```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
    Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

Data Collection

```
path = r'/content/drive/MyDrive/DATASET/Suicide_Records_INDIA.csv'
df = pd.read_csv(path)
```

Data Analysis

```
df.describe
```

```
    <bound method NDFrame.describe of        State  Year             Type_code  \
    0    HARYANA  2011         Means_adopted
    1    HARYANA  2011         Means_adopted
    2    HARYANA  2011  Professional_Profile
    3    HARYANA  2011                Causes
    4    HARYANA  2011  Professional_Profile
    ..       ...   ...                   ...
    224  HARYANA  2003                Causes
    225  HARYANA  2003                Causes
    226  HARYANA  2003                Causes
    227  HARYANA  2003                Causes
    228  HARYANA  2003                Causes

                                          Type  Gender Age_group
    0                               Harassment  Female     30-44
    1                       By Over Alcoholism    Male     30-44
    2                            Self employed  Female     45-59
    3                 Forcing For Honour Killing  Female     15-29
    4                      Professional Activity  Female     45-59
    ..                                     ...     ...       ...
    224                   Illegitimate Pregnancy  Female      0-14
    225                   Illegitimate Pregnancy    Male      0-14
    226                  Insanity/Mental Illness    Male     15-29
    227  Not having Children(Barrenness/Impotency  Female     15-29
    228             Other Causes (Please Specity)  Female     30-44

    [229 rows x 6 columns]>
```

```
df.head()
```

	State	Year	Type_code	Type	Gender	Age_group
0	HARYANA	2011	Means_adopted	Harassment	Female	30-44
1	HARYANA	2011	Means_adopted	By Over Alcoholism	Male	30-44
2	HARYANA	2011	Professional_Profile	Self employed	Female	45-59
3	HARYANA	2011	Causes	Forcing For Honour Killing	Female	15-29
4	HARYANA	2011	Professional_Profile	Professional Activity	Female	45-59

```
df.tail()
```

	State	Year	Type_code	Type	Gender	Age_group
224	HARYANA	2003	Causes	Illegitimate Pregnancy	Female	0-14
225	HARYANA	2003	Causes	Illegitimate Pregnancy	Male	0-14
226	HARYANA	2003	Causes	Insanity/Mental Illness	Male	15-29
227	HARYANA	2003	Causes	Not having Children(Barrenness/Impotency	Female	15-29
228	HARYANA	2003	Causes	Other Causes (Please Specity)	Female	30-44

```
df.shape
```

```
(229, 6)
```

```
df.Age_group
```

```
0      30-44
1      30-44
2      45-59
3      15-29
4      45-59
       ...
224     0-14
225     0-14
226    15-29
227    15-29
228    30-44
Name: Age_group, Length: 229, dtype: object
```

Data Cleaning

```
df.isnull().sum()
```

```
State        0
Year         0
Type_code    0
Type         0
Gender       0
Age_group    0
dtype: int64
```

```
df.duplicated()
```

```
0      False
1      False
2      False
3      False
4      False
       ...
224    False
225    False
226    False
227    False
228    False
Length: 229, dtype: bool
```

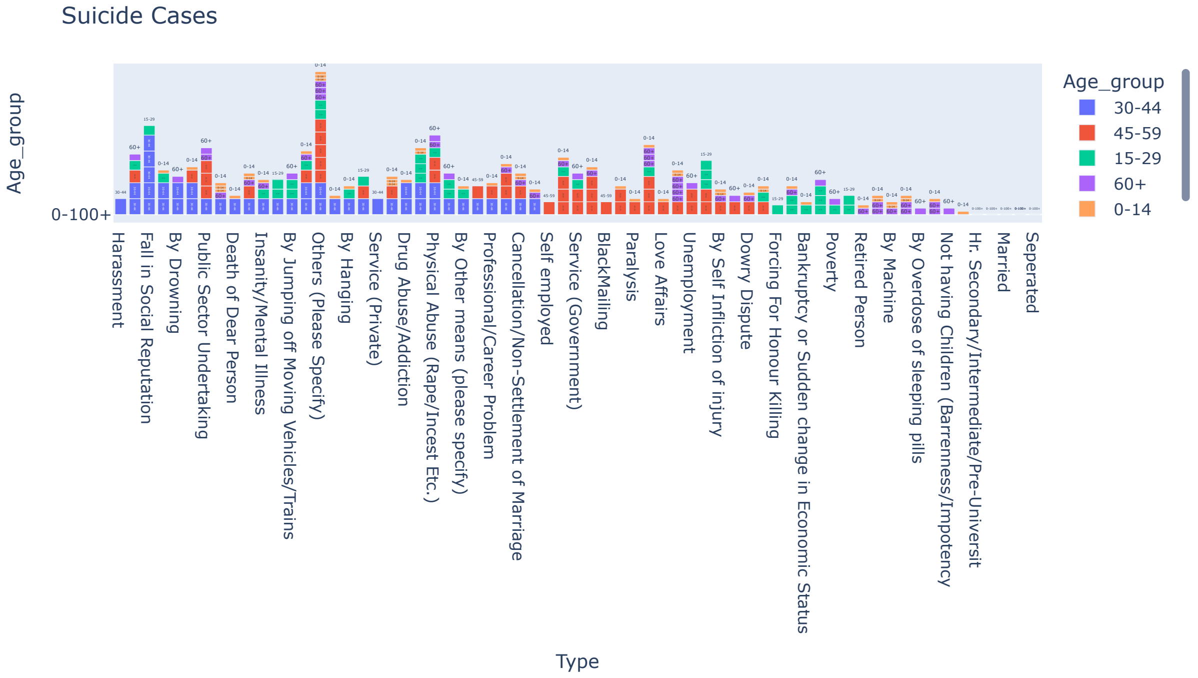
```
df.drop_duplicates()
```

	State	Year	Type_code	Type	Gender	Age_group
0	HARYANA	2011	Means_adopted	Harassment	Female	30-44
1	HARYANA	2011	Means_adopted	By Over Alcoholism	Male	30-44
2	HARYANA	2011	Professional_Profile	Self employed	Female	45-59
3	HARYANA	2011	Causes	Forcing For Honour Killing	Female	15-29
4	HARYANA	2011	Professional_Profile	Professional Activity	Female	45-59
...	...	...	...	...	...	...
224	HARYANA	2003	Causes	Illegitimate Pregnancy	Female	0-14
225	HARYANA	2003	Causes	Illegitimate Pregnancy	Male	0-14
226	HARYANA	2003	Causes	Insanity/Mental Illness	Male	15-29
227	HARYANA	2003	Causes	Not having Children(Barrenness/Impotency	Female	15-29
228	HARYANA	2003	Causes	Other Causes (Please Specity)	Female	30-44

228 rows × 6 columns

Data Visualization

