

# Human Cost of Israel-Palestine Conflict (2000 - 2021) Analysis



```
In [1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
import plotly.graph_objects as go
```

```
In [2]: import warnings
warnings.filterwarnings('ignore')
```

```
In [3]: df = pd.read_csv("israel_palestine_conflict.csv")
```

```
In [4]: df.head()
```

```
Out[4]:
```

	Year	Month	Palestinians Injuries	Israelis Injuries	Palestinians Killed	Israelis Killed
0	2000	DECEMBER	781	NaN	51	8
1	2000	NOVEMBER	3838	NaN	112	22
2	2000	OCTOBER	5984	NaN	104	10
3	2000	SEPTEMBER	NaN	NaN	16	1
4	2001	DECEMBER	304	NaN	67	36

```
In [5]: df.tail()
```

```
Out[5]:
```

	Year	Month	Palestinians Injuries	Israelis Injuries	Palestinians Killed	Israelis Killed
244	2021	JANUARY	NaN	NaN	4	0
245	2021	FEBRUARY	NaN	NaN	1	0
246	2021	MARCH	NaN	NaN	4	0
247	2021	APRIL	NaN	NaN	1	0
248	2021	MAY	NaN	NaN	26	3

```
In [6]: df.shape
```

```
Out[6]: (249, 6)
```

```
In [7]: df.columns
```

```
Out[7]: Index(['Year', 'Month', 'Palestinians Injuries', 'Israelis Injuries',  
              'Palestinians Killed', 'Israelis Killed'],  
             dtype='object')
```

```
In [8]: df.duplicated().sum()
```

```
Out[8]: 0
```

```
In [9]: df.isnull().sum()
```

```
Out[9]: Year                0  
Month                0  
Palestinians Injuries    54  
Israelis Injuries       117  
Palestinians Killed      0  
Israelis Killed         0  
dtype: int64
```

```
In [10]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 249 entries, 0 to 248  
Data columns (total 6 columns):  
#   Column                Non-Null Count  Dtype  
---  -  
0   Year                  249 non-null   int64  
1   Month                 249 non-null   object  
2   Palestinians Injuries 195 non-null   object  
3   Israelis Injuries     132 non-null   object  
4   Palestinians Killed    249 non-null   int64  
5   Israelis Killed       249 non-null   int64  
dtypes: int64(3), object(3)  
memory usage: 11.8+ KB
```

```
In [11]: df = df.fillna({  
          'Palestinians Injuries': '0',  
          'Israelis Injuries': '0'  
        })
```

```
In [12]: numerical_columns = ['Palestinians Injuries', 'Israelis Injuries', 'Palestinians Killed', 'Israelis Killed']  
df[numerical_columns] = df[numerical_columns].replace({'': ''}, regex=True)  
df[numerical_columns] = df[numerical_columns].apply(pd.to_numeric, errors='coerce')
```

In [13]:

df

Out[13]:

	Year	Month	Palestinians Injuries	Israelis Injuries	Palestinians Killed	Israelis Killed
0	2000	DECEMBER	781.0	0.0	51	8
1	2000	NOVEMBER	3838.0	0.0	112	22
2	2000	OCTOBER	5984.0	0.0	104	10
3	2000	SEPTEMBER	0.0	0.0	16	1
4	2001	DECEMBER	304.0	0.0	67	36
...	...	...	...	...	...	...
244	2021	JANUARY	0.0	0.0	4	0
245	2021	FEBRUARY	0.0	0.0	1	0
246	2021	MARCH	0.0	0.0	4	0
247	2021	APRIL	0.0	0.0	1	0
248	2021	MAY	0.0	0.0	26	3

249 rows × 6 columns

In [14]:

df.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 249 entries, 0 to 248
Data columns (total 6 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   Year                                249 non-null    int64
1   Month                              249 non-null    object
2   Palestinians Injuries              247 non-null    float64
3   Israelis Injuries                 247 non-null    float64
4   Palestinians Killed                249 non-null    int64
5   Israelis Killed                   249 non-null    int64
dtypes: float64(2), int64(3), object(1)
memory usage: 11.8+ KB
```

In [15]:

df.describe()

Out[15]:

	Year	Palestinians Injuries	Israelis Injuries	Palestinians Killed	Israelis Killed
count	249.000000	247.000000	247.000000	249.000000	249.000000
mean	2010.542169	451.315789	20.890688	40.160643	5.120482
std	6.014702	1471.798713	150.387900	129.148851	11.653323
min	2000.000000	0.000000	0.000000	0.000000	0.000000
25%	2005.000000	61.500000	0.000000	4.000000	0.000000
50%	2011.000000	161.000000	3.000000	12.000000	1.000000
75%	2016.000000	302.500000	15.000000	37.000000	5.000000
max	2021.000000	13735.000000	2347.000000	1590.000000	122.000000

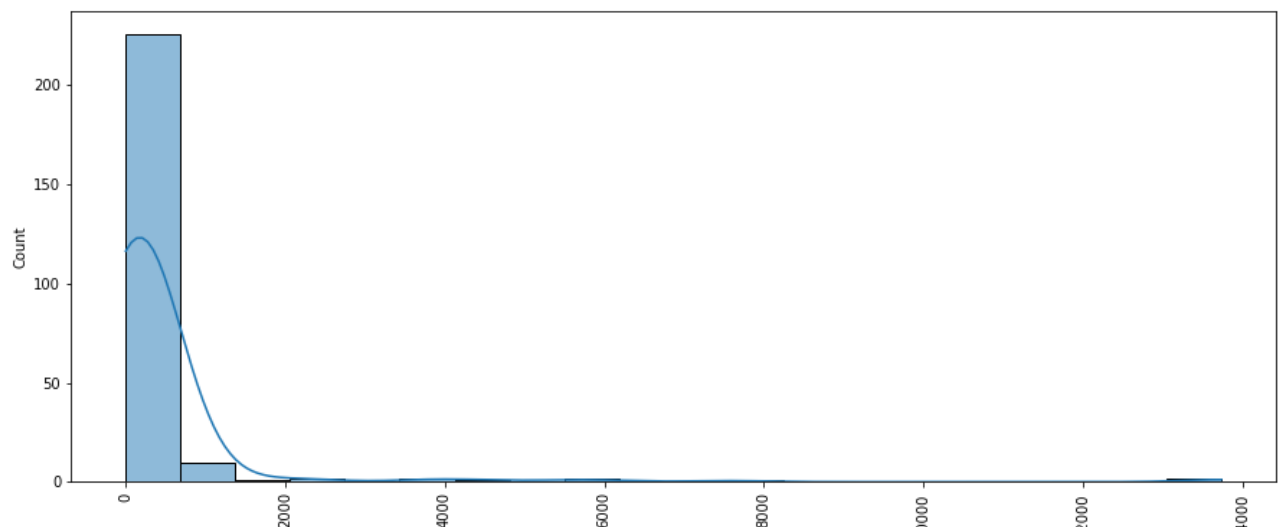
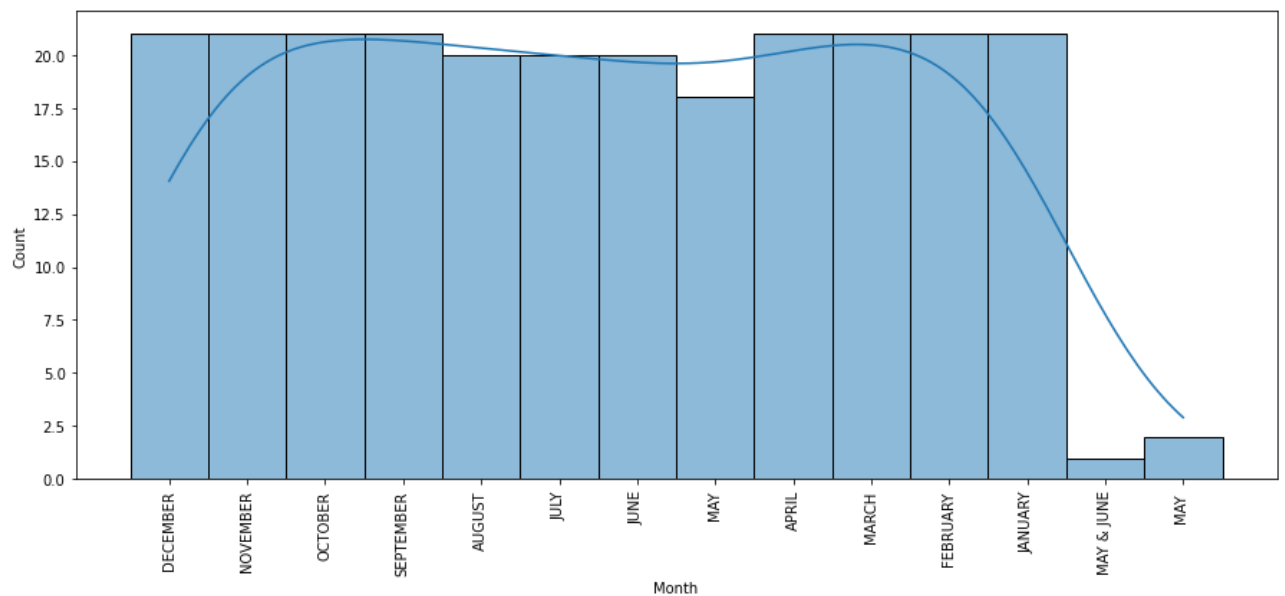
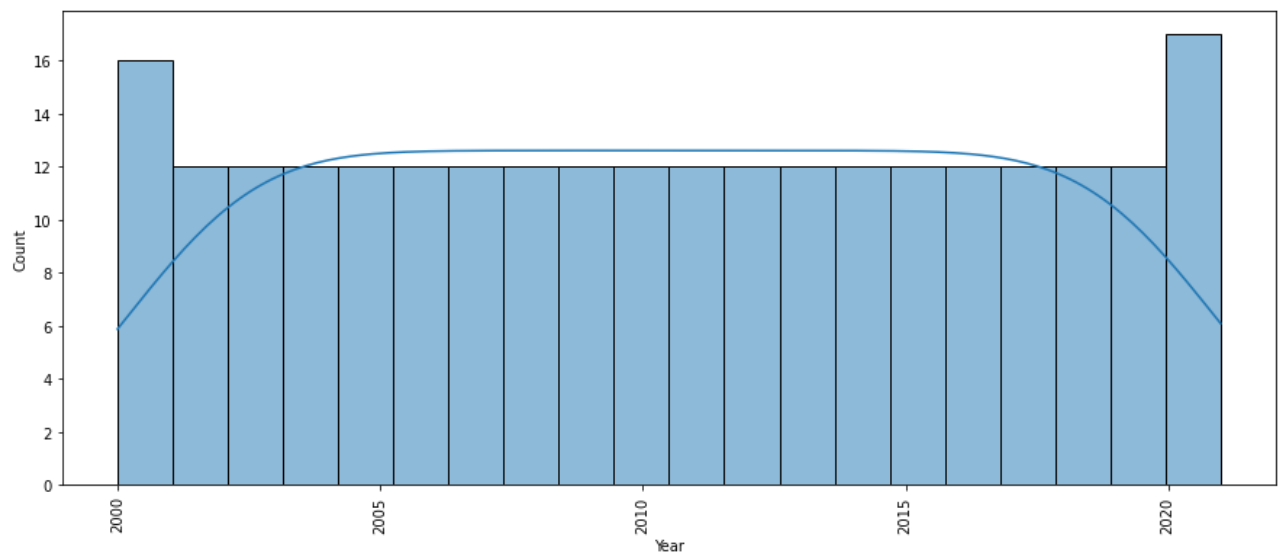
In [16]:

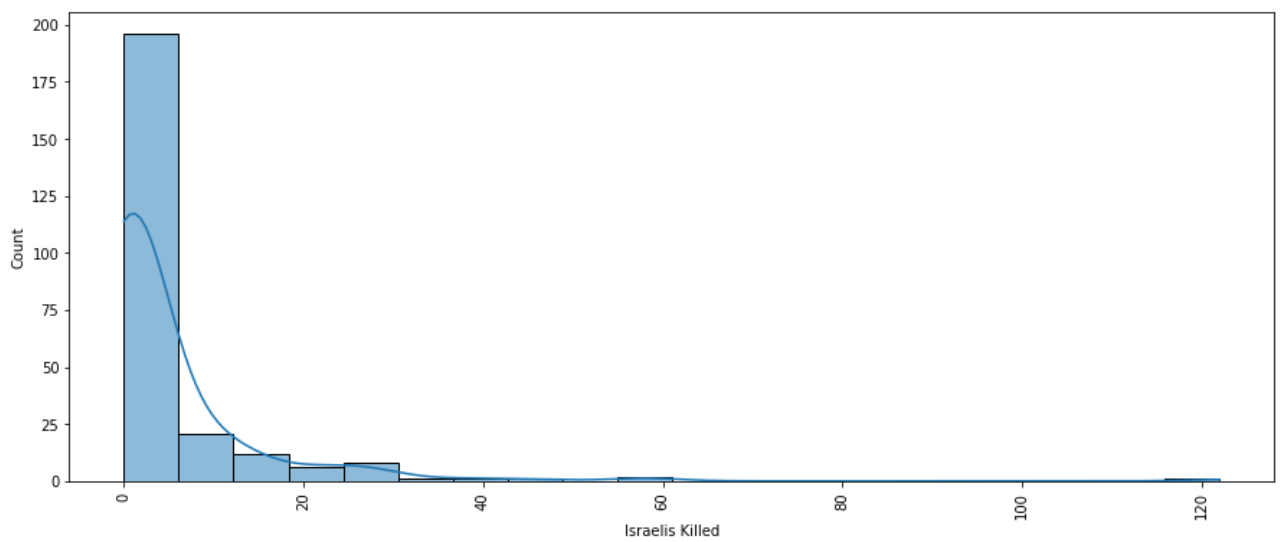
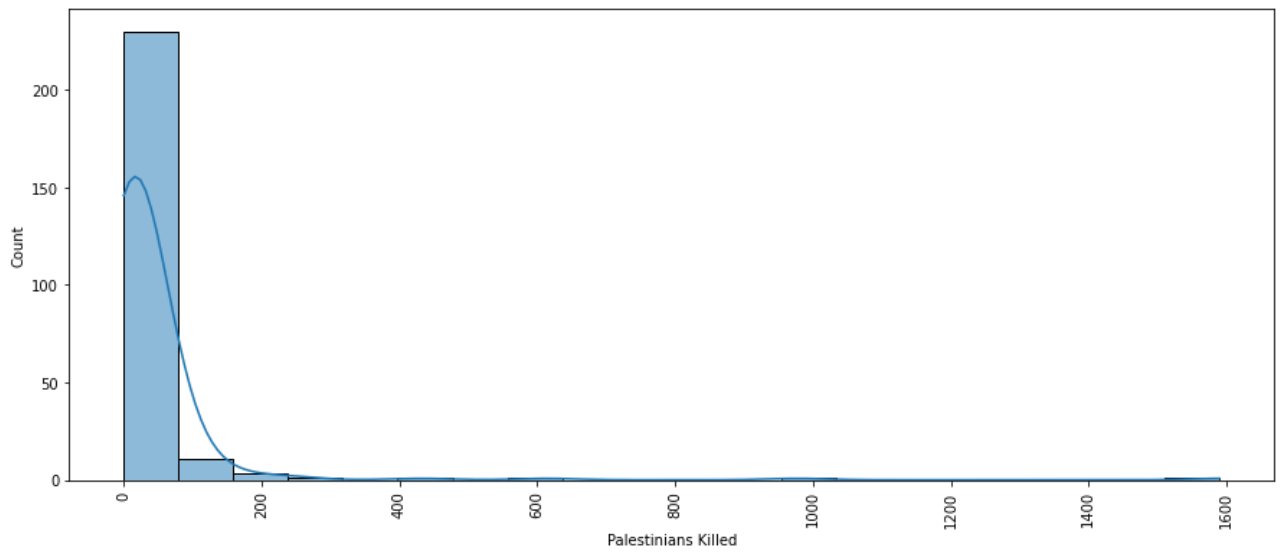
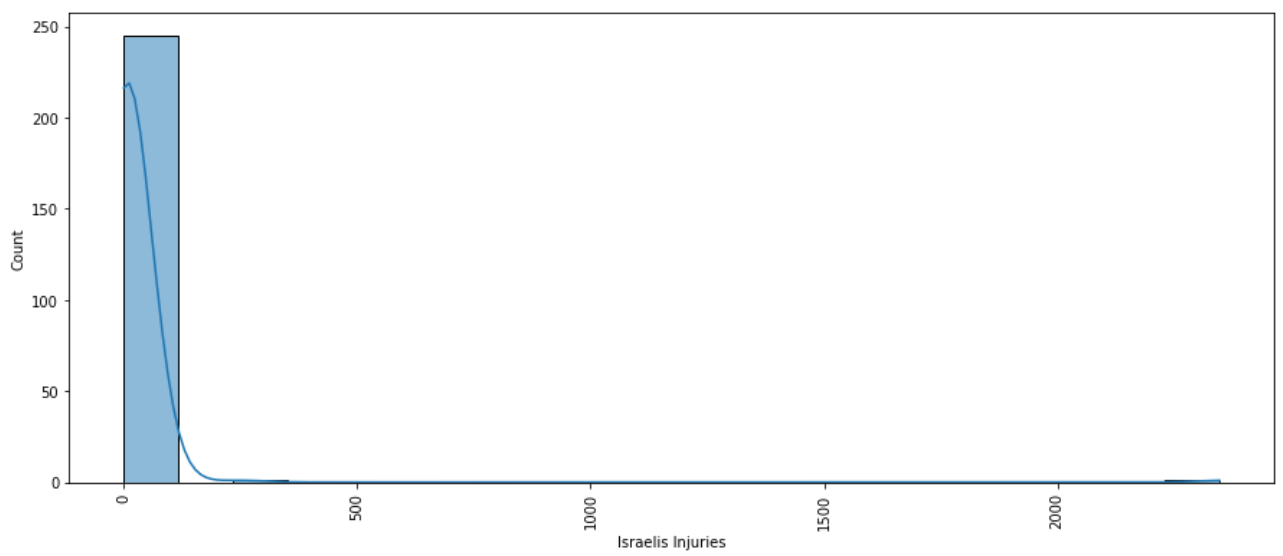
df.unique()

