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## QUESTION 5

# "Web is our Home Doctor": Analysis on how people per countries use the web search for their health concerns

### ABSTRACT - CASE ANALYSIS:

As search engines continue to improve and get more precise and more aware of what a keyword is linked with, people think of it as an easy of "answers" to their questions. Usually, these questions are about topics that are out of the territory for the individual that is looking for the answers.

It has been observed, that one of the most usual cases when an individual searches for important information is when a health concern has arrived. Most of us, when we feel a weird or continuous pain, a headache, when we bump out something we are searching on the internet what that might be and how to overcome it. Furthermore, we might be diagnosed with something and again, we do not ask our doctor all the questions we have about it, we prefer to search on our own on the web for some answers. Another instance, is that there are people in some countries that they do not afford to pay a doctor for a diagnosis, or they might do not afford the treatment and try to find solutions, or "alternative" solutions on the web.

Considering all the above, it is an engrossing subject of interest and research, how people worldwide use these search keys, what answers they seek and what does the popularity of these words mean, for the way these people face their health concerns – issues.

### DATA SOURCE:

We are using a dataset from Google Trends, parameterized to serve our analysis purpose. It combines the search terms : ' diagnosis', 'prevention', 'symptoms', 'diseases', 'treatment', from 01/01/04 till 11/18/19 based on health category from worldwide web search. The countries (in continent groups) tested are:

#### America:

Jamaica  
United States  
Canada  
Mexico

#### Oceania:

Australia  
New Zealand

#### Africa:

South Africa ( the southernmost country on the African continent)  
Ghana  
Nigeria  
Egypt

Kenya

**Europe:**

Ireland  
United Kingdom  
Netherlands  
Spain  
Germany  
France

**Asia:**

Philippines  
Singapore  
United Arab Emirates  
Pakistan  
India  
Malaysia  
Hong Kong  
Saudi Arabia  
Thailand  
Indonesia  
Japan

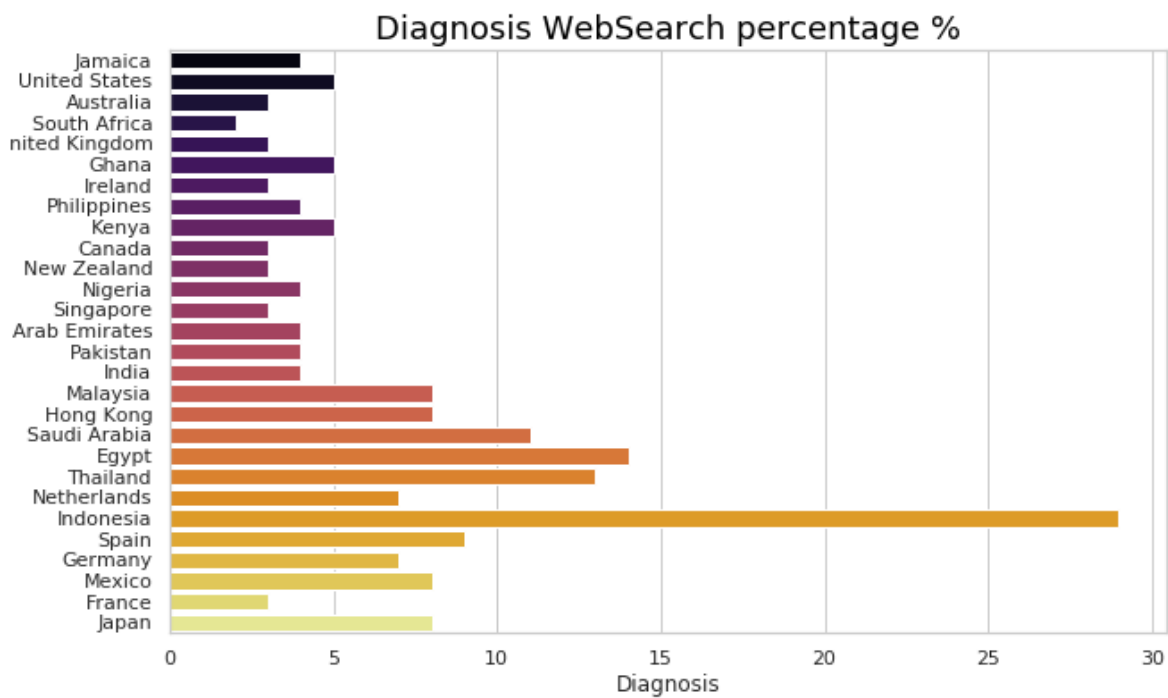
**SPECIFYING QUERIES:**

Our analysis answers the following questions:

- which are the most popular search keys among these specific words per country
- which are the most popular search keys among these specific words in all the studied countries such as 'diagnosis', 'prevention', 'symptoms', 'diseases', 'treatment'
- how strongly are those words correlated, testing every couple.