```
import plotly as py
from plotly import tools

import plotly.figure_factory as ff
import plotly.graph_objects as go
import plotly.express as px              #  '''Plotly express is a high-level data visualization package that allows you to create inte
                                                  #     It is built on top of Plotly Graph Objects, which provides a lower-level interfac

from plotly.subplots import make_subplots
import math


fig = px.bar(df, x= "Type", y="Age_group",color="Age_group",text = "Age_group",color_continuous_scale=px.colors.sequential.Viridis)

fig.update_traces( textposition='outside')
fig.update_layout(title_text='Suicide Cases')

fig.show()
```



```
suicide_gender=df[["Gender"]].sum().rename_axis('Gender').reset_index()
suicide_gender=suicide_gender.rename(columns ={0:"Gender"})

suicide_gender=suicide_gender.replace({"Total Male":"Male"},regex=True)
suicide_gender=suicide_gender.replace({"Total Female":"Female"},regex=True)


suicide_gender.head()
```

	Gender	Gender
0	Gender	FemaleMaleFemaleFemaleFemaleMaleMaleFemaleFema...

```
df.size
```

```
1374
```

```
# To know the diffarent number of unique in data
df.nunique()
```

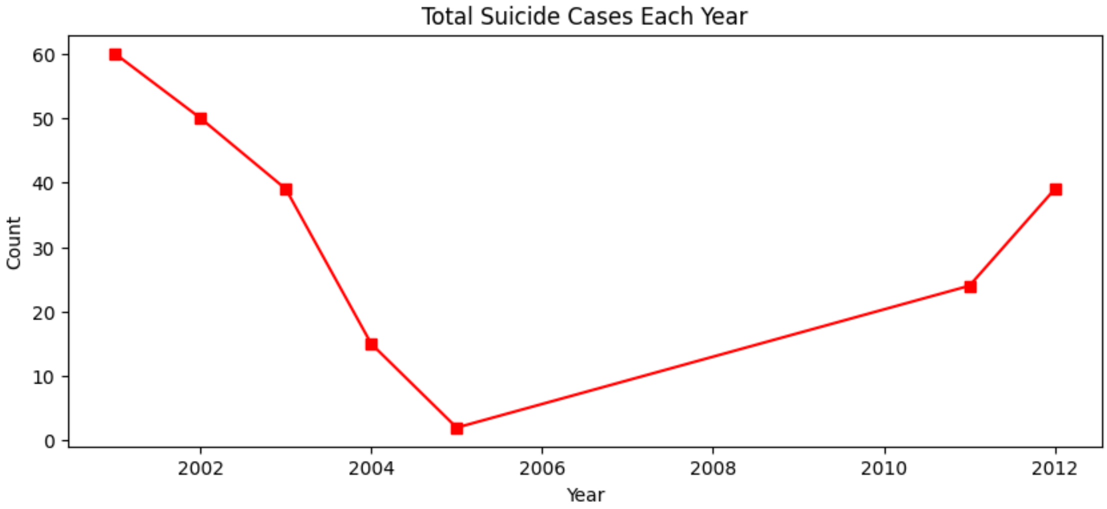
```
State         3
Year          7
Type_code     5
Type         65
Gender        2
Age_group     6
dtype: int64
```

```
df_year=df.groupby("Year")["Year"].count()
df_year.sort_values(ascending = True)
```

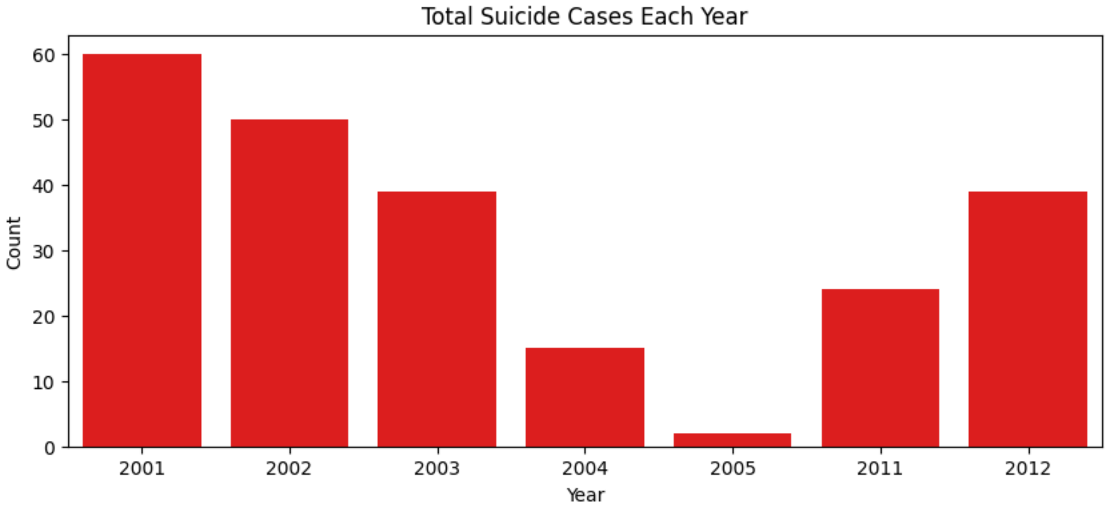
```
Year
2005     2
```

```
2004    15
2011    24
2003    39
2012    39
2002    50
2001    60
Name: Year, dtype: int64
```

