

Data Analytics Bootcamp
Project 1

The Impact of Covid-19 on Well-being of Healthcare Professionals in India

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Problem Overview

How has the COVID-19 pandemic impacted the overall well-being of healthcare professionals in India?



Questionnaire completed by 237 respondents in the month of June, 2020

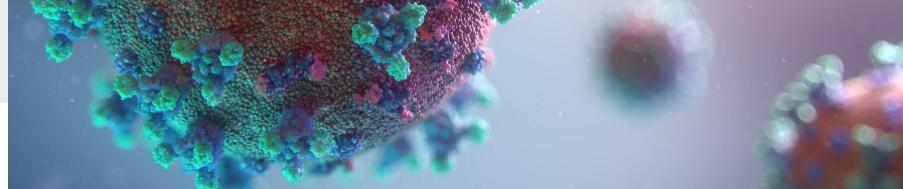
Survey Objectives:

- Assess the suitability of the CAS and OCS questionnaires for employed Indian healthcare professionals
- Examine the effect of COVID-19 anxiety, obsession with COVID-19, and work engagement on mental health at work among employed Indian healthcare professionals.
- Which demographic variables impacted COVID-19 anxiety.

Primary Data Source: Well-being of Healthcare Professionals in India

Data Element	Example
Timestamp	Date/Time of Survey Response
Demographic	Age Range, Marital Status, Location, Education, Gender, Job Function
Categorical	Not at all, Rare, Sometimes, Often, Very Often, Always
Likert Scale	1-5 (5 assumed to be the highest)
Binary	Yes/No
Multi-Select	Comma Separated
Free Hand Entry (optional)	"Please wash hands 20 times"

COVID-19 India Datasets



- The second dataset is a time series analysis on the confirmed covid cases, recoveries, and deaths in India.

COVID CASES DATASETS

```
[268] state_level_df.head()
```

✓ 0.0s

Python

...	State	Confirmed	Recovered	Deaths	Active	Last_Updated_Time	Migrated_Other	State_code	Delta_Confirmed	Delta_Recovered	Delta_Deaths	State_Notes
0	Total	2025409	1377384	41638	605933	06/08/2020 23:46:37	454	TT	0	0	0	NaN
1	Maharashtra	479779	316375	16792	146305	06/08/2020 20:42:51	307	MH	0	0	0	307 cases are marked as non-covid deaths in MH...
2	Tamil Nadu	279144	221087	4571	53486	06/08/2020 19:44:47	0	TN	0	0	0	[July 22]: 444 backdated deceased entries added...
3	Delhi	141531	127124	4059	10348	06/08/2020 18:39:45	0	DL	0	0	0	[July 14]: Value for the total tests conducted...
4	Karnataka	158254	80281	2897	75067	06/08/2020 21:19:51	9	KA	0	0	0	NaN

```
[270] complete_df.head()
```

✓ 0.0s

Python

...	Date	State	Latitude	Longitude	Total Confirmed cases	Death	Cured/Discharged/Migrated	New cases	New deaths	New recovered
0	2020-01-30	Kerala	10.8505	76.2711	1.0	0	0.0	0	0	0
1	2020-01-31	Kerala	10.8505	76.2711	1.0	0	0.0	0	0	0
2	2020-02-01	Kerala	10.8505	76.2711	2.0	0	0.0	1	0	0
3	2020-02-02	Kerala	10.8505	76.2711	3.0	0	0.0	1	0	0
4	2020-02-03	Kerala	10.8505	76.2711	3.0	0	0.0	0	0	0



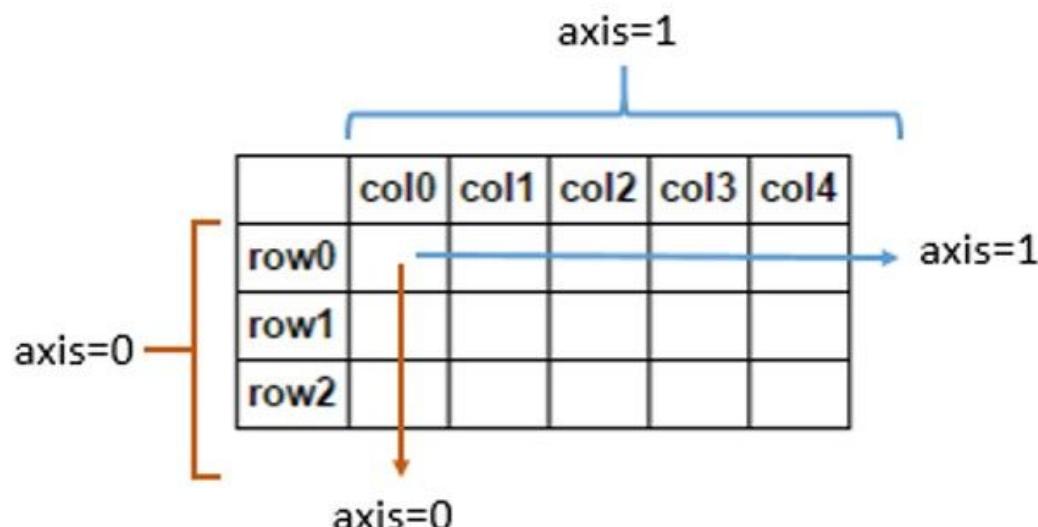
Data Cleaning

- Main cleaning for “Well-being of Healthcare Professionals in India” dataset
 - Questionnaire / survey style dataset (240 rows) x (60 columns)

<u>Issues</u>	<u>Solutions</u>
Encoding	“cp1252”
Custom Answers	Combine similar answers
Null Values	Slice out blank rows
Select all that apply question	Separate data into dataframe of dummy/indicator variables

Null Values

```
# Slice out rows that have more than 30 NaN values (Did not answer more than half the questions)
# Keep rows where sum of NaN values for the row is less than or equal to 30
cleaned_df = cleaned_df.loc[cleaned_df.isna().sum(axis=1)<=30,:]
```



Select all that apply question

A	B	C
1	During the COVID-19 lockdown, I have received support from (you can select more than one answer)	
2	0 Wife/Husband, Children, Friends	
3	1 Wife/Husband, Friends	
4	2 Wife/Husband, Friends	
5	3 Wife/Husband	
6	4 Wife/Husband, Children, Father and/Mother, Brother/ Sister, Friends, Extended family (relatives)	
7	5 Wife/Husband, Children	
8	6 Wife/Husband, Father and/Mother	
9	7 Wife/Husband, Children, Friends	
10	8 Wife/Husband, Children	
11	9 Children, Colleagues	
12	10 Wife/Husband, Children, Friends	
13	11 Wife/Husband	
14	12 Wife/Husband, Children	
15	13 Wife/Husband, Children, Friends	
16	14 Brother/ Sister	
17	15 Wife/Husband, Father and/Mother, Friends	
18	16 Wife/Husband, Father and/Mother, Friends	
19	17 Wife/Husband	
20	18 Wife/Husband, Children, Brother/ Sister, Extended family (relatives)	
21	19 Wife/Husband	
22	20 Wife/Husband, Children, Father and/Mother, Brother/ Sister, Friends, Extended family (relatives)	
23	21 Wife/Husband, Father and/Mother, Brother/ Sister, Landlord, Friends, Extended family (relatives), police ,municipality ,medical college	
24	22 Extended family (relatives)	
25	23 Wife/Husband, Brother/ Sister, Friends	
26	24 Wife/Husband	
27	25 Wife/Husband, Children, Father and/Mother, Brother/ Sister	
28	26 Wife/Husband, Children, Father and/Mother, My institute ICMR-RMRIMS	
29	27 Wife/Husband, Father and/Mother	
30	28 Wife/Husband, Father and/Mother, Friends	
31	29 Wife/Husband	
32	30 Wife/Husband, Children, Father and/Mother, Brother/ Sister, Friends, Extended family (relatives)	
33	31 Wife/Husband	
34	32 Wife/Husband, Children, Brother/ Sister, Friends, Extended family (relatives)	
35	33 Wife/Husband, Children, Friends	
36	34 Wife/Husband, Children, Father and/Mother, Brother/ Sister, Extended family (relatives)	
37	35 Wife/Husband	
38	36 Wife/Husband, Children, Father and/Mother, Brother/ Sister, Landlord, Friends, Extended family (relatives)	