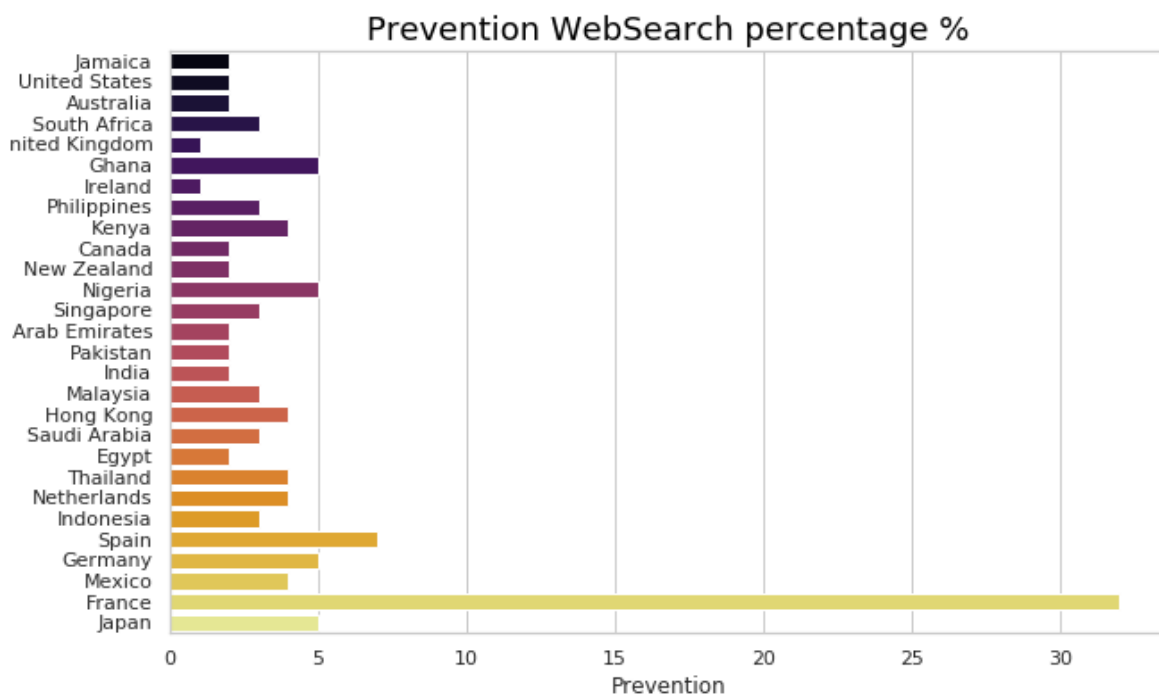
## RESULTS: Popularity among SearchKeys per Country

### Diagnosis WebSearch percentage % per Country Barplot



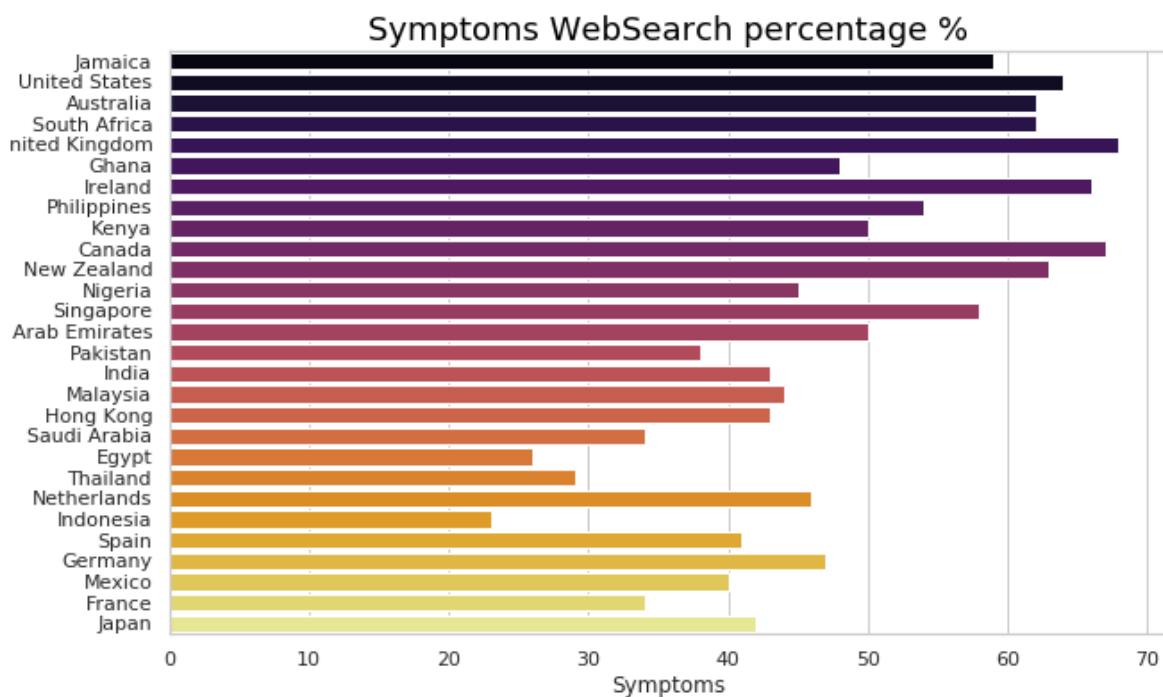
- Percentages are really low, most of them under 15%
- Indonesia is the peak country which searches for diagnosis online.
- South Africa is the least country on the ranking.