```
# Graph#
fig, ax=plt.subplots(figsize=(10,4))
plt.plot(df_year, color="r", marker="s")

# Axis labels
ax.set_title ("Total Suicide Cases Each Year")
ax.set_xlabel ("Year")
ax.set_ylabel ("Count");
```



```
fig, ax=plt.subplots(figsize=(10,4))
sns.barplot(
    x = df_year.index,
    y = df_year,
    color= "r"
)
ax.set_title ("Total Suicide Cases Each Year")
ax.set_xlabel ("Year")
ax.set_ylabel ("Count");
```



```
df["Type"].nunique()
```

```
65
```

```
# To know type that are most apperaring
df["Type"].value_counts().sort_values(ascending= False)
```

```
Others (Please Specify)                    15
Student                                     8
```

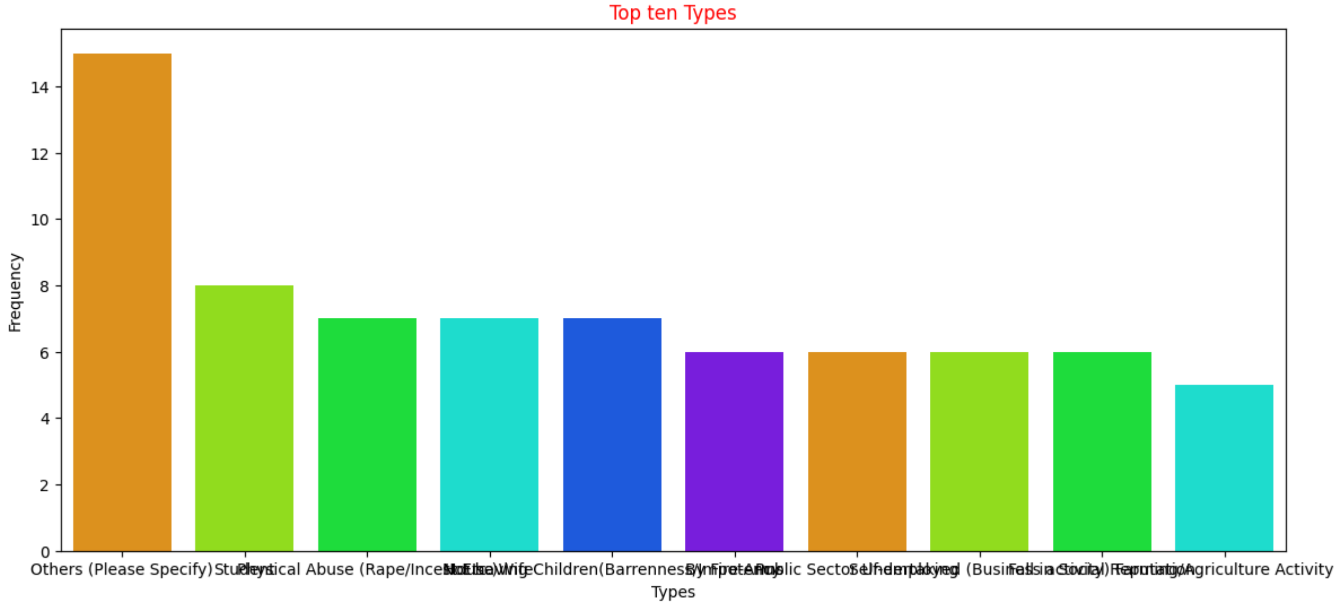
```
    Physical Abuse (Rape/Incest Etc.)             7
    House Wife                                    7
    Not having Children(Barrenness/Impotency      7
                                                 ..
    Married                                       1
    Harassment                                    1
    Not having Children (Barrenness/Impotency     1
    By Overdose of sleeping pills                 1
    Seperated                                     1
    Name: Type, Length: 65, dtype: int64
```

```
top_ten_most_appering_type = df["Type"].value_counts().sort_values(ascending= False).head(10)
top_ten_most_appering_type
```

```
    Others (Please Specify)                     15
    Student                                      8
    Physical Abuse (Rape/Incest Etc.)            7
    House Wife                                   7
    Not having Children(Barrenness/Impotency     7
    By Fire-Arms                                 6
    Public Sector Undertaking                    6
    Self-employed (Business activity)            6
    Fall in Social Reputation                    6
    Farming/Agriculture Activity                 5
    Name: Type, dtype: int64
```

```
# Graph
fig, ax=plt.subplots(figsize=(14,6))
color_palette = sns.color_palette("gist_rainbow")
sns.barplot(
    x = top_ten_most_appering_type.index,
    y = top_ten_most_appering_type,
    color= "r",
    palette = color_palette

)
ax.set_title ("Top ten Types", color="r")
ax.set_xlabel ("Types")
ax.set_ylabel ("Frequency")
```

```
    Text(0, 0.5, 'Frequency')
```



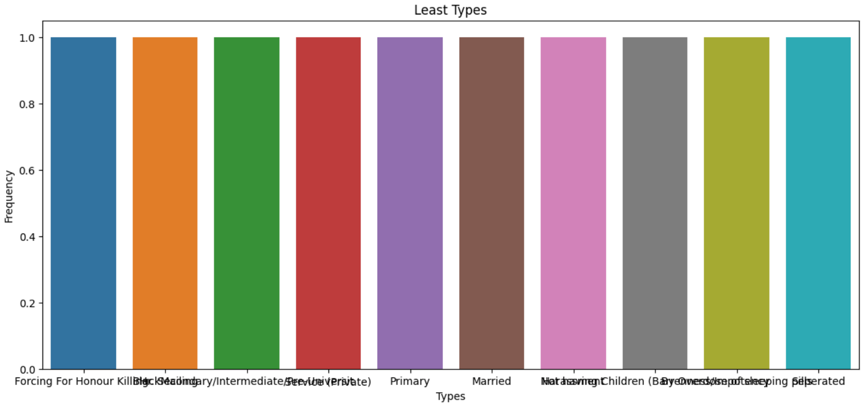
```
bottom_ten_least_appering_type = df["Type"].value_counts().sort_values(ascending= False).tail(10)
bottom_ten_least_appering_type
```