Separate into DF of dummy/indicator variables

```
social_support_series = cleaned_df["During the COVID-19 lockdown, I have received support from (you can select  
more than one answer)"]  
social_support_df = social_support_series.str.get_dummies(sep=", ")
```

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Brother/ Sister	Children	Colleagues	Extended family (relatives)	Father and/Mother	Feoncy	Friends	Landlord	MD of my Hospital	My institute ICMR-RMRIMS	Nil	Not working as Healthcare	Self	Wife/Husband	colleagues	police ,municipality ,medical college	
2	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0
3	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
4	2	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
6	4	1	1	0	1	1	0	1	0	0	0	0	0	0	1	0	0
7	5	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
8	6	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
9	7	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0
10	8	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
11	9	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12	10	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0

Q1: How HCW feel about their jobs by geolocation?

Datasets: Research and Covid Cases

APIs: openweathermap

Plots: Horizontal Bars, Scatter, Boxplot

Regressions: Linear, 2nd and 3rd degrees

Q1 Data Engineering (Cases & Mapping 1)

1. Merged the two covid cases datasets, keeping the columns of interest only
2. Configured and plotted the map

1.

```
# Cleaning and joining
complete_df = complete_df.rename(columns={"Name of State / UT": "State"})

coord_df = pd.merge(complete_df.groupby("State")["Latitude"].apply(lambda x: x[x.index.max()]),
                    complete_df.groupby("State")["Longitude"].apply(lambda x: x[x.index.max()]),
                    on="State")
```

[422] ✓ 0.0s

```
# group by
cases_df = state_level_df.groupby("State").agg({"Confirmed": "sum",
                                                "Recovered": "sum",
                                                "Deaths": "sum",
                                                "Active": "sum"
                                               })

cases_df = cases_df[["Confirmed", "Recovered", "Deaths", "Active"]]
```

[423] ✓ 0.0s

```
# Merging and cleaning
state_cases_df = pd.merge(coord_df, cases_df, on="State", how="right")
state_cases_df = state_cases_df.dropna(how="any")
```

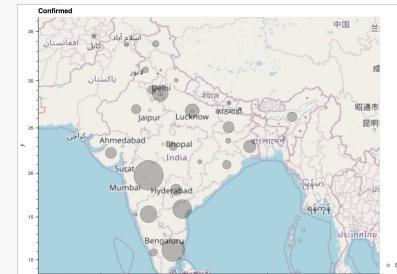
[424] ✓ 0.0s

```
# totals
total_confirmed = state_cases_df["Confirmed"].sum()
total_deaths = state_cases_df["Deaths"].sum()
total_active = state_cases_df["Active"].sum()
```

2.

```
# Configure the map
map_plot_2 = state_cases_df.hvplot.points(x="Longitude",
                                            y="Latitude",
                                            geo = True,
                                            tiles = "OSM",
                                            frame_width = 800,
                                            frame_height = 600,
                                            size="Deaths",
                                            scale=0.5,
                                            label="State",
                                            color="Deaths",
                                            cmap="Reds",
                                            alpha=0.5,
                                            hover_cols = ["State",
                                                          "Confirmed",
                                                          "Recovered",
                                                          "Active",
                                                          "Death_Rate"],
                                            title = "Deaths")
```

[442] ✓ 0.1s



Q1 Data Engineering (Death Rate)

Added a column Death Rate = Confirmed Cases / Death

```
for index, row in state_cases_df.iterrows():

    state_cases_df.loc[index,"%_Confirmed_Country"] = int(row["Confirmed"]/total_confirmed*100
    state_cases_df.loc[index,"%_Deaths_Country"] = int(row["Deaths"]/total_deaths*100
    state_cases_df.loc[index,"%_Active_Country"] = int(row["Active"]/total_active*100
    state_cases_df.loc[index,"Death_Rate"] = int(row["Deaths"])/int(row["Confirmed"])*100

    state_cases_df[%_Confirmed_Country] = state_cases_df[%_Confirmed_Country].map("{:.1f}%".format)
    state_cases_df[%_Deaths_Country] = state_cases_df[%_Deaths_Country].map("{:.1f}%".format)
    state_cases_df[%_Active_Country] = state_cases_df[%_Active_Country].map("{:.1f}%".format)

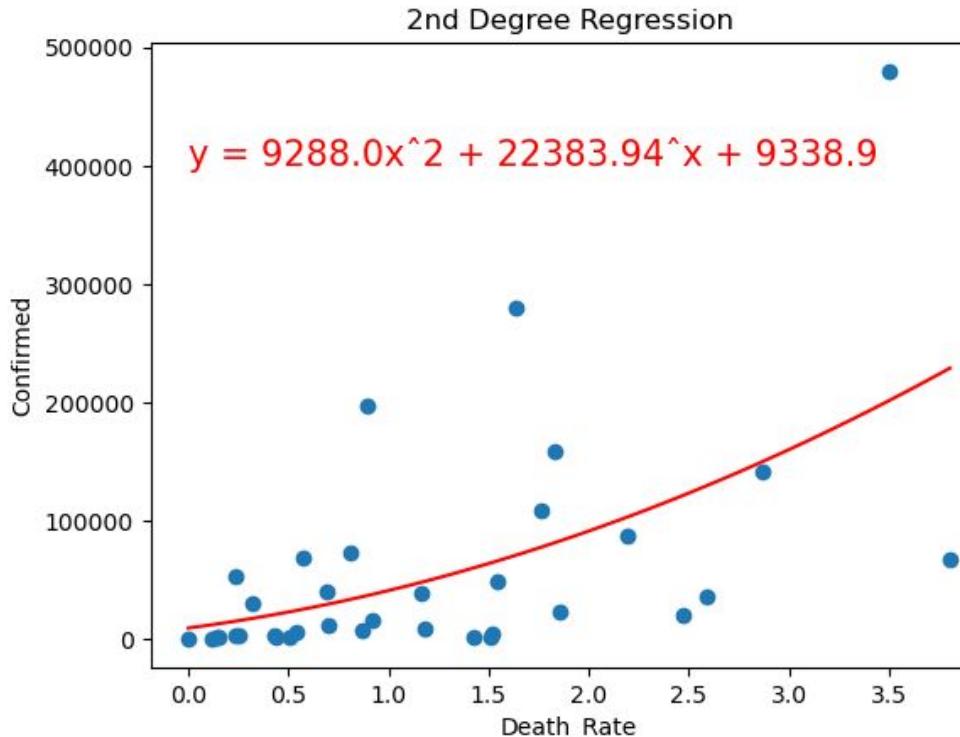
[425] ✓ 0.0s
```

