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Patient demand for plastic surgeons for every US state based on Google searches[☆]

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ABSTRACT

Introduction: As a profession, plastic surgeons must meet the public demand for esthetic and reconstructive procedures. Patients search for physicians using Google, which offers insights into patient needs through their search history.

Methods: The *Google Trends* Relative Search Volumes (RSV) were pulled for all searches for “plastic surgery” over 12 months. The number of active plastic surgeons per state was divided by Census Bureau population estimates to calculate the surgeons-per-capita value, or “surgical concentration.” The Google score divided by this concentration yields a “surgical demand index” for each state.

Results: Florida, New York, and Connecticut had the greatest concentration of surgeons per ten-thousand people (0.220, 0.217, and 0.209, respectively), while Wyoming, Arkansas, and Vermont had the smallest (0.051, 0.071, 0.080). California exhibited the greatest number of Google searches (RSV=100), followed by Florida and Hawaii (RSV=95). Oregon (RSV=38), Virginia (RSV=52), and Alaska (RSV=58) had the fewest searches. The “surgical demand index” was greatest in Wyoming (1187.778), Oklahoma (993.751), and Arkansas (974.664) and smallest in Oregon (264.682), Virginia (320.716), and Connecticut (354.872).

Conclusion: The distribution of US plastic surgeons is not homogeneous. The Google data suggest that some markets (e.g. Oregon)

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are saturated while others (e.g. Wyoming) have significant demand that is not met by the number of plastic surgeons in those states.

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Introduction

Background

In our modern era, patients have unprecedented access to information through the internet. Google, the most visited site online,¹ provides its search data to the public, through a platform called *Google Trends*² (Alphabet Inc., Mountain View, C.A.).

Objectives

The objective of this study was to compare the relative popularity of searches for plastic surgery across the United States with the number of plastic surgeons in each state. We hypothesized that several states with low representation of plastic surgeons would nevertheless have a population that is interested in plastic surgery. This may identify regional market needs- locations a new plastic surgeon may want to open a practice. Additionally, we sought to illustrate how the Google data can be mined and analyzed to study public interest in surgery.

Methods

Study design

Google data are reported as the Relative Search Volume for all searches for “Plastic Surgery” for the twelve-month period from June 2014–June 2015. These data are reported state-by-state, and normalized by total search volume. Data are reported on a scale from 0 to 100 based on a proportion to all searches.³ The number of American Society of Plastic Surgeons (ASPS) members in each state was provided by the ASPS for the same year. State populations are the US Census Bureau 2014 estimates.⁴

Surgical demand is reported as the Surgical Demand Index, a measure of how the concentration of plastic surgeons matches the public curiosity with plastic surgery. The Index is calculated by dividing the Google Relative Search Volume by the concentration of plastic surgeons in any individual state, according the formula:

$$\text{Surgical Demand Index} = \frac{\text{Frequency of Searches}}{\text{Number of Plastic Surgeons Nearby}} = \frac{\text{Google Relative Search Volume}}{\left(\frac{\text{Number of Plastic Surgeons in Each State}}{\text{State Population}} \right)}$$

Results

Descriptive data and main results

California had the highest Google Relative Search Volume at 100 (a benchmark used to calibrate all other states), followed by Florida (95), Hawaii (95), New York (94), and North Carolina (91). Oregon had the lowest volume at 38, followed by Virginia (52), Alaska (58), Nebraska (60) and Wyoming (61). The data are presented in [Fig. 1](#) and [Table 1](#).

California has the most surgeons at 765 and Wyoming the fewest at 3. When the number of surgeons is divided by the state population, Florida ranks at the top with 0.220 surgeons per ten-thousand people, then New York (0.217), Connecticut (0.209), Maryland (0.206), and Illinois (0.201).

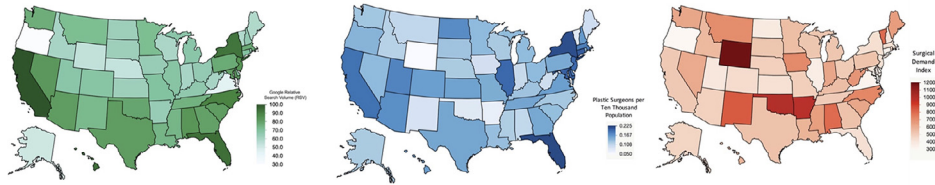


Fig. 1. Google Relative Search Volume, concentration of plastic surgeons, and Surgical Demand Index for each state.

The least-dense states are Wyoming (0.051), Arkansas (0.071), Vermont (0.080), Oklahoma (0.083), and New Mexico (0.091).

Demand for plastic surgeons was highest in Wyoming (1187.778 Relative Search Volume/surgeons per ten-thousand), then Oklahoma (993.751), Arkansas (974.664), New Mexico (845.205), and Alabama (802.012). Demand was lowest in Oregon (264.683), Virginia (320.716), Connecticut (354.872), Illinois (363.043), and North Dakota (386.805).

In this study, we show that the distribution of interest in plastic surgery and the distribution of plastic surgeons, is not homogeneous. There are states where there is excessive interest in the field but hardly any surgeons (e.g. Wyoming), and those that despite an army of physicians on call, the public interest is more scarce (e.g. Oregon).