### Prevention WebSearch percentage % per Country Barplot



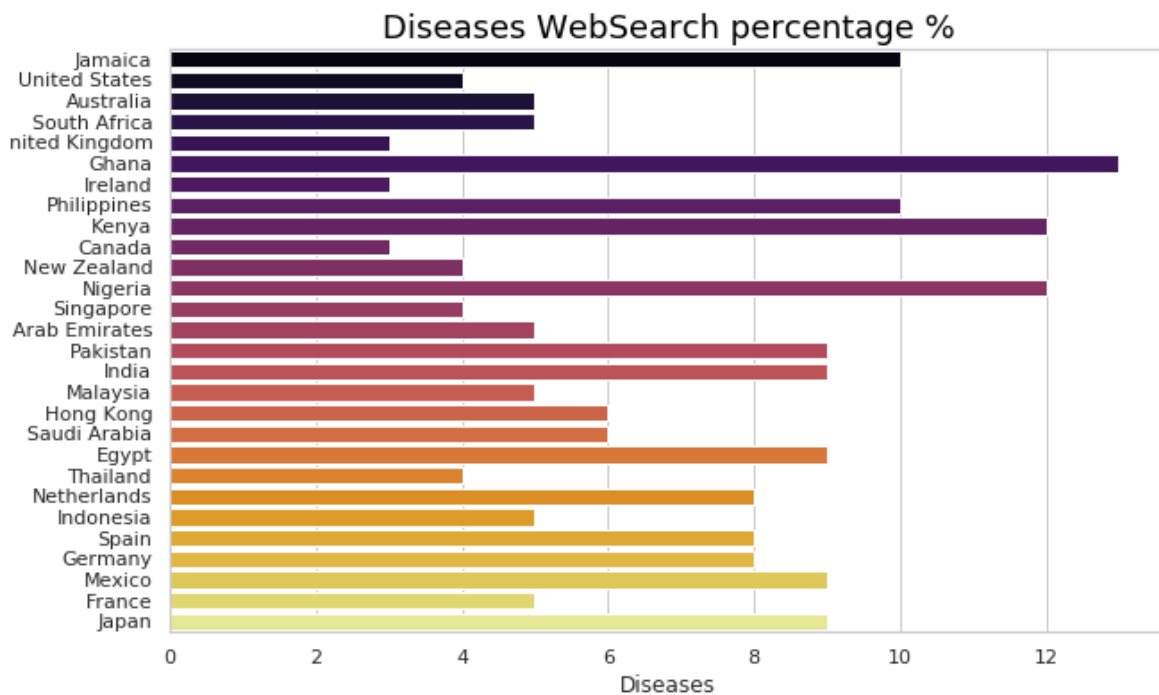
- Percentages are really low, most of them under 7%, that is, sad fact because prevention is more important in order to be healthier.
- France, is by far the first country on the list with a high divergence from the other, thus french people are looking for ways to prevent health issues to arise.
- Surprisingly, two Europe continent countries hit the last place, UK and Ireland. Note that UK and Ireland used to be the same country back in the years, hence, they might share the same mentality.

Symptoms WebSearch percentage % per Country Barplot



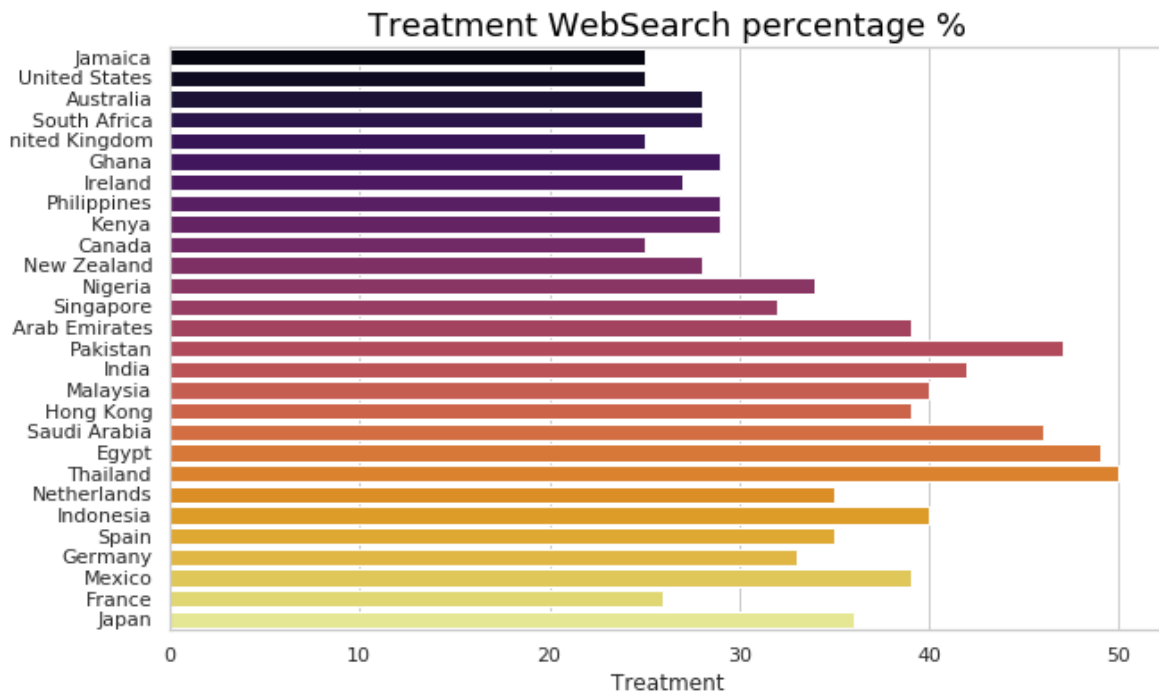
- Percentages are really high, there is a tendency for checking symptoms for health issues.
- UK in this plot comes first, with a small deviance from Canada and Ireland. Again, UK and Ireland share the same attitude towards health concerns.
- Indonesia is the last country that checks for symptoms.