```
df.nunique()
```

```
Out[16]: Year                22  
Month                14  
Palestinians Injuries  169  
Israelis Injuries      53  
Palestinians Killed    77  
Israelis Killed        33  
dtype: int64
```

```
In [17]: for i in df.columns:  
plt.figure(figsize=(15,6))  
sns.histplot(df[i], kde = True, bins = 20, palette = 'hls')  
plt.xticks(rotation = 90)  
plt.show()
```

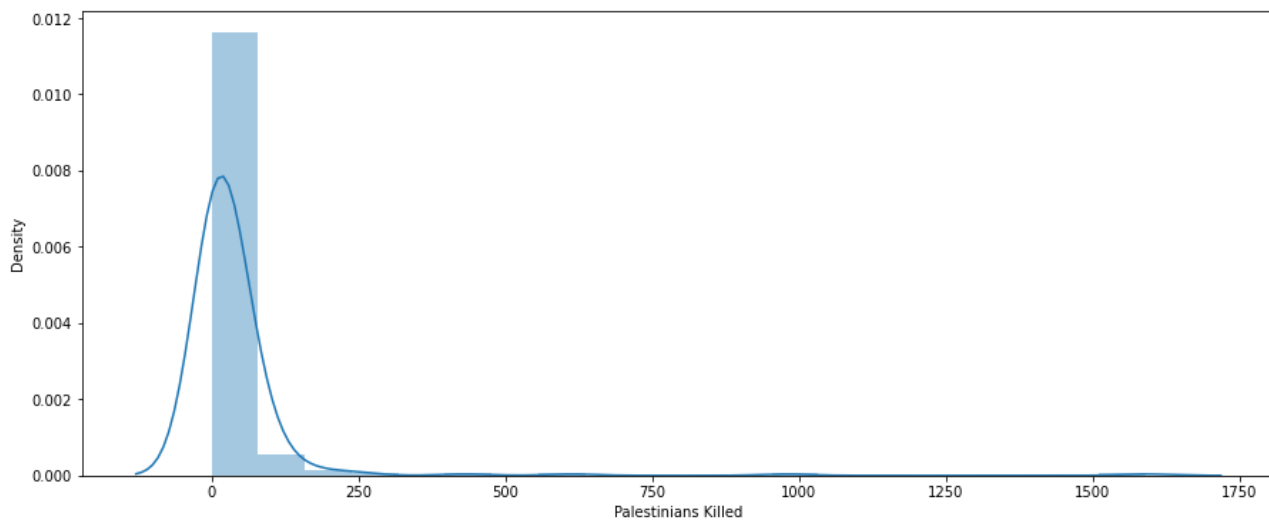
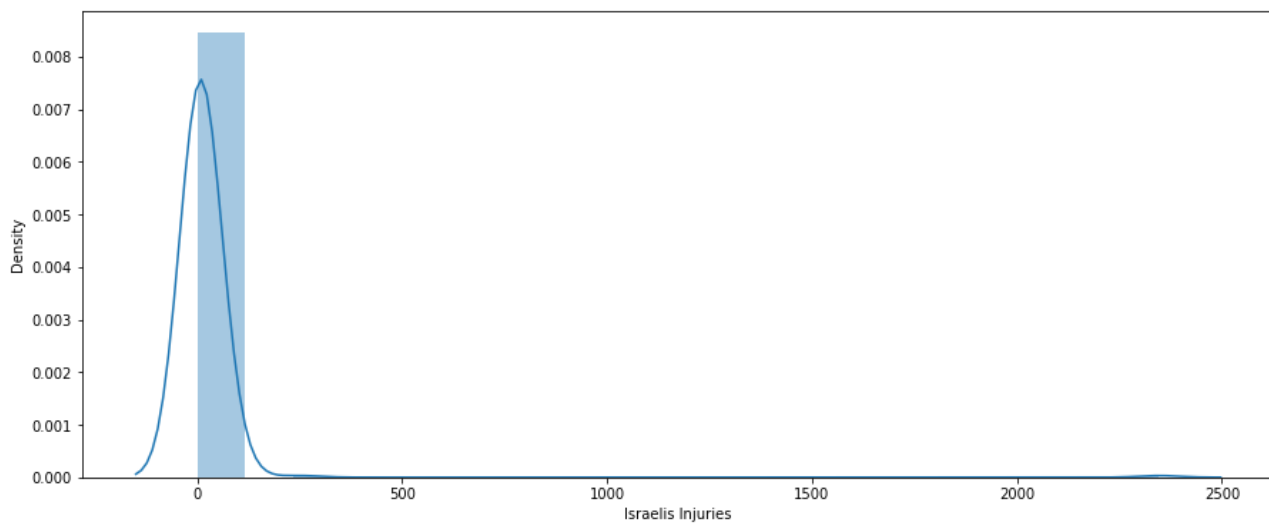
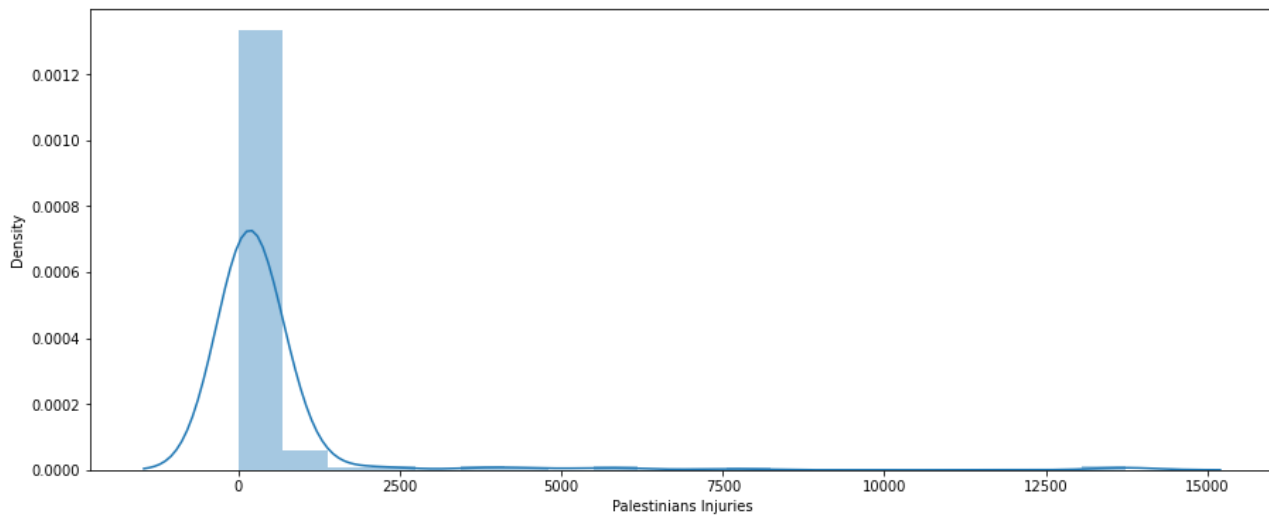
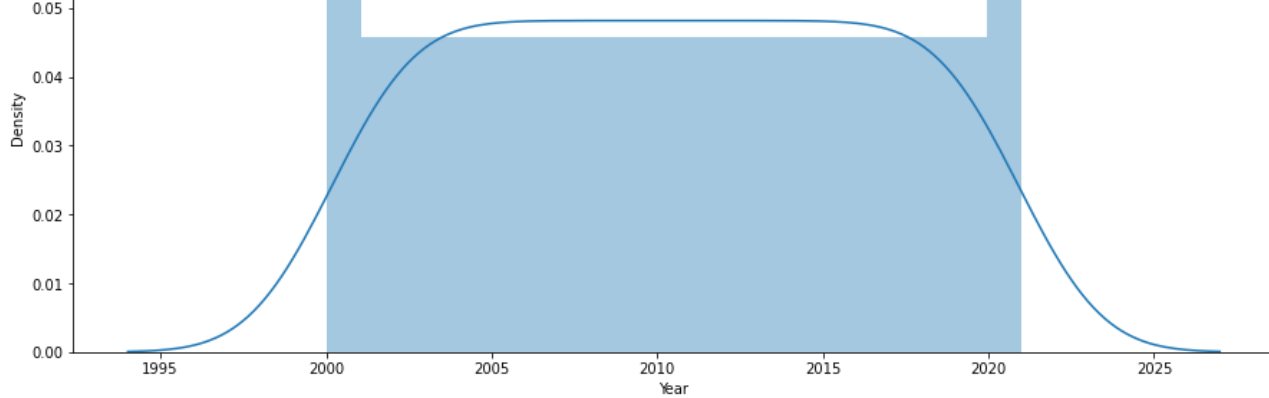


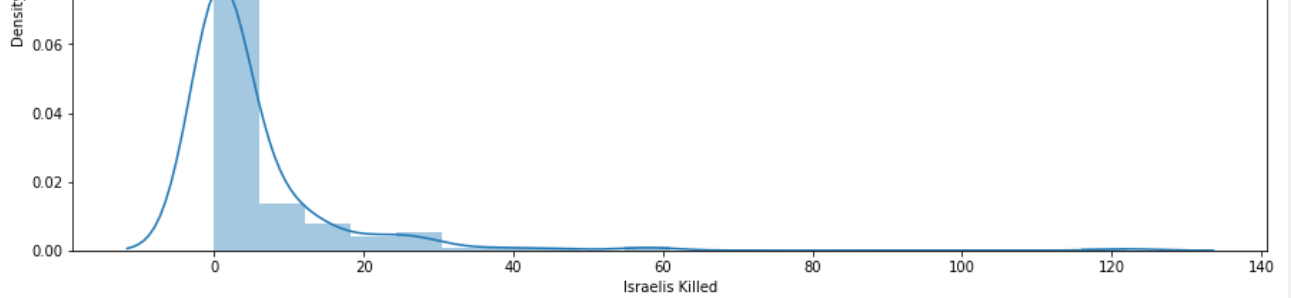