...	Latitude	Longitude	Confirmed	Recovered	Deaths	Active	%_Confirmed_Country	%_Deaths_Country	%_Active_Country	Death_Rate
State										
Andaman and Nicobar Islands	11.7401	92.6586	1123	355	16	752	0.1%	0.0%	0.1%	1.424755
Andhra Pradesh	15.9129	79.7400	196789	112870	1753	82166	9.7%	4.2%	13.6%	0.890802
Arunachal Pradesh	28.2180	94.7278	1948	1245	3	700	0.1%	0.0%	0.1%	0.154004
Assam	26.2006	92.9376	52818	37225	126	15464	2.6%	0.3%	2.6%	0.238555
Bihar	25.0961	85.3131	68148	43820	388	23939	3.4%	0.9%	4.0%	0.569349

Q1 Results and Conclusions (1):

Confirmed Cases vs Death Rate

The higher the number of cases, even higher the Death Rate



Q1 Data Engineering (Positiveness)

1. Selected the columns related to "How HCW feel about their jobs"
2. Grouped by State
3. Created a Positiveness Score [Positiveness Score = Positive Emotions (average) - Negative Emotions (average)]

1.

```
feel = []

for col in research_df.columns:
    if "feel_" in col:
        feel.append(col)

# Defined negative and positive feelings

neg_feel = ['feel_angry',
            'feel_anxious',
            'feel_bored',
            'feel_depressed',
            'feel_discouraged',
            'feel_disgusted',
            'feel_fatigued',
            'feel_frightened',
            'feel_furious',
            'feel_gloomy']

pos_feel = ['feel_at_ease',
            'feel_calm',
            'feel_content',
            'feel_ecstatic',
            'feel_energetic',
            'feel_enthusiastic',
            'feel_excited',
            'feel_inspired',
            'feel_relaxed',
            'feel_satisfied']
```

2.

```
# Feels by State

feel_state_df = research_df[feel].copy().astype("float")
feel_state_df = research_df[["state"]].join(feel_state_df)
feel_state_df = feel_state_df.dropna(how="any")

feel_state_df = feel_state_df.groupby("state").median()

feel_state_df.head()
```

[417] ✓ 0.0s

state	feel_angry	feel_anxious	feel_at_ease	feel_bored	feel_fatigued
Andhra Pradesh	2.0	2.0	3.0	1.0	2.0
Arunachal Pradesh	1.0	1.0	5.0	1.0	1.0
Assam	2.0	1.0	5.0	1.0	1.0
Bihar	2.0	2.0	4.0	1.5	2.0
Chandigarh	2.0	3.0	4.0	2.0	2.0

3.

```
neg_feel_state_df = pd.DataFrame(feel_state_df[neg_feel].mean(axis=1),columns=["neg_feel"])
pos_feel_state_df = pd.DataFrame(feel_state_df[pos_feel].mean(axis=1),columns=["pos_feel"])

feel_state_df = pd.merge(
    pd.merge(feel_state_df,
            neg_feel_state_df,on="state"),
            pos_feel_state_df,on="state")

# Defined overall feeling score as the diff between positive and negative scores

feel_state_df["score_overall"] = feel_state_df["pos_feel"]-feel_state_df["neg_feel"]

overall_df = feel_state_df[["neg_feel","pos_feel","score_overall"]]
overall_df
```

[418] ✓ 0.0s

state	neg_feel	pos_feel	score_overall
Andhra Pradesh	1.70	3.50	1.80
Arunachal Pradesh	1.40	5.00	3.60
Assam	1.30	4.80	3.50
Bihar	1.35	3.90	2.55
Chandigarh	1.80	4.20	2.40
Chhattisgarh	1.30	2.30	1.00
Delhi	1.90	3.90	2.00
Gujarat	2.30	4.10	1.80
Jammu and Kashmir	1.50	2.95	1.45
Jharkhand	2.00	3.50	1.50
Karnataka	1.20	4.05	2.85
Madhya Pradesh	2.35	3.40	1.05
Maharashtra	1.15	3.55	2.40

Q1 Results and Conclusions (2):

Positiveness Score

In general, the responders feel positive about their jobs (Positiveness Score = 2.1)



```
# General Feels Score

print(f"Positive Score: {round(feel_job_df[pos_feel].mean(),1)}")
print(f"Negative Score: {round(feel_job_df[neg_feel].mean(),1)}")
print(f"Overall Score (pos-neg): {round(feel_job_df[pos_feel].mean()-feel_job_df[neg_feel].mean(),1)}")
```

[441]

✓ 0.0s

```
... Positive Score: 3.6
Negative Score: 1.6
Overall Score (pos-neg): 2.1
```

Q1 Data Engineering (Mapping 2)

1. Used OpenWeather API to retrieve the latitude and longitude by state
2. Configured the map



1.

```
# Save config information.  
url = "http://api.openweathermap.org/data/2.5/weather?"  
units = "metric"  
  
# Build partial query URL  
query_url = f"{url}appid={weather_key}&units={units}&q="  
  
# Loop through the list of research_states and perform a request for data on each  
for index, row in feel_state_df.iterrows():  
  
    try:  
        response = requests.get(query_url + str(index) + ",IN").json()  
        feel_state_df.loc[index, "longitude"] = response["coord"]["lon"]  
        feel_state_df.loc[index, "latitude"] = response["coord"]["lat"]  
        feel_state_df.loc[index, "temperature"] = response['main']['temp']  
  
    except:  
        response = requests.get(query_url + "Hyderabad" + ",IN").json()  
        feel_state_df.loc[index, "longitude"] = response["coord"]["lon"]  
        feel_state_df.loc[index, "latitude"] = response["coord"]["lat"]  
        feel_state_df.loc[index, "temperature"] = response['main']['temp']  
        pass
```

[420] ✓ 3.5s

2.

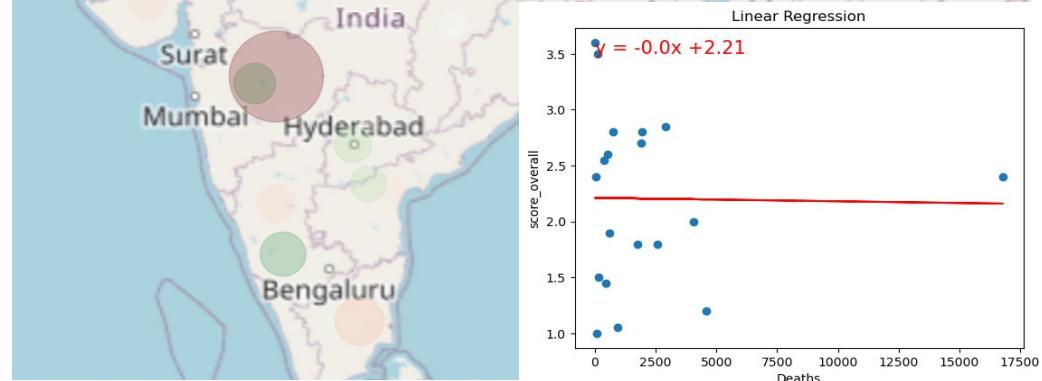
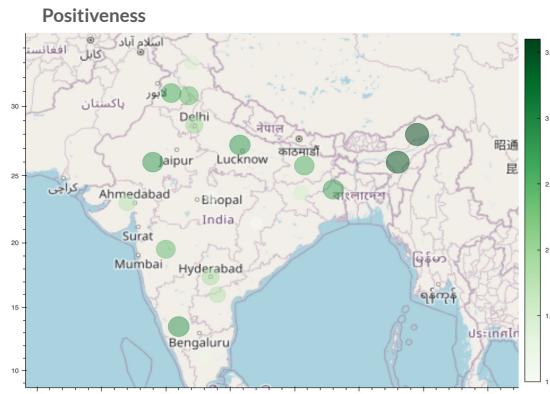
```
# Configure the map  
map_plot = feel_state_df.hvplot.points("longitude",  
                                         "latitude",  
                                         geo = True,  
                                         tiles = "OSM",  
                                         frame_width = 800,  
                                         frame_height = 600,  
                                         size="score_overall",  
                                         scale=20,  
                                         color="score_overall",  
                                         cmap="Greens",  
                                         alpha=0.5,  
                                         label="state",  
                                         title="Positiveness")  
  
# Display the map plot  
map_plot
```