```
    Forcing For Honour Killing                   1
    BlackMailing                                 1
    Hr. Secondary/Intermediate/Pre-Universit     1
    Service (Private)                            1
    Primary                                      1
    Married                                      1
    Harassment                                   1
    Not having Children (Barrenness/Impotency    1
    By Overdose of sleeping pills                1
```

```
     Seperated                                    1
     Name: Type, dtype: int64
```

```
# Graph
fig, ax=plt.subplots(figsize=(14,6))
color_palette = sns.color_palette()
sns.barplot(
    x = bottom_ten_least_appering_type.index,
    y = bottom_ten_least_appering_type,
    color= "r",
    palette=color_palette
)
ax.set_title ("Least Types")
ax.set_xlabel ("Types")
ax.set_ylabel ("Frequency")
```

```
     Text(0, 0.5, 'Frequency')
```



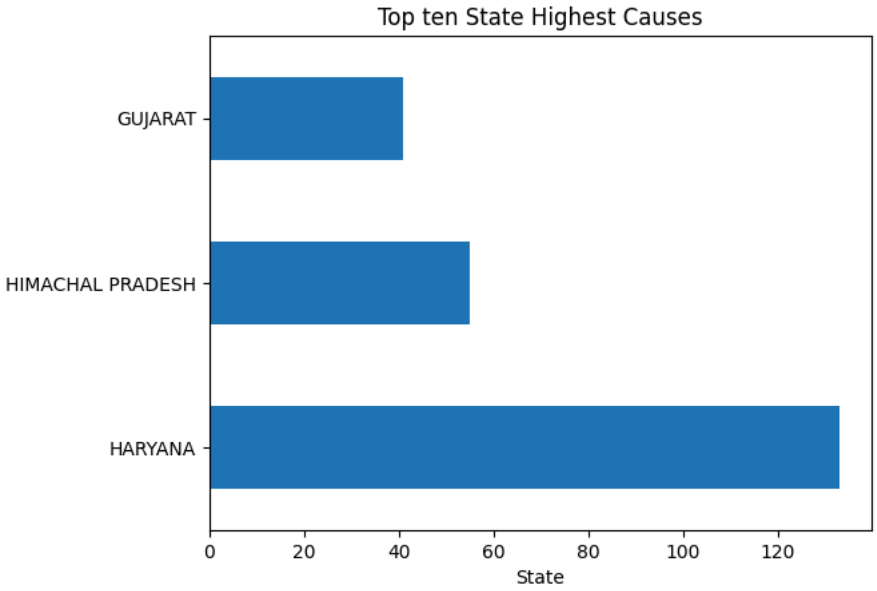
```
df_number_state_apearence = df["State"].value_counts().sort_values(ascending= False)
df_number_state_apearence.head()
```

```
     HARYANA             133
     HIMACHAL PRADESH     55
     GUJARAT              41
     Name: State, dtype: int64
```

```
top_10_appearing_state = df_number_state_apearence.head(10)
top_10_appearing_state
```

```
     HARYANA             133
     HIMACHAL PRADESH     55
     GUJARAT              41
     Name: State, dtype: int64
```

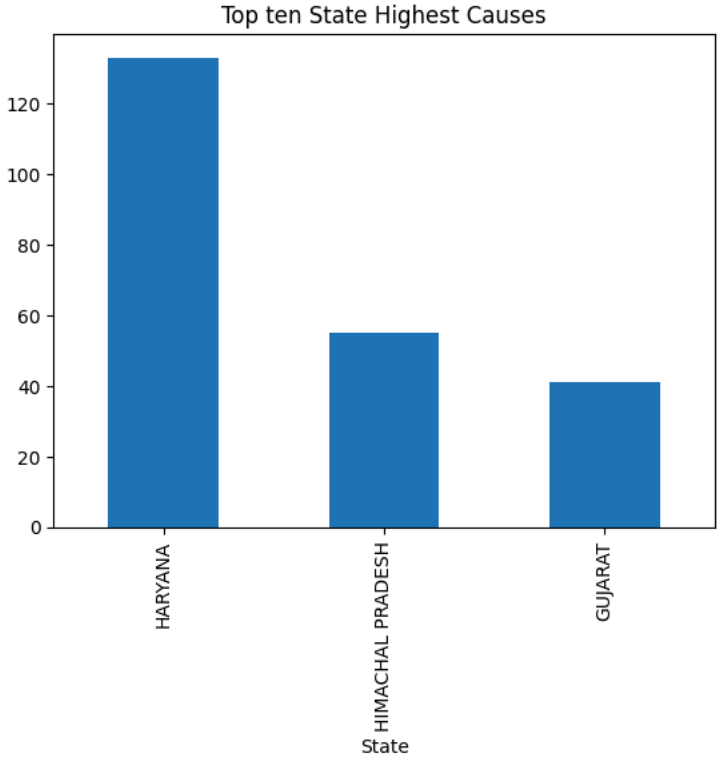
```
top_10_appearing_state.plot(
    kind = 'barh',
    xlabel = "State",
    title = "Top ten State Highest Causes"
);
```



```
bottom_10_least_apppearing_state = (df_number_state_apearence
                                    .tail(10)
                                    .sort_values(ascending=False))
bottom_10_least_apppearing_state
```

```
HARYANA             133
HIMACHAL PRADESH     55
GUJARAT              41
Name: State, dtype: int64
```

```
bottom_10_least_apppearing_state.plot(
    kind = 'bar',
    xlabel = "State",
    title = "Top ten State Highest Causes"
);
```



```
female = (df["Gender"] == "Female").sum()
female
```

```
122
```

```
male = (df["Gender"] == "Male").sum()
male
```

```
107
```

```
proportion_female = ((female.sum() / len(df["Gender"])) * 100).round(2)
proportion_female
```