Diseases WebSearch percentage % per Country Barplot



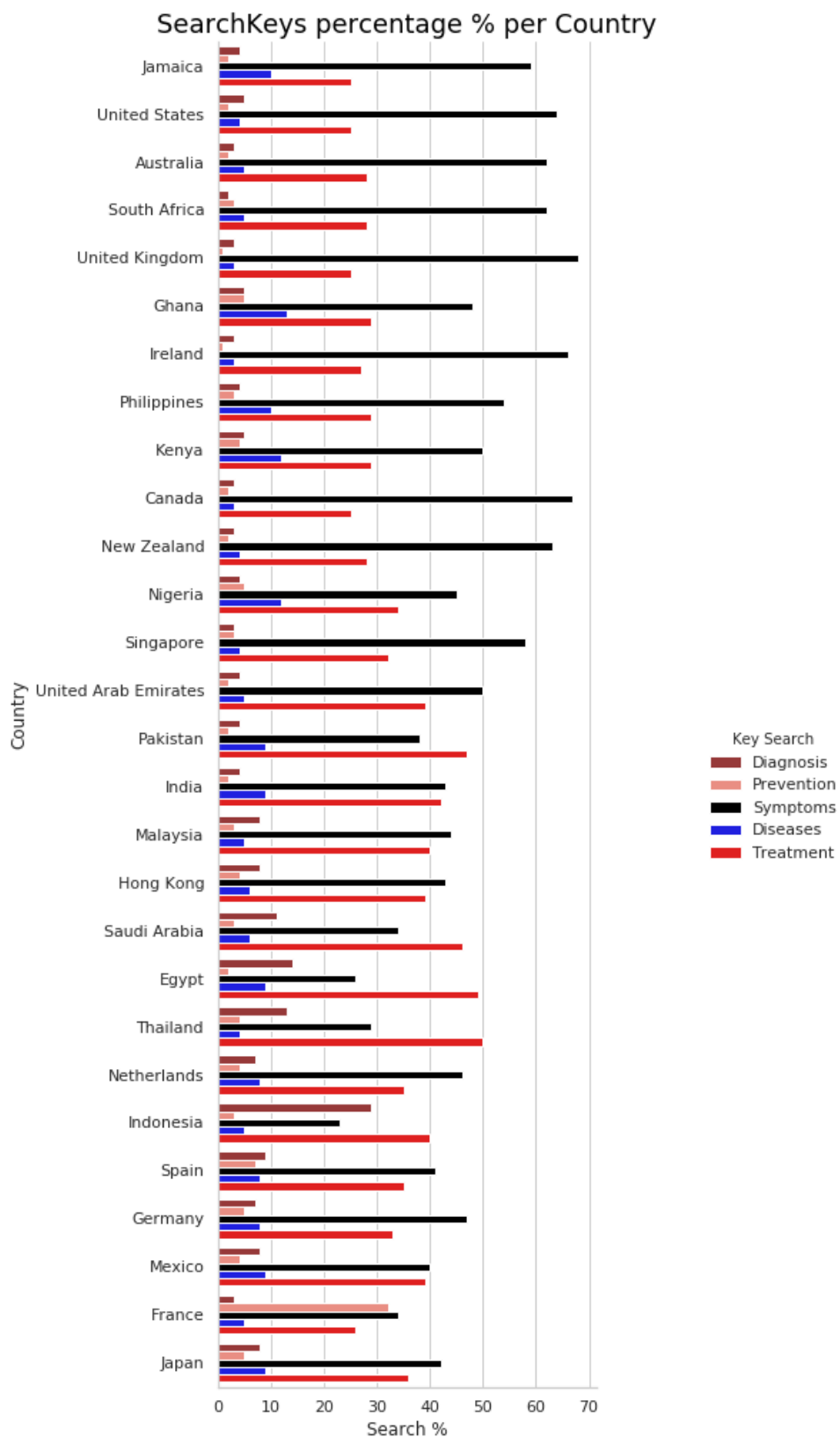
- The percentages are ranging from 3% - 13%.
- Ghana, Kenya and Nigeria (three Africa continent countries) have the first three positions in the "diseases" race.
- UK, Ireland, Canada (again) are the last three countries in the list.

Treatment WebSearch percentage % per Country Barplot



- Rates are moderate, they scale from 25% - 50%
- Thailand searches more about treatment solutions on the web, with Egypt coming second and Pakistan third.
- Lowest rates on treatment searches have Jamaica, USA, UK, Canada.