[421] ✓ 0.1s

Q1 Results and Conclusions (3):

Positiveness Score vs Deaths

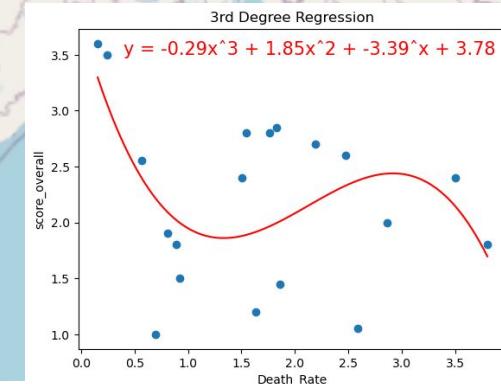
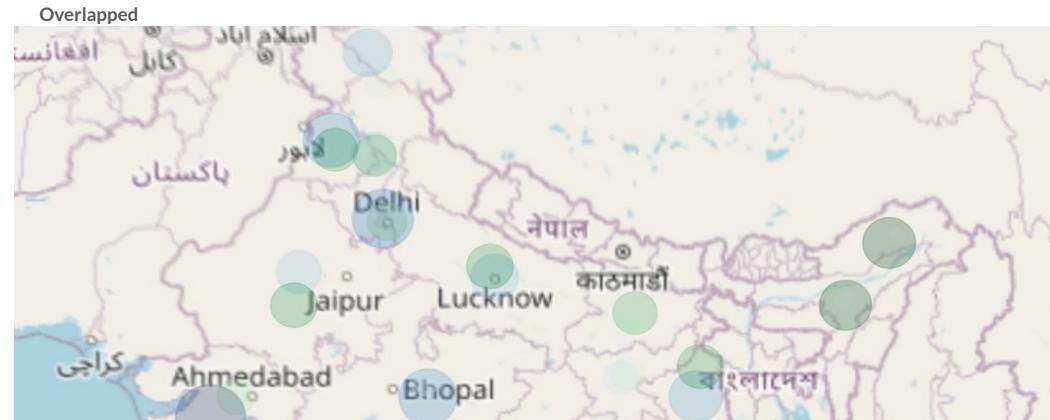
The correlation between the number of deaths and how HCW feel about their jobs is technically null ($r_{\text{test}} = 0.0002$)



Q1 Results and Conclusions (4):

Positiveness Score vs Death Rate

The correlation between the Death Rate and how HCW feel about their jobs is high ($r_value = 0.52$).



Q2: Is there a correlation between job function and anxiousness?

Expectation: Those on the floor had higher levels of anxiety compared to those in an administrative role

Chi-square Test

- H_0 : There is no association between the two categorical variables.
- H_a : There is an association between the two categorical variables.

Calculate Chi-Square statistic from contingency table

```
[7] test_statistic, p, dof, expected = st.chi2_contingency(contingency_table)
    test_statistic
    ✓ 0.0s
```

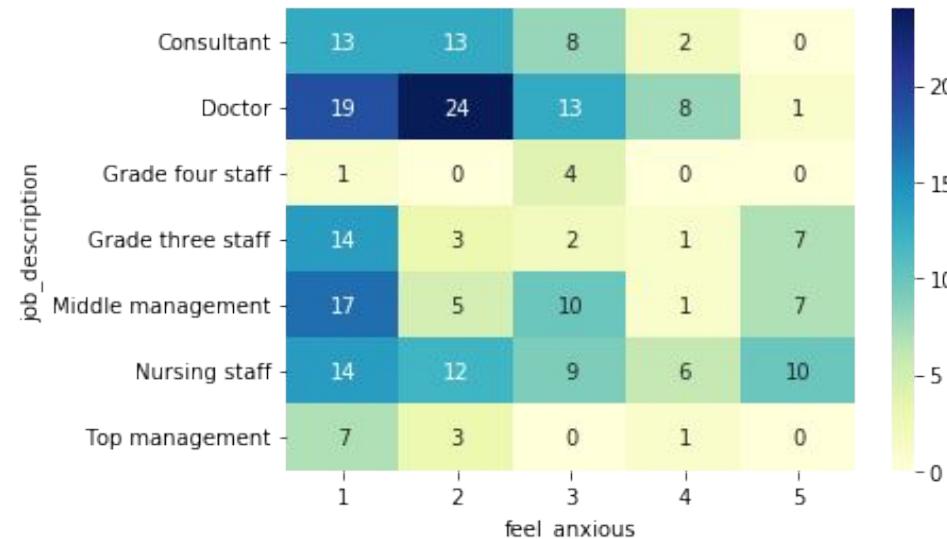
... 59.66288721096792

Look up the critical value of the Chi-Square distribution.

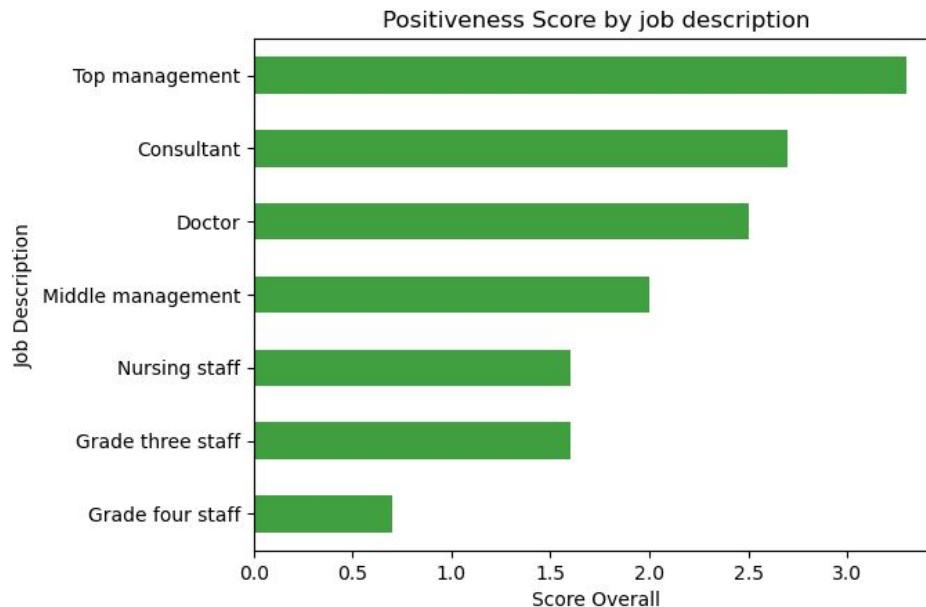
```
[8] # Look up the critical value of the Chi-Square distribution.
# With a p-value of 0.05, the confidence level is 1.00-0.05 = 0.95.
critical_value = st.chi2.ppf(q = 0.95, df = dof)

# The critical value
critical_value
✓ 0.0s
```

... 36.41502850180731



Q2 Results and Conclusions:



HCW by Job Description

Compared to their superiors, the operational staff tend to harbor less positive feelings during the covid 19 lockdown