```
53.28
```

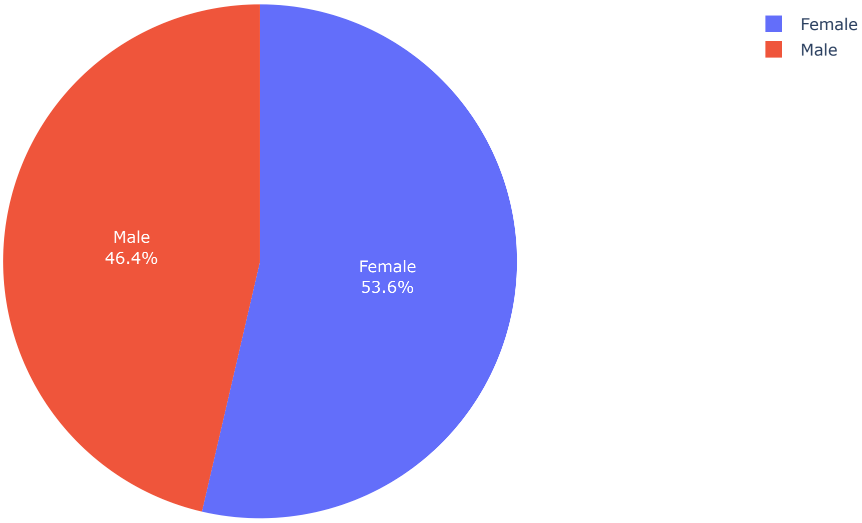
```
proportion_male = ((male.sum() / len(df["Gender"])) * 100).round(2)
proportion_male
```

```
46.72
```

```
df1=df["Gender"].value_counts()
df1
```

```
Female    122
Male      107
Name: Gender, dtype: int64
```

```
fig = px.pie(
    df,
    names = df["Gender"],
    values = df["Gender"].index
)
# fig.update_traces to label each portion with name and percentage inside
fig.update_traces(textinfo = "label+percent", insidetextfont = dict(color = "white"))

# {"itemclick":False} to ensure that when you click at the legend item will not disapear
fig.update_layout(legend = {"itemclick":False})
fig.show()
```



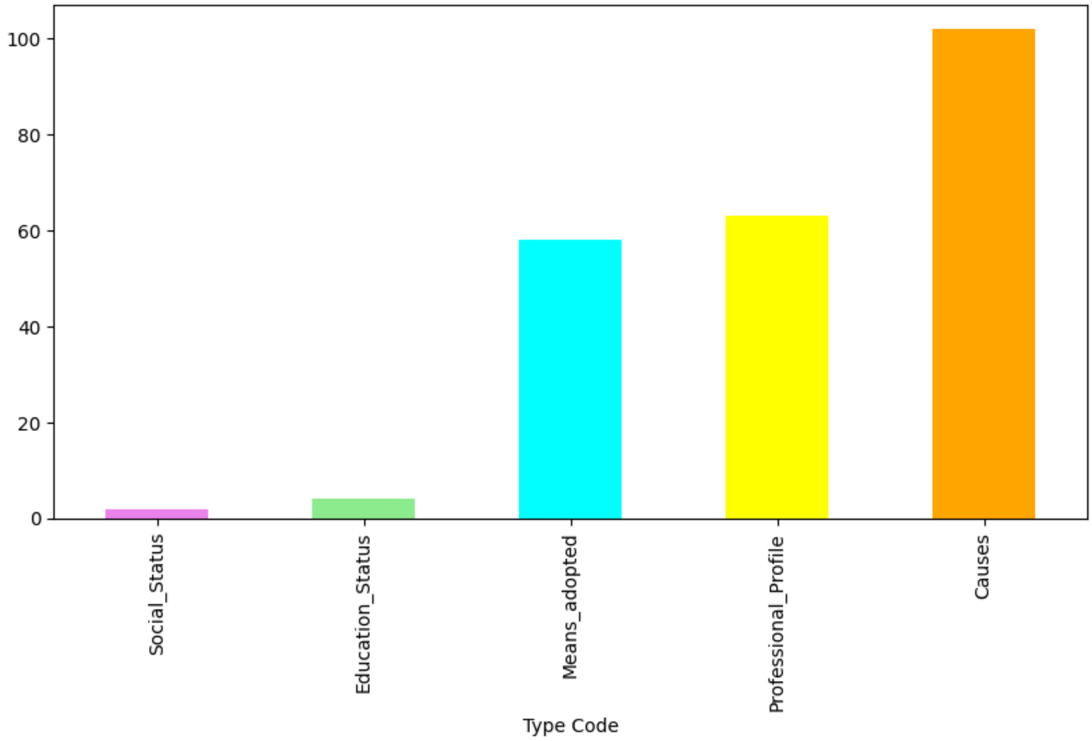
```
df["Type_code"].nunique()
```

```
5
```

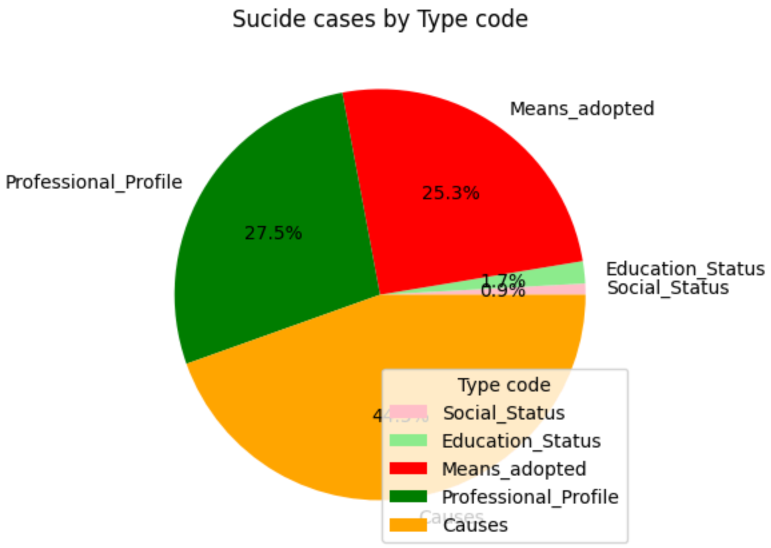
```
type_code = df.groupby("Type_code")["Type_code"].count().sort_values(ascending= True)
type_code
```

