Instructions on how to obtain the data.

Register for account at IPUMS USA, select the EDUC and STATEICP variables and extract with csv. Download the csv and unzip the file in terminal. Read the csv.

A brief overview of the ratio estimators approach.

Used to scale up estimates for the total population in each state based on a known ratio. The ratio of doctoral degree holders to total respondents in California is used as a reference. Apply this ratio to other states to estimate their total populations based on the number of doctoral degree holders.

In California: 516,430 doctoral degree holders and 391,171 total respondents, giving a ratio of 391171 / 516430 = 0.76

Your estimates and the actual number of respondents.

Below in the table.

Some explanation of why you think they are different.

Using ratio of one state to estimate all states is not a good method because every state differs in education and and population. This method assumes that the ratio of doctoral degree holders to the total population in California is representative of other states. Which leads to large discrepancies.

```
 [1] "YEAR"     "SAMPLE"   "SERIAL"   "CBSERIAL" "HHWT"     "CLUSTER"
 [7] "STATEICP" "STRATA"   "GQ"       "PERNUM"   "PERWT"    "EDUC"
[13] "EDUCD"


 [1]  71  64  26   2  40  50  63  25  65  30 101  61  81 115   1  16  22  23 114
[20]  15  17 116  12  14  11


[1] "Number of doctoral degree holders: 44079"
```

Table 1: Comparison of Estimated and Actual Total Respondents by State

STATEICP	doctoral_count	total_count	estimated_total	difference
1	49333	3626205	37367	-3588838
2	15786	1385340	11957	-1373383
3	169872	6981974	128670	-6853304
4	21948	1395231	16625	-1378606
5	15986	1093734	12109	-1081625
6	11300	647064	8559	-638505
11	14619	1018396	11073	-1007323
12	118843	9261699	90018	-9171681
13	258461	19677151	195772	-19481379
14	159941	12972008	121148	-12850860
21	142359	12582032	107830	-12474202
22	58574	6833037	44367	-6788670
23	94057	10034118	71244	-9962874
24	105825	11756058	80157	-11675901
25	52211	5892539	39547	-5852992
31	29106	3200517	22046	-3178471
32	33055	2937150	25038	-2912112
33	64989	5717184	49226	-5667958
34	59904	6177957	45374	-6132583
35	17938	1967923	13587	-1954336
36	4892	779261	3705	-775556
37	7887	909824	5974	-903850
40	130985	8683619	99215	-8584404
41	42691	5074296	32336	-5041960
42	24333	3045637	18431	-3027206
43	235306	22244823	178233	-22066590
44	119830	10912876	90765	-10822111
45	37153	4590241	28142	-4562099
46	22308	2940057	16897	-2923160
47	120933	10698973	91601	-10607372
48	54520	5282634	41296	-5241338
49	266133	30029572	201583	-29827989
51	36243	4512310	27452	-4484858
52	127642	6164660	96683	-6067977
53	33099	4019800	25071	-3994729
54	71377	7051339	54065	-6997274

56	13533	1775156	10251	-1764905
61	74315	7359197	56290	-7302907
62	83302	5839926	63097	-5776829
63	16181	1939033	12256	-1926777
64	11431	1122867	8658	-1114209
65	23531	3177772	17824	-3159948
66	31316	2113344	23720	-2089624
67	39531	3380800	29943	-3350857
68	7458	581381	5649	-575732
71	516430	39029342	391171	-38638171
72	55444	4240137	41996	-4198141
73	104364	7785786	79051	-7706735
81	6446	733583	4883	-728700
82	18341	1440196	13892	-1426304
98	24974	671803	18917	-652886