Anxiety Level Group Comparison - Lives With and Without Family

Null-Hypothesis:

Anxiety level does not increase if living with family

Alternate Hypothesis:

Anxiety level does increases if living with family

Independent Sample t-Test:

Group 1 = Living with family

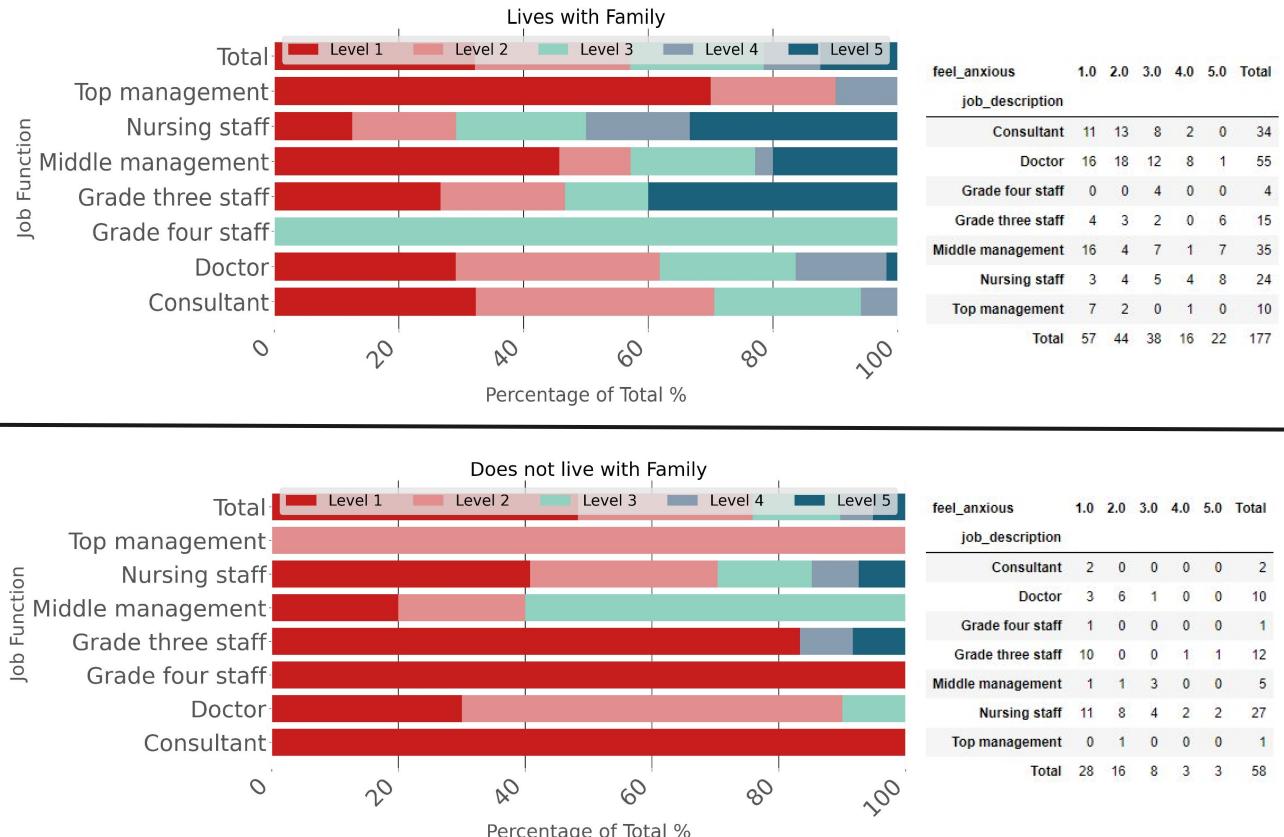
Group 2 = Not living with family

t-Test Results:

- statistic = 1.534
- p-value = 0.174

Conclusion:

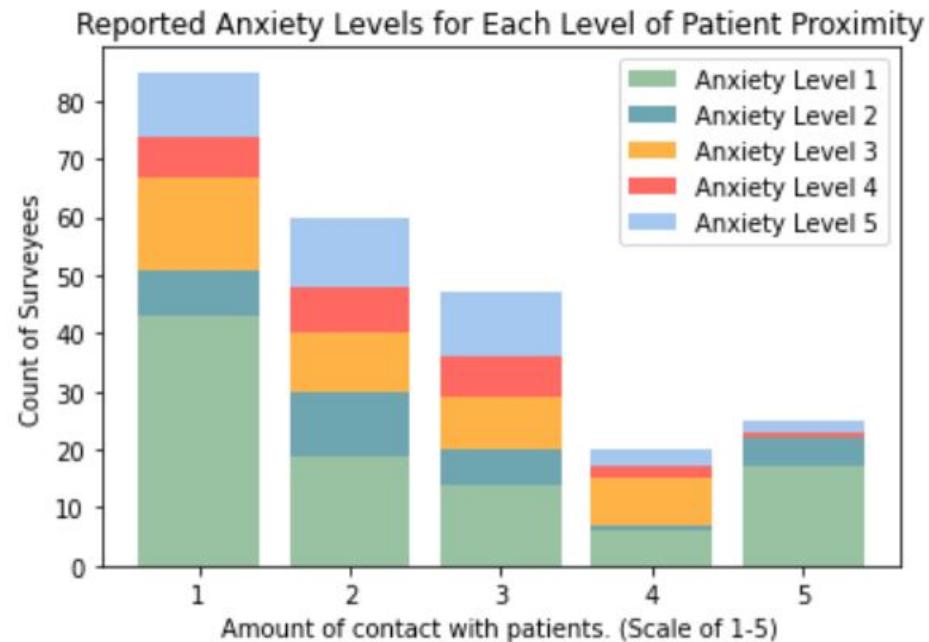
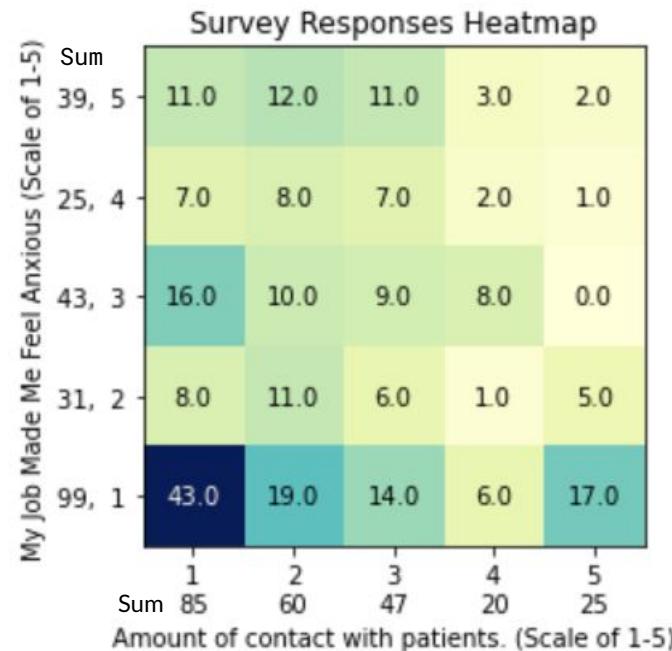
p-value is greater than .05; therefore we can't reject the Null Hypothesis



Using a heatmap to compare Survey Anxiety Levels

R-value = -0.0234

P-value = .71967



Q3: Is there a correlation between relationships and support for work life?