```
Type_code
Social_Status             2
Education_Status          4
Means_adopted            58
Professional_Profile     63
Causes                  102
Name: Type_code, dtype: int64
```

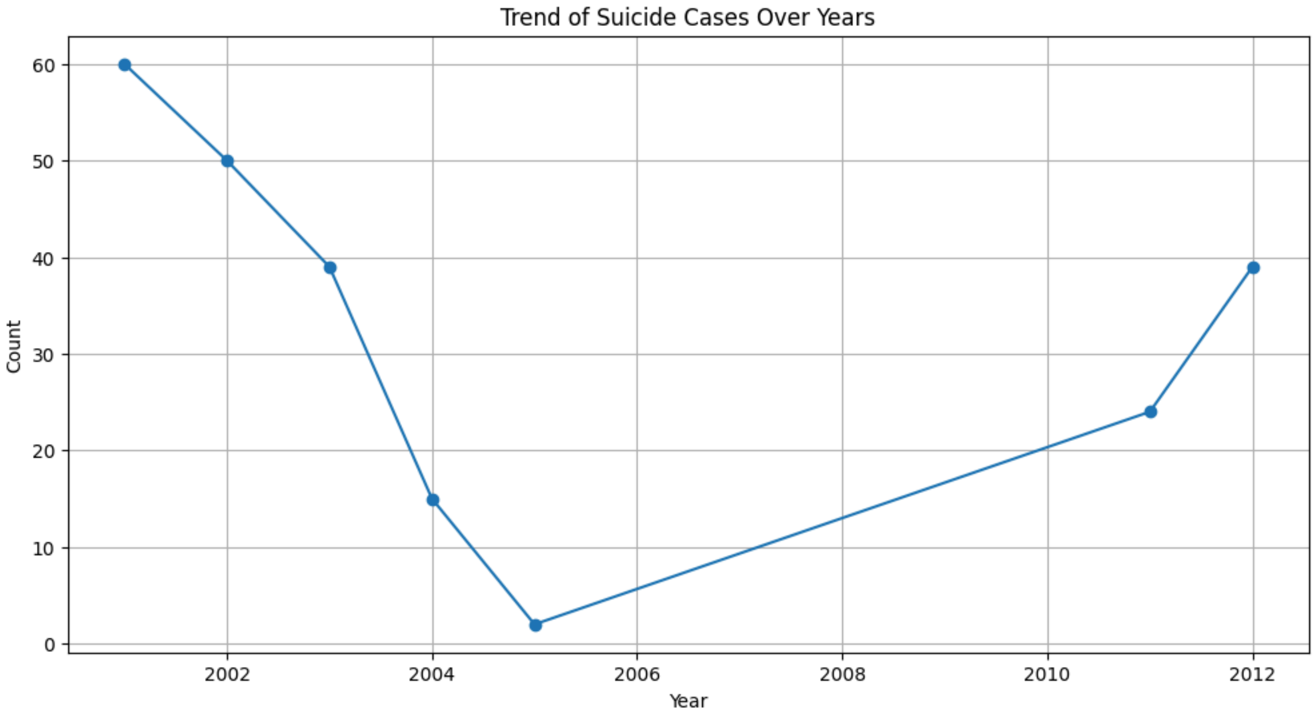
```
# Graphs comparisson using type code
fig, (ax1) =plt.subplots(1,  figsize=(10,5))

type_code.plot(
    kind = 'bar',
    xlabel = "Type Code",
    #title = "Sucide cases by Type code",
    color=['violet', 'lightgreen','cyan',"yellow","orange"]
);
```



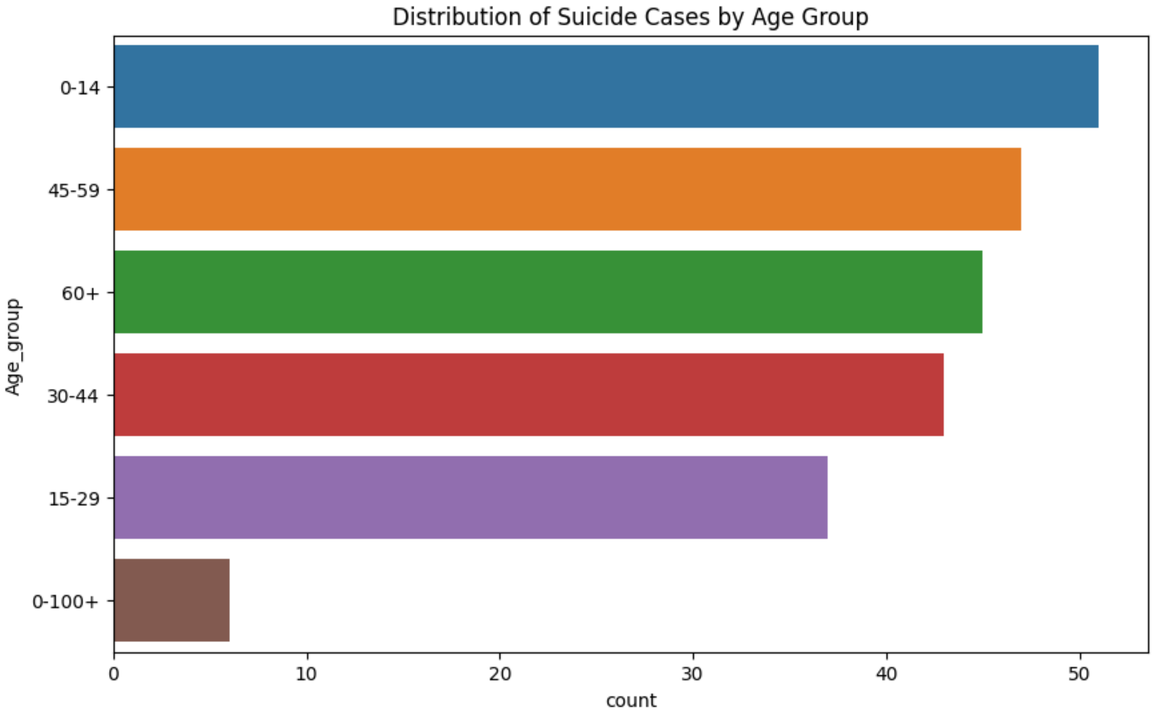
```
fig, (ax) =plt.subplots(1,  figsize=(10,5))
ax.pie(type_code,
       labels = type_code.index, autopct='%1.1f%%', startangle=0,
       colors=['Pink', 'lightgreen','Red',"green","orange"]

