080222
43	217799	2731	0.0125391
44	109349	1451	0.0132694
45	45040	450	0.0099911
46	29796	263	0.0088267
47	109230	1421	0.0130092
48	54651	647	0.0118388
49	292919	3216	0.0109791
51	46605	448	0.0096127
52	62442	1608	0.0257519
53	39445	281	0.0071238
54	72374	841	0.0116202
56	18135	159	0.0087676
61	74153	896	0.0120831
62	59841	1031	0.0172290
63	19884	175	0.0088010
64	11116	113	0.0101655
65	30749	282	0.0091710
66	20243	350	0.0172899
67	35537	428	0.0120438
68	5962	72	0.0120765
71	391171	6336	0.0161975
72	43708	647	0.0148028
73	80818	1195	0.0147863
81	6972	51	0.0073150
82	14995	214	0.0142714
98	6718	311	0.0462935

**Laplace to estimator. Given 391,171 California Respondents use estimator to find number of participants for all states.**

Table 2: Esimated Number of Respondents Per State

State ICP	Doctor Count	Estimated Respondent Count
1	600	37043
2	165	10187
3	2014	124340
4	244	15064
5	177	10928
6	131	8088
11	152	9384
12	1438	88779
13	2829	174656
14	1620	100015
21	1457	89952
22	620	38277
23	991	61182
24	1213	74888
25	513	31672
31	258	15928
32	321	19818
33	572	35314
34	621	38339
35	153	9446
36	60	3704
37	71	4383
40	1531	94521
41	460	28399
42	251	15496
43	2731	168606
44	1451	89582
45	450	27782
46	263	16237
47	1421	87729
48	647	39944
49	3216	198549
51	448	27659
52	1608	99274
53	281	17348
54	841	51922

State ICP	Doctor Count	Estimated Respondent Count
56	159	9816
61	896	55317
62	1031	63652
63	175	10804
64	113	6976
65	282	17410
66	350	21608
67	428	26424
68	72	4445
71	6336	391171
72	647	39944
73	1195	73777
81	51	3149
82	214	13212
98	311	19200

#### Different between estimator and non estimator

Table 3: Esimated Number of Respondents Per State

State ICP	Estimated Respondent Count	Respondent Count	Difference
1	37043	37369	-326
2	10187	14523	-4336
3	124340	73077	51263
4	15064	14077	987
5	10928	10401	527
6	8088	6860	1228
11	9384	9641	-257
12	88779	93166	-4387
13	174656	203891	-29235
14	100015	132605	-32590
21	89952	128046	-38094
22	38277	69843	-31566
23	61182	101512	-40330
24	74888	120666	-45778
25	31672	61967	-30295
31	15928	33586	-17658
32	19818	29940	-10122
33	35314	58984	-23670

State ICP	Estimated Respondent Count	Respondent Count	Difference
34	38339	64551	-26212
35	9446	19989	-10543
36	3704	8107	-4403
37	4383	9296	-4913
40	94521	88761	5760
41	28399	51580	-23181
42	15496	31288	-15792
43	168606	217799	-49193
44	89582	109349	-19767
45	27782	45040	-17258
46	16237	29796	-13559
47	87729	109230	-21501
48	39944	54651	-14707
49	198549	292919	-94370
51	27659	46605	-18946
52	99274	62442	36832
53	17348	39445	-22097
54	51922	72374	-20452
56	9816	18135	-8319
61	55317	74153	-18836
62	63652	59841	3811
63	10804	19884	-9080
64	6976	11116	-4140
65	17410	30749	-13339
66	21608	20243	1365
67	26424	35537	-9113
68	4445	5962	-1517
71	391171	391171	0
72	39944	43708	-3764
73	73777	80818	-7041
81	3149	6972	-3823
82	13212	14995	-1783
98	19200	6718	12482

Based on the `?@tbl-diff`, the estimator is usually less than the actual. This is probably the case because California is more educated compared to most American states. Thus, they will have a higher percentage of doctors, resulting in an underestimate of the total number of respondents.