Null Hypothesis: Those who were supported by relationships such as friends, government, and spouses had more positive feelings toward their work

Alternate Hypothesis: Those who weren't supported by relationships such as friends, families, and spouses had more positive feelings toward their work

Likert Scale

	At my work, I feel bursting with energy	At my job, I feel strong and vigorous	I am enthusiastic about my job	My job inspires me	When I get up in the morning, I feel like going to work	I feel happy when I am working intensely	I am proud of the work that I do	I am immersed in my work	I get carried away when I am working
ID									
0	Often	Often	Often	Often	Often	Often	Often	Often	Sometimes
1	Very often	Very often	Always	Always	Always	Always	Always	Very often	Sometimes
2	Very often	Very often	Very often	Very often	Very often	Very often	Very often	Very often	Often

```
    # Cleaning values to change it into a number for positive feelings
    for i in range(0,9):
        positive_feels_df.iloc[:,i] = positive_feels_df.iloc[:,i].replace({
            'Often': 1,
            'Very often': 2,
            'Sometimes': 0,
            'Always': 3,
            'Never': -3,
            'Almost Never': -2,
            'Rarely': -1
        })
```

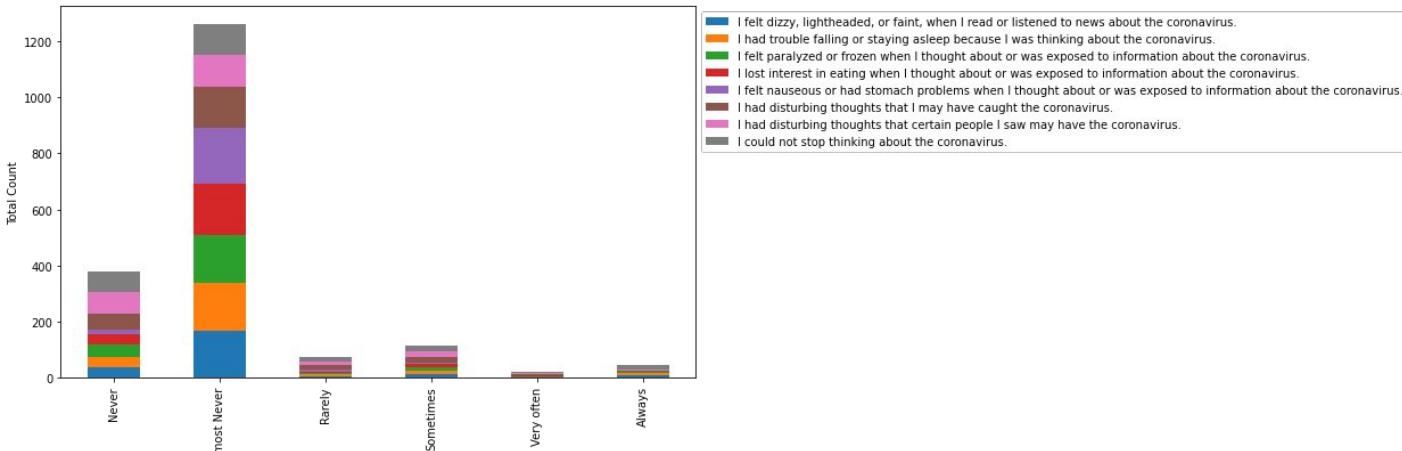
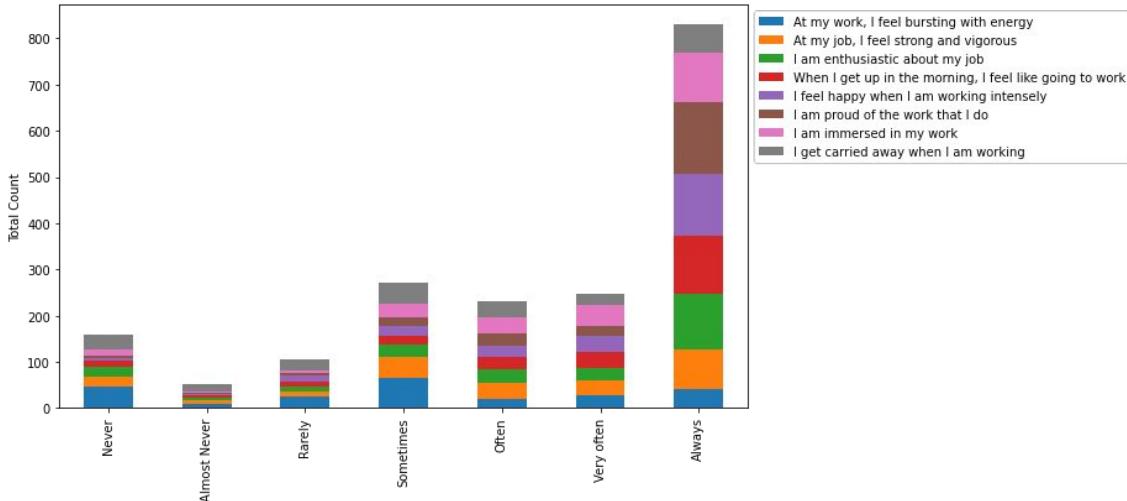
Q3 Results and Conclusions:

Stacked Bar Chart



Findings:

- An overwhelming positivity towards their work



Q3 Results and Conclusions:

Positive Questions vs Support Scores

Support score is based on an incremental value of support such as friends, family, spouse, etc.



	At my work, I feel bursting with energy	At my job, I feel strong and vigorous	I am enthusiastic about my job	My job inspires me	When I get up in the morning, I feel like going to work	I feel happy when I am working intensely	I am proud of the work that I do	I am immersed in my work	I get carried away when I am working	Support Score
At my work, I feel bursting with energy	1.000000	0.399833	0.332366	0.178676	0.344049	0.289035	0.265125	0.271040	0.294927	0.244918
At my job, I feel strong and vigorous	0.399833	1.000000	0.580555	0.382003	0.442157	0.407840	0.364369	0.450765	0.309161	0.158792
I am enthusiastic about my job	0.332366	0.580555	1.000000	0.593714	0.618144	0.490608	0.458353	0.436928	0.364739	0.205597
My job inspires me	0.178676	0.382003	0.593714	1.000000	0.591183	0.662717	0.721489	0.454161	0.263237	0.136787
When I get up in the morning, I feel like going to work	0.344049	0.442157	0.618144	0.591183	1.000000	0.586203	0.619847	0.626764	0.330491	0.138983
I feel happy when I am working intensely	0.289035	0.407840	0.490608	0.662717	0.586203	1.000000	0.703737	0.552442	0.311807	0.138497
I am proud of the work that I do	0.265125	0.364369	0.458353	0.721489	0.619847	0.703737	1.000000	0.556495	0.295068	0.137679
I am immersed in my work	0.271040	0.450765	0.436928	0.454161	0.626764	0.552442	0.556495	1.000000	0.430246	0.237191
I get carried away when I am working	0.294927	0.309161	0.364739	0.263237	0.330491	0.311807	0.295068	0.430246	1.000000	0.103132
Support Score	0.244918	0.158792	0.205597	0.136787	0.138983	0.138497	0.137679	0.237191	0.103132	1.000000

Q3 Results and Conclusions:

Negative Questions vs Support Score

Support score is based on an incremental value of support such as friends, family, spouse, etc.