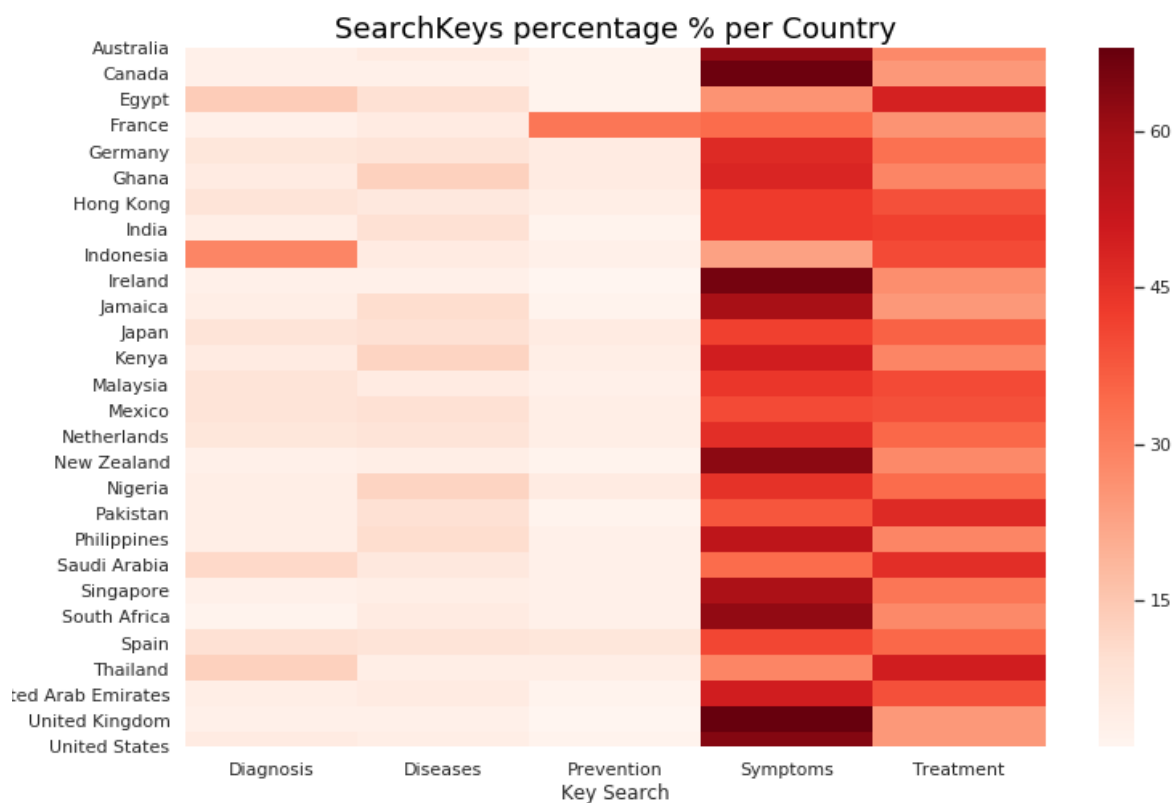
SearchKeys percentage % per Country Barplot



### SearchKeys percentage % per Country Barplot

- UK's, Ireland's and Canada's searches are similar. They are the top-3 of symptoms searches countries and they rank the last-3 in prevention, diseases and treatment. They have identical profile towards the way they use the web for their health concerns, that is they are worried to check if they have any symptoms rather than find ways to prevent them, or get to know in general the diseases that exist. Moreover, they are not looking for treatments online.
- Indonesia on the other hand, is the country that mostly seeks diagnosis via internet and is the last country that cares about the symptoms. They try to use web as their "home doctor". It seems that they do not get worried when they have symptoms until it is high time to figure out what they have.
- Thailand, Egypt and Pakistan are the top countries for the treatment search. They look for therapies through the internet. Reasons might be that they cannot afford a doctor diagnosis, that is why also their ratings on diagnosis keysearch is moderate to high comparatively with other countries.
- Note that, the only country that cares about preventing a health issue is France, which shows a rightful mindset towards health concerns.

### SearchKeys percentage % per Country Heatmap



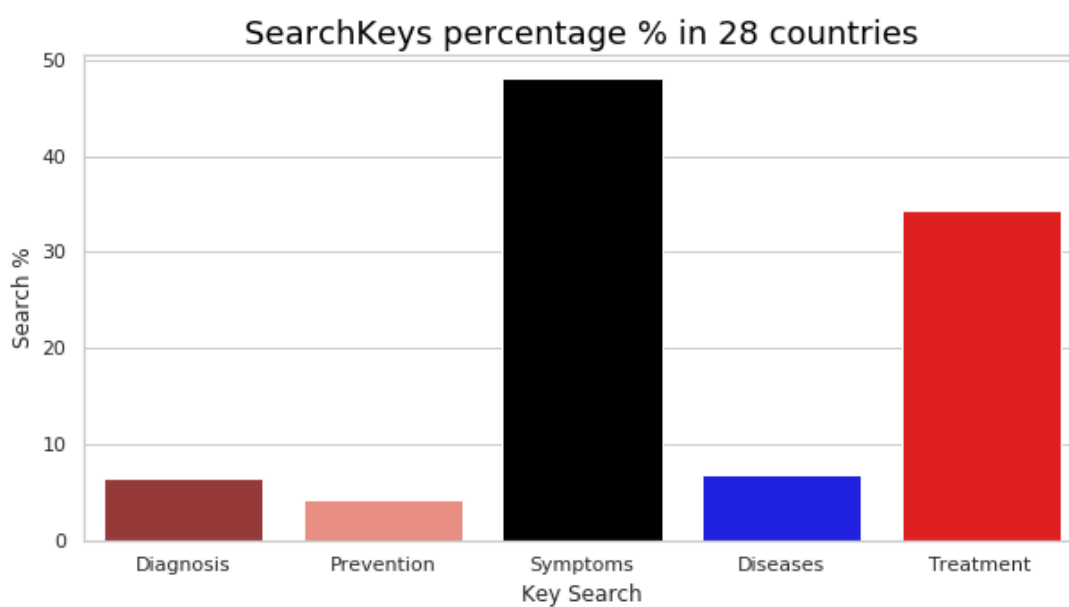
Heatmap visualizes in a better way our statements that we mentioned above



- Symptoms is the most popular search key as see for many countries
- Prevention is the word that is the least popular.