)
ax.set_title ("Sucide cases by Type code");
ax.legend(title="Type code", loc= "lower right");
```

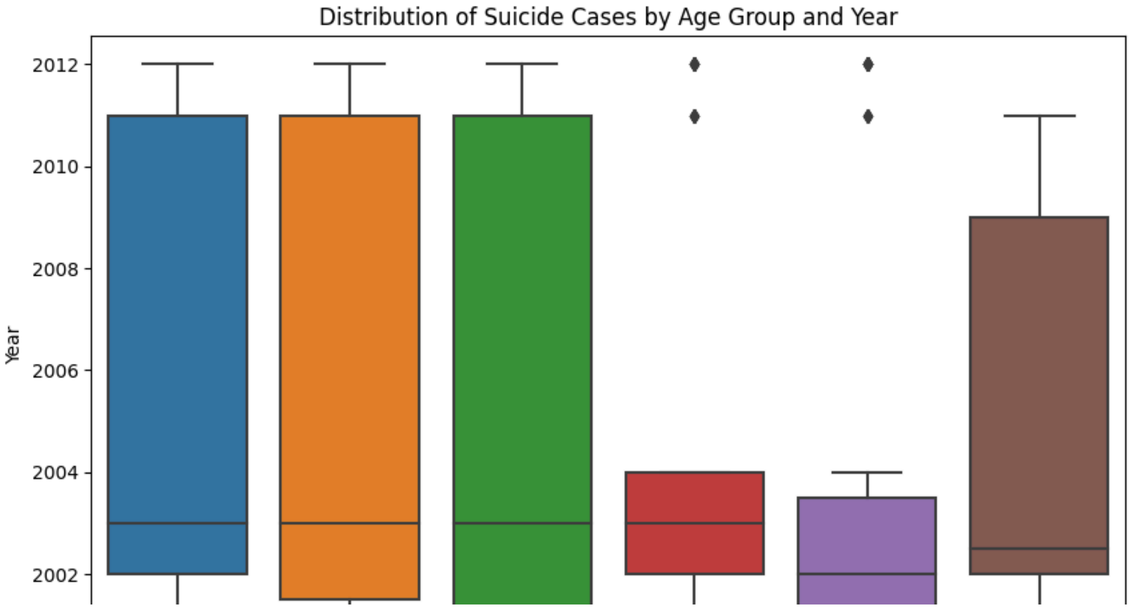


```
# Trend of suicide cases over time
plt.figure(figsize=(12, 6))
time_series = df.groupby('Year')['Type'].count()
time_series.plot(marker='o')
plt.title("Trend of Suicide Cases Over Years")
plt.xlabel("Year")
plt.ylabel("Count")
plt.grid(True)
plt.show()
```

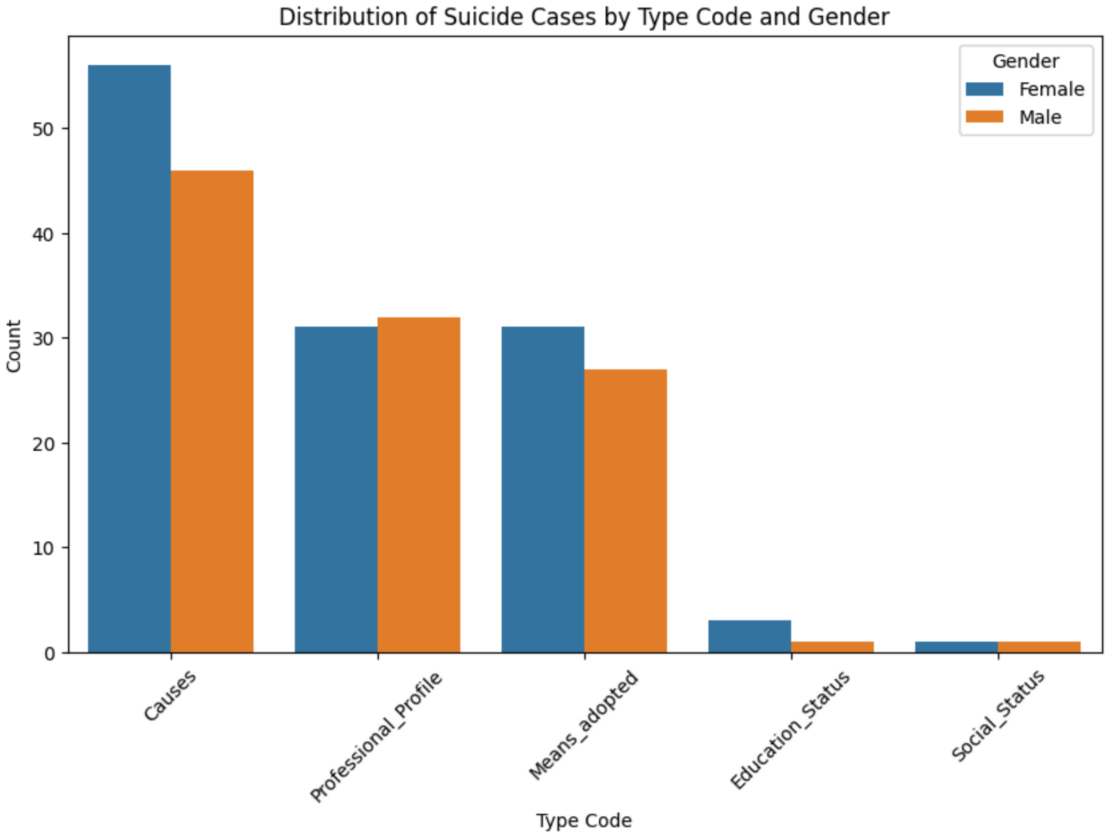