	I felt dizzy, lightheaded, or faint, when I read or listened to news about the coronavirus.	I had trouble falling or staying asleep because I was thinking about the coronavirus.	I felt paralyzed or frozen when I thought about or was exposed to information about the coronavirus.	I lost interest in eating when I thought about or was exposed to information about the coronavirus.	I felt nauseous or had stomach problems when I thought about or was exposed to information about the coronavirus.	I had disturbing thoughts that I may have caught the coronavirus.	I had disturbing thoughts that certain people I saw may have the coronavirus.	I could not stop thinking about the coronavirus.	Support Score
I felt dizzy, lightheaded, or faint, when I read or listened to news about the coronavirus.	1.000000	0.567577	0.313258	0.368182	0.078624	0.216060	0.243621	0.370705	-0.055037
I had trouble falling or staying asleep because I was thinking about the coronavirus.	0.567577	1.000000	0.436798	0.548439	0.334794	0.418893	0.515173	0.394179	-0.064682
I felt paralyzed or frozen when I thought about or was exposed to information about the coronavirus.	0.313258	0.436798	1.000000	0.282881	0.228642	0.302604	0.219813	0.237938	-0.059000
I lost interest in eating when I thought about or was exposed to information about the coronavirus.	0.368182	0.548439	0.282881	1.000000	0.339912	0.356790	0.413974	0.350467	-0.101155
I felt nauseous or had stomach problems when I thought about or was exposed to information about the coronavirus.	0.078624	0.334794	0.228642	0.339912	1.000000	0.287705	0.262573	0.225505	-0.061103
I had disturbing thoughts that I may have caught the coronavirus.	0.216060	0.418893	0.302604	0.356790	0.287705	1.000000	0.644657	0.440715	-0.025724
I had disturbing thoughts that certain people I saw may have the coronavirus.	0.243621	0.515173	0.219813	0.413974	0.262573	0.644657	1.000000	0.508183	0.048329
I could not stop thinking about the coronavirus.	0.370705	0.394179	0.237938	0.350467	0.225505	0.440715	0.508183	1.000000	-0.014506
Support Score	-0.055037	-0.064682	-0.059000	-0.101155	-0.061103	-0.025724	0.048329	-0.014506	1.000000

Q2 Results and Conclusions:

Feeling Questions vs Support Score

Support score is based on an incremental value of support such as friends, family, spouse, etc.

	My job made me feel enthusiastic.	My job made me feel discouraged.	My job made me feel relaxed.	My job made me feel content.	My job made me feel disgusted.	My job made me feel inspired.	My job made me feel bored.	My job made me feel energetic.	My job made me feel satisfied.	My job made me feel depressed.	My job made me feel at ease.	My job made me feel frightened.	My job made me feel fatigued.	My job made me feel gloomy.	My job made me feel anxious.	My job made me feel angry.	My job made me feel excited.	My job made me feel calm.	My job made me feel ecstatic.	My job made me feel furious.	Support Score																			
My job made me feel enthusiastic.	1.000000	-0.187138	0.569150	0.521666	-0.170625	0.766179	-0.232869	0.793618	0.693379	-0.172040	0.487097	0.010350	0.018030	0.151072	-0.055436	-0.140966	0.856629	0.339948	0.393183	0.115841	0.15798																			
My job made me feel discouraged.		-0.187138	1.000000	-0.250660	-0.011565	0.857838	-0.213628	0.512213	-0.196986	-0.226966	0.846605	-0.097700	0.468846	0.489987	0.273355	0.485397	0.621341	-0.129650	-0.080519	0.187772	0.443350	-0.287910																		
My job made me feel relaxed.			1.000000	0.370059	-0.194706	0.570278	-0.119559	0.528706	0.605312	-0.230005	0.312559	-0.035705	-0.080728	0.111092	-0.200342	-0.218448	0.474380	0.414069	0.305829	0.008399	0.210723																			
My job made me feel content.				1.000000	0.008185	0.469054	-0.010595	0.421867	0.481605	0.025412	0.466516	0.047227	0.044754	-0.055623	0.077324	0.049727	0.476723	0.611329	0.514136	0.069403	0.052801																			
My job made me feel disgusted.					1.000000	-0.187374	0.487990	-0.191589	-0.223253	0.777539	-0.133800	0.463886	0.451719	0.338093	0.452803	0.562626	-0.140286	-0.036074	0.223209	0.484962	-0.328675																			
My job made me feel inspired.						1.000000	-0.187374	0.469054	-0.187374	0.000000	-0.327919	0.696909	0.764540	-0.192277	0.393966	0.044753	-0.020268	0.237847	-0.037952	-0.180328	0.750671	0.389422	0.358416																	
My job made me feel bored.							1.000000	-0.281060	-0.348160	0.512637	-0.053436	0.258782	0.422641	0.101804	0.212126	0.447048	-0.286191	0.012384	-0.028564	0.234438	-0.104066																			
My job made me feel energetic.								1.000000	0.696909	-0.281060	0.100000	0.676554	-0.196602	0.414828	0.002564	-0.025494	0.214356	-0.001510	-0.116164	0.807791	0.345130	0.379417																		
My job made me feel satisfied.									1.000000	-0.232869	0.605312	0.421867	-0.191589	0.696909	-0.281060	0.100000	-0.0225908	0.395978	-0.024331	-0.078327	0.185818	0.337819	0.118470																	
My job made me feel depressed.										1.000000	-0.230005	0.025412	0.777539	-0.192277	0.512637	-0.196602	-0.225908	1.000000	-0.115195	0.496699	0.505652	0.299638	0.473159	0.624637																
My job made me feel at ease.											1.000000	-0.087700	0.312559	0.466516	-0.133800	0.393966	-0.053436	0.414828	0.395978	-0.115195	0.000000	-0.019592	0.031346	0.005437	0.179827															
My job made me feel frightened.												1.000000	-0.035705	0.047227	0.463886	0.044753	0.258782	0.002564	-0.024331	0.496699	1.000000	0.600601	0.502566	0.458791	0.368465	0.014815														
My job made me feel fatigued.													1.000000	-0.020268	0.451719	-0.020268	0.422641	-0.025494	-0.078327	0.506542	0.031346	0.600601	1.000000	0.319903	0.407193	0.498050	0.000330													
My job made me feel gloomy.														1.000000	-0.053436	0.111092	-0.055623	0.338093	0.237847	0.101804	0.214356	0.188518	0.299638	0.005437	0.502566	0.319903	1.000000	-0.104066												
My job made me feel anxious.															1.000000	-0.200342	0.077324	0.452803	-0.037952	0.212126	-0.001510	-0.023188	0.473159	0.179827	0.458791	0.407193	0.330085	0.148764	0.210570											
My job made me feel angry.																1.000000	-0.218448	0.049727	0.562626	-0.180328	0.447048	-0.116164	-0.233192	0.624637	0.035373	0.368465	0.498050	0.148764	0.539824	1.000000	-0.085032									
My job made me feel excited.																	1.000000	-0.129650	0.474380	0.476723	-0.140286	0.750671	-0.286191	0.807791	0.646747	-0.143997	0.454105	0.014815	0.009390	0.210570	-0.020559	-0.085032	1.000000	0.330941	0.374582	0.189280	0.074390			
My job made me feel calm.																		1.000000	-0.080519	0.414069	0.611329	-0.036074	0.389422	0.012384	0.345130	0.406810	-0.047766	0.399447	-0.082303	-0.145406	-0.110601	0.046861	-0.110405	0.330941	0.390437	-0.081229	0.178337			
My job made me feel ecstatic.																			1.000000	0.187772	0.305829	0.514136	0.223209	0.358416	-0.028554	0.379417	0.337819	0.161119	0.271052	0.065442	0.099145	0.011348	0.144643	0.108593	0.353921	0.346933	0.346933	0.216338		
My job made me feel furious.																				1.000000	0.443350	0.008399	0.069403	0.484962	0.161130	0.234438	0.177326	0.118470	0.433191	0.018097	0.673296	0.502491	0.661732	0.346933	0.353921	0.189280	-0.081229	0.099451	1.000000	-0.273238
Support Score	0.157898	-0.287910	0.210723	0.052801	-0.328875	0.145552	-0.104068	0.113321	0.144691	-0.250954	0.150381	-0.285852	-0.180187	-0.259187	-0.218230	-0.281638	0.074390	0.178337	0.059609	-0.273238	1.000000																			



Data Challenges

- Limited data (240 rows) x (60 columns)
- Likert challenges



Future Opportunities

Additional Analysis Opportunities:

- Correlate death rate by number of hospitals, per region/state
- Economic Layering
 - Number of Deaths, by GDP
 - Happiness Score, by GDP

Automation Enhancements:

- Enable user to select which question and demographic variables they wish to view correlations between (i.e. enthusiastic about job against feeling gloomy, feeling anxious)
- Compute summary statistics on the selected variables (i.e. r value, p value).
- Output a visualization, data table and summary statistics be provided below it.