### RESULTS: Popularity among SearchKeys in all studied Countries

SearchKeys percentage % in 28 countries Barplot

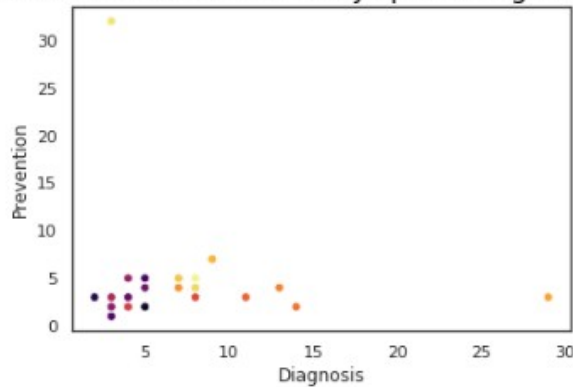


- Symptoms in all countries is the most popular search with almost 50% rate.
- Treatment comes second.
- Diagnosis and diseases share the third place.
- Prevention comes last.

## RESULTS: Correlation between SearchKeys per Country

### Diagnosis – Prevention SearchKeys percentage % Scatterplot

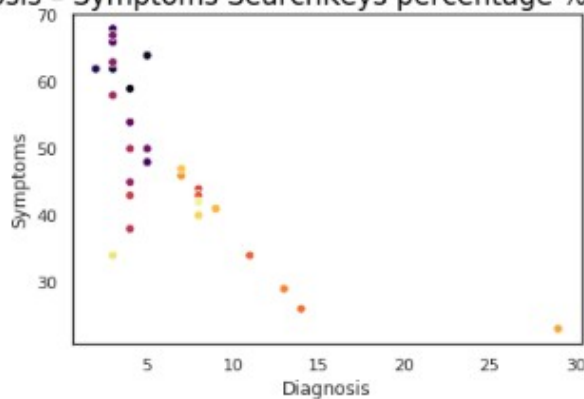
#### Diagnosis – Prevention SearchKeys percentage % correlation



- There is a positive correlation between diagnosis and prevention search keys.
- Data points are clustered in the left down corner, thus, percentages are low, but still correlated.

### Diagnosis – Symptoms SearchKeys percentage % Scatterplot

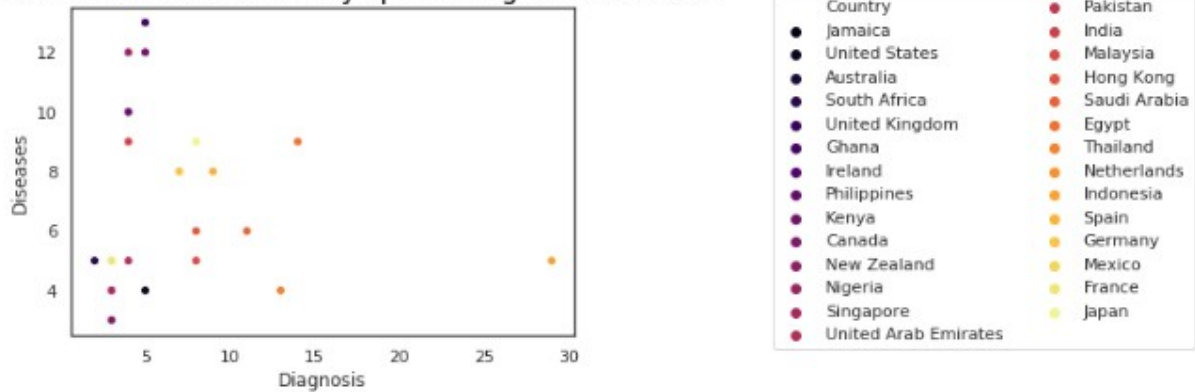
#### Diagnosis – Symptoms SearchKeys percentage % correlation



- There is a strong negative linear correlation between them.
- As diagnosis rate increases, symptoms rate decreases.

### Diagnosis – Diseases SearchKeys percentage % Scatterplot

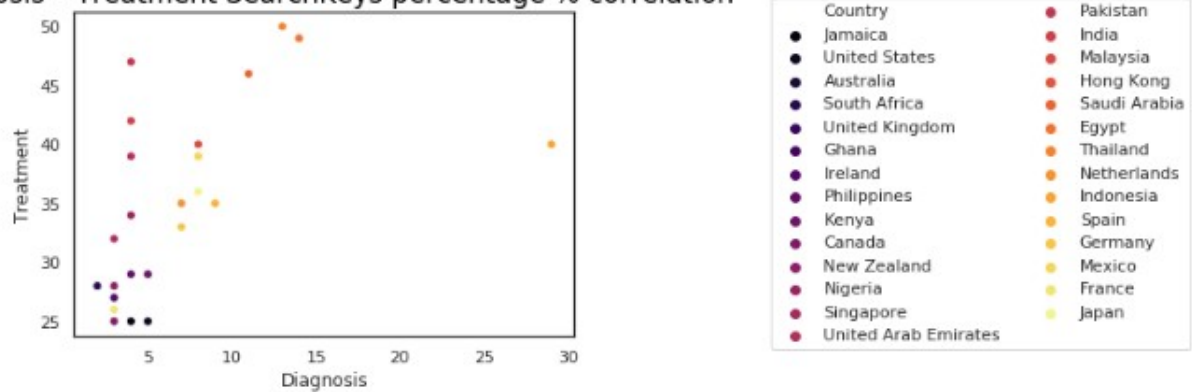
Diagnosis – Diseases SearchKeys percentage % correlation



- It seems that there is no correlation between those two searchkeys.