Discussion

Key results

Google Trends data previously showed that search volume for selected cosmetic surgery procedures correlated with the number of procedures reported by the ASPS.⁵ Similarly, this study demonstrates that augmenting the Google data with another source (such as the number of surgeons practicing in each state) yields relevant findings. We can expect the Google Trends data to inform more discussions of plastic surgery by virtue of the scale and accessibility of the data.

Limitations

One limitation of this study is that only Active ASPS member Surgeons were accounted for each state. Certain markets may be saturated by physicians practicing plastic surgery who have other training or certifications. The recorded years of the data are due to a lack of updated ASPS surgeon numbers as well as the decennial nature of the US census. In the future, we aim to use the most updated numbers as they are gathered by these agencies and even track the trends over time. Our work suggests opportunities in certain regions but without data on hiring and job postings, this is speculative. Next, searches for “plastic surgery” reveal a global interest in the field and include not only those interested in a procedure. These data do not control for sensationalism in plastic surgery, for example, which may vary from state to state. They also do not distinguish between esthetic and reconstructive procedures.

Interpretation

These data offer several possible applications, but may be chiefly relevant to a new plastic surgeon hoping to enter a market where his or her practice has ample opportunity to flourish. Wyoming, with its small population, does not immediately appear to be an ideal option. Just looking at the Google data, the 40% decrease in plastic surgery search volume compared to California is not too surprising. Yet, the Surgical Demand Index ranks Wyoming as number one, 27 places higher than the Golden State.

Table 1
State-by-state characteristics on search volume, surgeons, and population.

Rank, Surgical Demand Index	State Name	Number of ASPs Surgeons	State Population	Surgical Density (Surgeons per 10,000 people)	Google Relative Search Volume	Surgical Demand Index(Google RSV/Surgeons per 10,000 people)
1	Wyoming	3	584,153	0.051	61	1187.778
2	Oklahoma	32	3878,051	0.083	82	993.751
3	Arkansas	21	2966,369	0.071	69	974.664
4	New Mexico	19	2085,572	0.091	77	845.205
5	Alabama	52	4849,377	0.107	86	802.012
6	Vermont	5	626,562	0.080	64	801.999
7	North Carolina	125	9943,964	0.126	91	723.921
8	Iowa	30	3107,126	0.097	69	714.639
9	Montana	11	1023,579	0.107	76	707.200
10	West Virginia	18	1850,326	0.097	66	678.453
11	Maine	13	1330,089	0.098	64	654.813
12	Mississippi	36	2994,079	0.120	78	648.717
13	Indiana	69	6596,855	0.105	66	631.004
14	Washington	90	7061,530	0.127	80	627.692
15	South Carolina	65	4832,482	0.135	84	624.505
16	Nevada	39	2839,099	0.137	85	618.778
17	Hawaii	23	1419,561	0.162	95	586.340
18	Louisiana	62	4649,676	0.133	78	584.959
19	Idaho	19	1634,464	0.116	66	567.761
20	Minnesota	75	5457,173	0.137	76	552.994
21	Kentucky	57	4413,457	0.129	71	549.746
22	Texas	419	26,956,958	0.155	84	540.426
23	Georgia	156	10,097,343	0.154	83	537.230
24	Pennsylvania	194	12,787,209	0.152	81	533.899
25	Michigan	135	9909,877	0.136	72	528.527
26	South Dakota	11	853,175	0.129	68	527.417
27	Wisconsin	71	5757,564	0.123	65	527.101
28	California	755	38,802,500	0.195	100	513.940
29	Ohio	159	11,594,163	0.137	70	510.435
30	Tennessee	103	6549,352	0.157	79	502.329
31	Missouri	91	6063,589	0.150	74	493.083
32	Rhode Island	15	1055,173	0.142	70	492.414
33	Nebraska	23	1881,503	0.122	60	490.827
34	Arizona	117	6731,484	0.174	84	483.286
35	Alaska	9	736,732	0.122	58	474.783
36	Colorado	87	5355,866	0.162	73	449.400
37	Massachusetts	125	6745,408	0.185	81	437.102
38	New Jersey	179	8938,175	0.200	87	434.425
39	New York	428	19,746,227	0.217	94	433.679
40	Florida	438	19,893,297	0.220	95	431.476
41	Kansas	46	2904,021	0.158	68	429.290
42	New Hampshire	22	1326,813	0.166	70	422.168
43	Maryland	123	5976,407	0.206	84	408.145
44	Delaware	17	935,614	0.182	73	401.764
45	Utah	53	2942,902	0.180	72	399.790
46	North Dakota	13	739,482	0.176	68	386.806
47	Illinois	259	12,880,580	0.201	73	363.043
48	Connecticut	75	3596,677	0.209	74	354.872
49	Virginia	135	8326,289	0.162	52	320.716
50	Oregon	57	3970,239	0.144	38	264.683

Generalizability

Plastic Surgeons have never been strangers to the internet, and these data show that the public have not been strangers to us. As has been shown with other specialties, the number of plastic surgeons utilizing this platform for personal curiosity, professional decisions, and research queries is sure to rise.

Declaration of Competing Interest

The authors have no financial or personal relationships to disclose.

Financial Disclosure Statement

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