```
# Distribution of Suicide Cases by Age Group
plt.figure(figsize=(10, 6))
sns.countplot(y='Age_group', data=df, order=df['Age_group'].value_counts().index)
plt.title('Distribution of Suicide Cases by Age Group')
plt.show()

plt.figure(figsize=(10, 6))
sns.boxplot(data=df, x='Age_group', y='Year')
plt.title("Distribution of Suicide Cases by Age Group and Year")
plt.xticks(rotation=45)
plt.xlabel("Age Group")
plt.ylabel("Year")
plt.show()
```

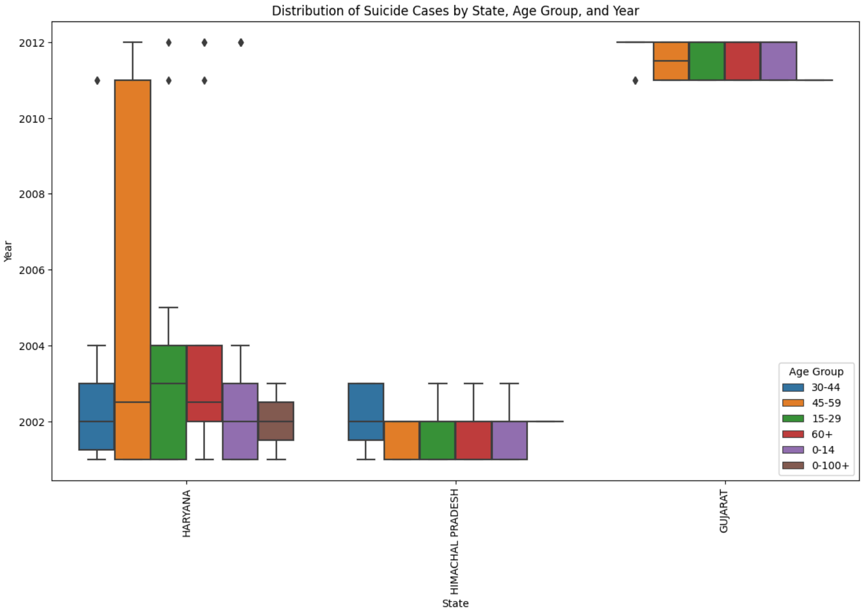




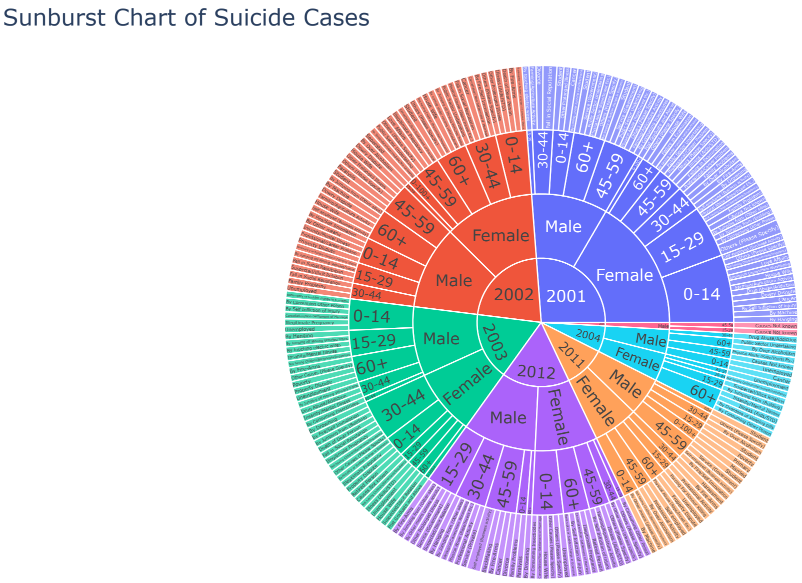
```
# Distribution of suicide cases by 'Type_code' and 'Gender
plt.figure(figsize=(10, 6))
sns.countplot(data=df, x='Type_code', hue='Gender', order=df['Type_code'].value_counts().index)
plt.title("Distribution of Suicide Cases by Type Code and Gender")
plt.xticks(rotation=45)
plt.xlabel("Type Code")
plt.ylabel("Count")
plt.legend(title="Gender")
plt.show()
```



```
# Distribution of Suicide Cases by State, Age Group, and Year
plt.figure(figsize=(14, 8))
sns.boxplot(data=df, x='State', y='Year', hue='Age_group')
plt.title("Distribution of Suicide Cases by State, Age Group, and Year")
plt.xticks(rotation=90)
plt.xlabel("State")
plt.ylabel("Year")
plt.legend(title="Age Group")
plt.show()
```



```
# Group the data and calculate the count of each combination
grouped_data = df.groupby(['Year', 'Gender', 'Age_group', 'Type']).size().reset_index(name='Count')

# Create the sunburst chart
fig = px.sunburst(grouped_data, path=['Year', 'Gender', 'Age_group', 'Type'], values='Count')
fig.update_layout(title="Sunburst Chart of Suicide Cases")
fig.show()
```



```
# Import necessary libraries
import pandas as pd
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler
import matplotlib.pyplot as plt
```

```
!pip install fuzzywuzzy
```

```
    Collecting fuzzywuzzy
      Downloading fuzzywuzzy-0.18.0-py2.py3-none-any.whl (18 kB)
    Installing collected packages: fuzzywuzzy
    Successfully installed fuzzywuzzy-0.18.0
```

```
# Extract features using TF-IDF
# Term Frequency-Inverse Document Frequency (TF-IDF) representation
# Each string becomes a vector, and then you can apply traditional clustering algorithms like K-means or hierarchical clustering.
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.cluster import KMeans
from fuzzywuzzy import fuzz
```