### Diagnosis – Treatment SearchKeys percentage % Scatterplot

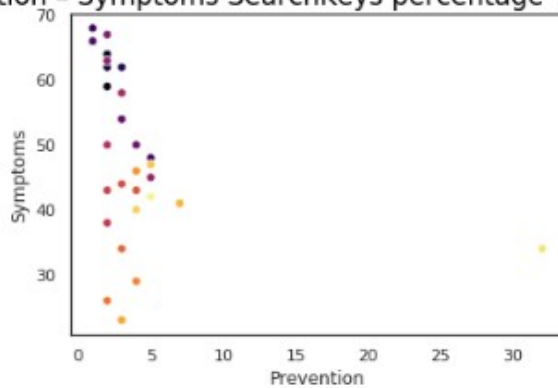
Diagnosis – Treatment SearchKeys percentage % correlation



- It seems that there is somehow a positive correlation between them but sparse.

### Prevention – Symptoms SearchKeys percentage % Scatterplot

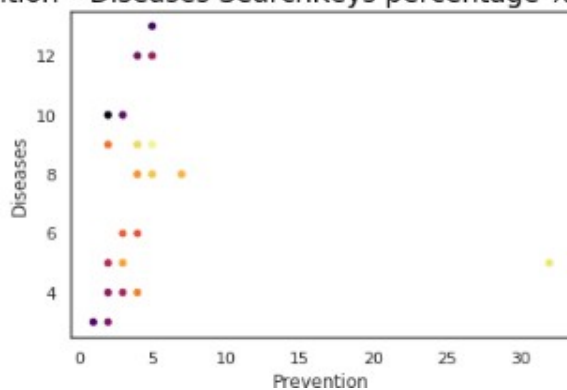
Prevention – Symptoms SearchKeys percentage % correlation



- There is a negative steep correlation.
- As prevention rates increase, symptoms rate search falls.

### Prevention – Diseases SearchKeys percentage % Scatterplot

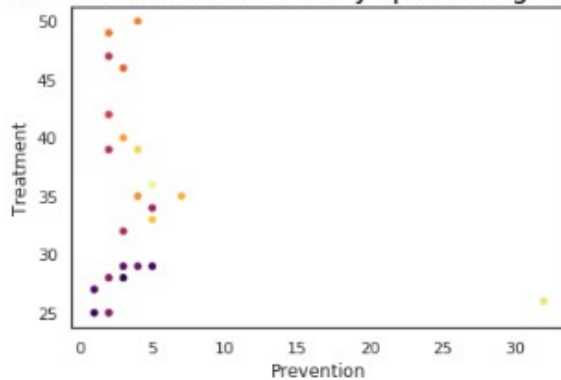
Prevention – Diseases SearchKeys percentage % correlation



- There is no correlation.
- However, if we take a careful look, there are pairs of countries that share the same level of rates for diseases searchkey.

### Prevention - Treatment SearchKeys percentage % Scatterplot

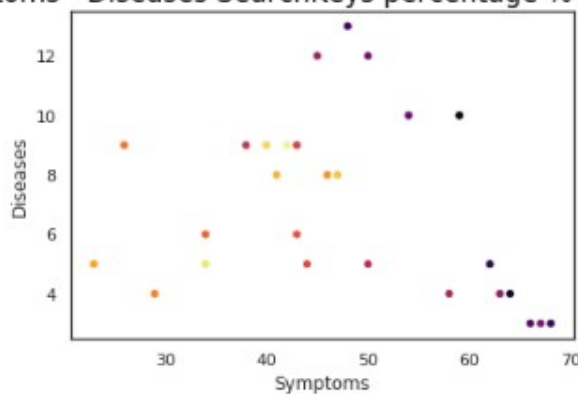
Prevention - Treatment SearchKeys percentage % correlation



•It seems that there is no correlation.

### Symptoms - Diseases SearchKeys percentage % Scatterplot

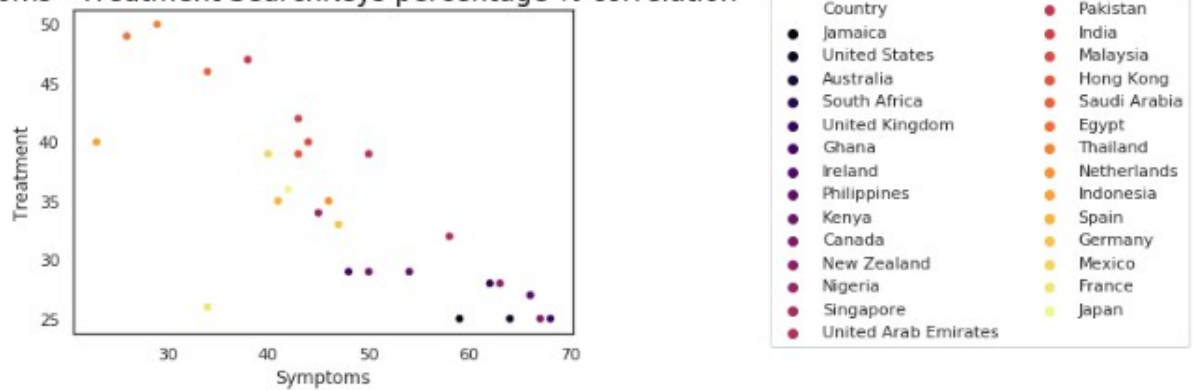
Symptoms - Diseases SearchKeys percentage % correlation



•It seems that there is no correlation.