Thanks!



We are happy to accept
your questions.

My job made me feel enthusiastic.	My job made me feel discouraged.	My job made me feel relaxed.	My job made me feel content.	My job made me feel disgusted.	My job made me feel inspired.	My job made me feel bored.	My job made me feel energetic.	My job made me feel satisfied.	My job made me feel depressed.	My job made me feel at ease.	My job made me feel frightened.	My job made me feel fatigued.	My job made me feel gloomy.	My job made me feel anxious.	My job made me feel angry.	My job made me feel excited.	My job made me feel calm.	My job made me feel ecstatic.	My job made me feel tedious.	Support Score
1.000000	-0.187138	0.569150	0.521686	-0.170626	0.766179	-0.232869	0.793618	0.693379	-0.172040	0.487097	0.010350	0.018030	0.151072	-0.055436	-0.140966	0.856629	0.339948	0.393183	0.115841	0.157898
-0.187138	1.000000	-0.250660	-0.011565	0.857838	-0.213628	0.512213	-0.196986	-0.226969	0.846605	-0.097700	0.468846	0.489387	0.273355	0.485397	0.621341	-0.126650	-0.080519	0.187772	0.443350	-0.287910
0.569150	-0.250660	1.000000	0.370059	-0.194706	0.570278	-0.119559	0.528706	0.605312	-0.230005	0.312559	-0.035705	-0.080728	0.111092	-0.200342	-0.218448	0.474380	0.414069	0.305829	0.008399	0.210723
0.521686	-0.011565	0.370059	1.000000	0.008185	0.469054	-0.010595	0.421867	0.481605	0.025412	0.466516	0.047227	0.044754	-0.055623	0.077324	0.049727	0.476723	0.611329	0.514136	0.069403	0.052801
-0.170626	0.857838	-0.194706	0.008185	1.000000	-0.187374	0.487990	-0.191589	-0.223253	0.777539	-0.133800	0.463886	0.451719	0.338093	0.452803	0.562626	-0.146266	-0.036074	0.223209	0.484962	-0.328875
0.766179	-0.213628	0.570278	0.469054	-0.187374	1.000000	-0.327919	0.699609	0.764540	-0.192277	0.393966	0.044753	-0.020268	0.237847	-0.037952	-0.180328	0.750671	0.389422	0.358416	0.161130	0.145552
-0.232869	0.512213	-0.119559	-0.010595	0.487990	-0.327919	1.000000	-0.281060	-0.348160	0.512637	-0.053436	0.258782	0.422641	0.101804	0.212126	0.447048	-0.286191	0.012384	-0.028554	0.234438	-0.104068
0.793618	-0.196986	0.528706	0.421867	-0.191589	0.699609	-0.281060	1.000000	0.676554	-0.196602	0.414828	0.002564	-0.025494	0.214356	-0.001510	-0.116164	0.807791	0.345130	0.379417	0.177326	0.113321
0.693379	-0.226969	0.605312	0.481605	-0.223253	0.764540	-0.348160	0.676554	1.000000	-0.225908	0.395597	-0.024331	-0.078327	0.188518	-0.023188	-0.233192	0.646747	0.406810	0.337819	0.118470	0.144691
-0.172040	0.846605	-0.230005	0.025412	0.777539	-0.192277	0.512637	-0.196602	-0.225908	1.000000	-0.115195	0.496699	0.506542	0.299638	0.473159	0.624637	-0.143957	-0.047766	0.161119	0.433191	-0.250954
0.487097	-0.097700	0.312559	0.466516	-0.133800	0.393966	-0.053436	0.414828	0.395978	-0.115195	1.000000	-0.019592	0.031346	0.005437	0.179827	0.035373	0.454105	0.399447	0.271052	0.018097	0.150381
0.010350	0.468846	-0.035705	0.047227	0.463886	0.044753	0.258782	0.002564	-0.024331	0.496699	-0.019592	1.000000	0.600601	0.502586	0.458791	0.366465	0.014815	-0.082303	0.065442	0.673296	-0.258352
0.018030	0.489387	-0.080728	0.044754	0.451719	-0.020268	0.422641	-0.025494	-0.078327	0.506542	0.031346	0.600601	1.000000	0.319903	0.407193	0.498050	0.000330	-0.145406	0.099145	0.502491	-0.180187
0.151072	0.273355	0.111092	-0.055623	0.338093	0.237847	0.101804	0.214356	0.188518	0.299638	0.005437	0.502586	0.319903	1.000000	0.330085	0.148764	0.210570	-0.110601	0.011348	0.661732	-0.250918
-0.055436	0.485397	-0.200342	0.077324	0.452803	-0.037952	0.212126	-0.001510	-0.023188	0.473159	0.179827	0.458791	0.407193	0.330085	1.000000	0.539824	-0.020559	0.046861	0.144643	0.346933	-0.218230
-0.140966	0.621341	-0.218448	0.049727	0.562626	-0.180328	0.447048	-0.116164	-0.233192	0.624637	0.035373	0.368465	0.498050	0.148764	0.539824	1.000000	-0.085032	-0.110405	0.108593	0.353921	-0.281638
0.856629	-0.129650	0.474380	0.476723	-0.140286	0.750671	-0.286191	0.807791	0.646747	-0.143957	0.454105	0.014815	0.000330	0.210570	-0.020559	-0.085032	1.000000	0.330941	0.374582	0.189280	0.074390
0.339948	-0.080519	0.414069	0.611329	-0.036074	0.389422	0.012384	0.345130	0.406810	-0.047766	0.399447	-0.082303	-0.145406	-0.110601	0.046861	-0.110405	0.330941	1.000000	0.390437	-0.081229	0.178337
0.393183	0.187772	0.305829	0.514136	0.223209	0.358416	-0.028554	0.379417	0.337819	0.161119	0.271052	0.065442	0.099145	0.011348	0.144643	0.108693	0.374582	0.390437	1.000000	0.099451	0.059609
0.115841	0.443350	0.008399	0.069403	0.484962	0.161130	0.234438	0.177326	0.118470	0.433191	0.018097	0.673296	0.502491	0.661732	0.346933	0.353921	0.189280	-0.081229	0.099451	1.000000	-0.273238
0.157898	-0.287910	0.210723	0.052801	-0.328875	0.145552	-0.104068	0.113321	0.144691	-0.250954	0.150381	-0.258352	-0.180187	-0.259187	-0.218230	0.074390	0.178337	0.059609	-0.273238	1.000000	