### Symptoms - Treatment SearchKeys percentage % Scatterplot

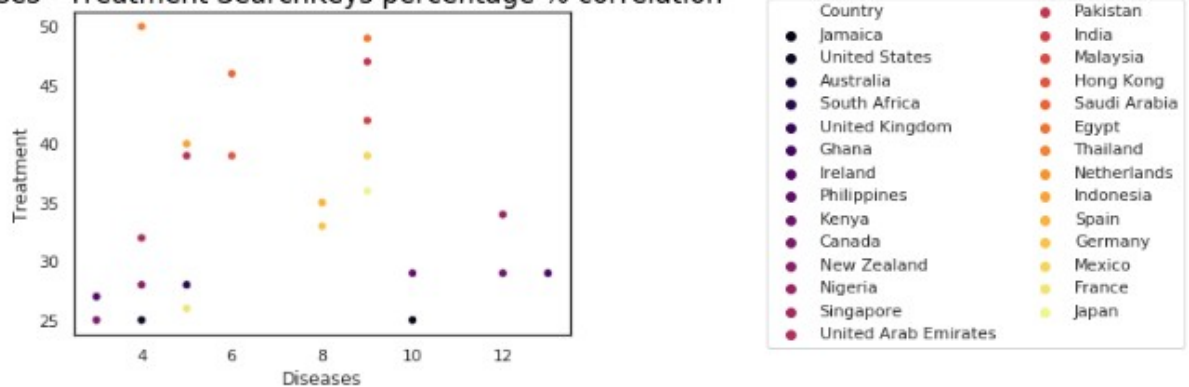
Symptoms - Treatment SearchKeys percentage % correlation



- There is a strong negative linear correlation.
- Those who look for treatment they are not searching for symptoms.

### Diseases - Treatment SearchKeys percentage % Scatterplot

Diseases - Treatment SearchKeys percentage % correlation



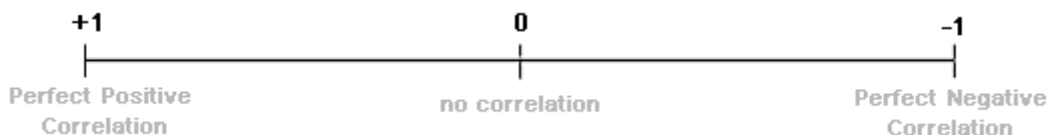
- It seems that there is no correlation.

## Pearsons Correlation Coefficient Formula and Results

Strength of Association	Positive	Negative
Small	.1 to .3	-0.1 to -0.3
Medium	.3 to .5	-0.3 to -0.5
Large	.5 to 1.0	-0.5 to -1.0

	Diagnosis	Prevention	Symptoms	Diseases	Treatment
Diagnosis	1.000000	-0.073960	-0.721034	-0.016840	0.549346
Prevention	-0.073960	1.000000	-0.310900	0.005633	-0.163557
Symptoms	-0.721034	-0.310900	1.000000	-0.307983	-0.799743
Diseases	-0.016840	0.005633	-0.307983	1.000000	0.133249
Treatment	0.549346	-0.163557	-0.799743	0.133249	1.000000

## Spearman's Correlation Coefficient Formula and Results



	Diagnosis	Prevention	Symptoms	Diseases	Treatment
Diagnosis	1.000000	0.400112	-0.744309	0.330904	0.709854
Prevention	0.400112	1.000000	-0.501147	0.443284	0.205604
Symptoms	-0.744309	-0.501147	1.000000	-0.377302	-0.816212
Diseases	0.330904	0.443284	-0.377302	1.000000	0.286078
Treatment	0.709854	0.205604	-0.816212	0.286078	1.000000

### CONCLUSIONS:

Taking into account these two correlation coefficient formulas we come to the conclusions that indeed there is a large positive correlation between “diagnosis” and “treatment” rates which means that most of the people tend to search for **what** they have based on their assured symptoms and **how** to cure it. Furthermore, there is a large negative correlation between “diagnosis” and “symptoms” and also “symptoms” and “treatment” which shows the different approach to health concerns. Symptoms are early-stage of concern phase, whereas diagnosis and treatment are in a later-stage, after you are already convinced that you definitely have some symptoms. There is also a medium negative relation between “prevention” and “symptoms”, hence, people who are curious to learn how to prevent themselves from bad health conditions are not the ones who have the symptoms. Those who are looking for the symptoms do not care that much about the prevention methods.

In general, our analysis points out that there countries that share the same mindset based on their geographical region. What they search reveals their attitude towards health, how they prefer to deal with their condition or what they are curious to learn. These keywords correlation, show also how is their attitude, and we managed to translate it.