```
In [18]: df1 = df[['Year', 'Palestinians Injuries', 'Israelis Injuries','Palestinians Killed',
                  'Israelis Killed']]
```

```
In [19]: for i in df1.columns:
plt.figure(figsize=(15,6))
sns.distplot(df1[i], kde = True, bins = 20)
plt.xticks(rotation = 0)
plt.show()
```

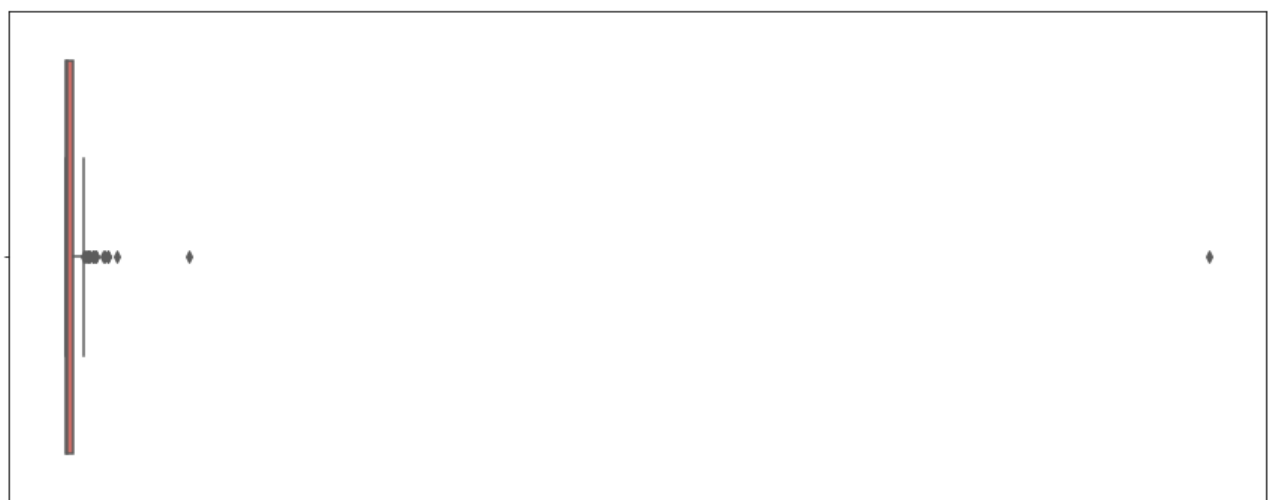
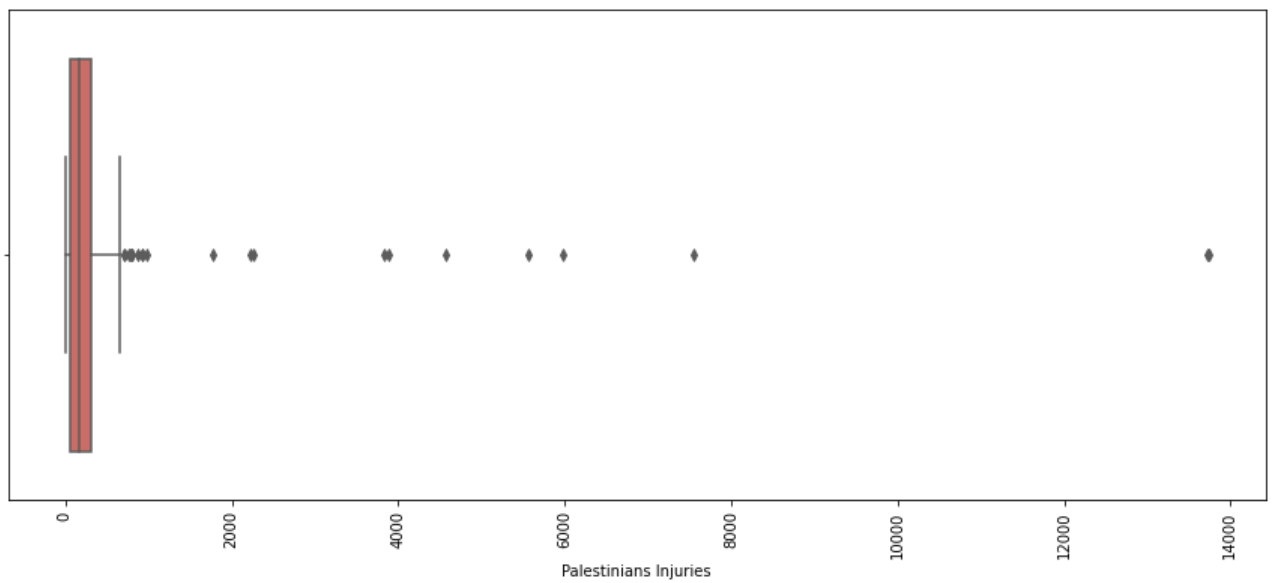
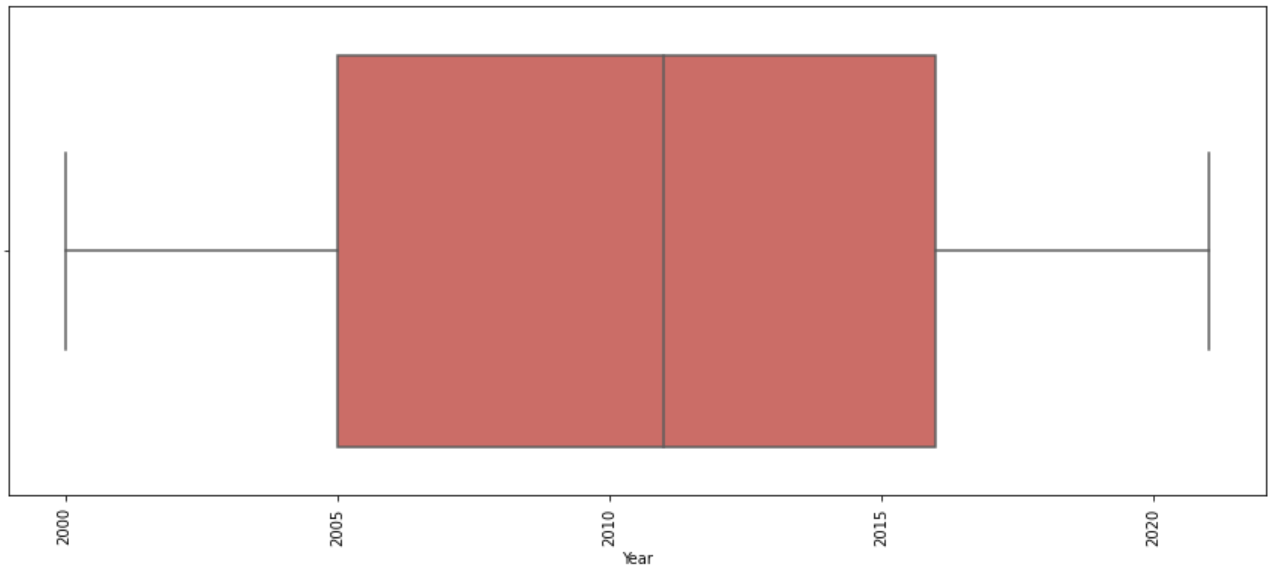


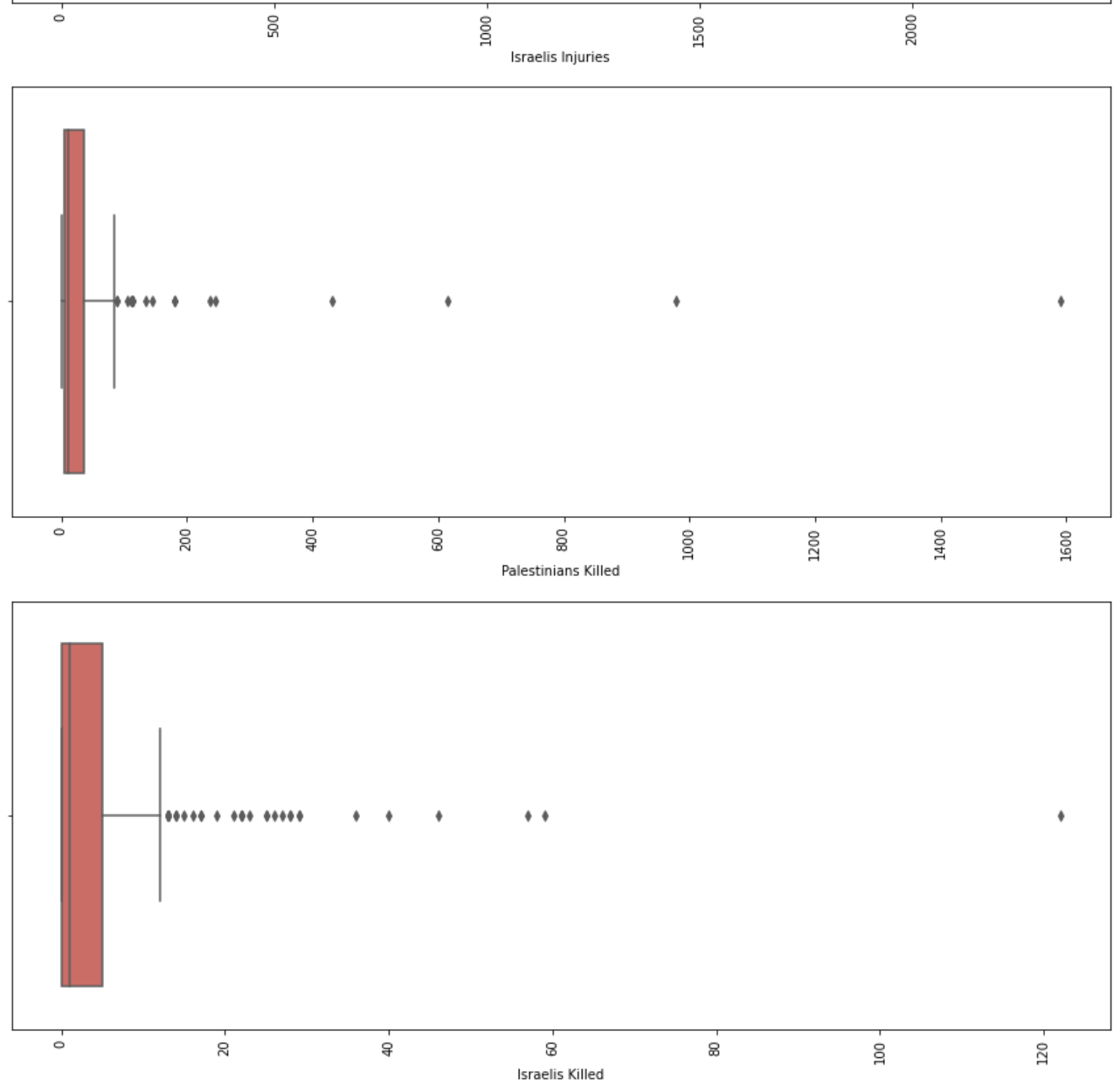




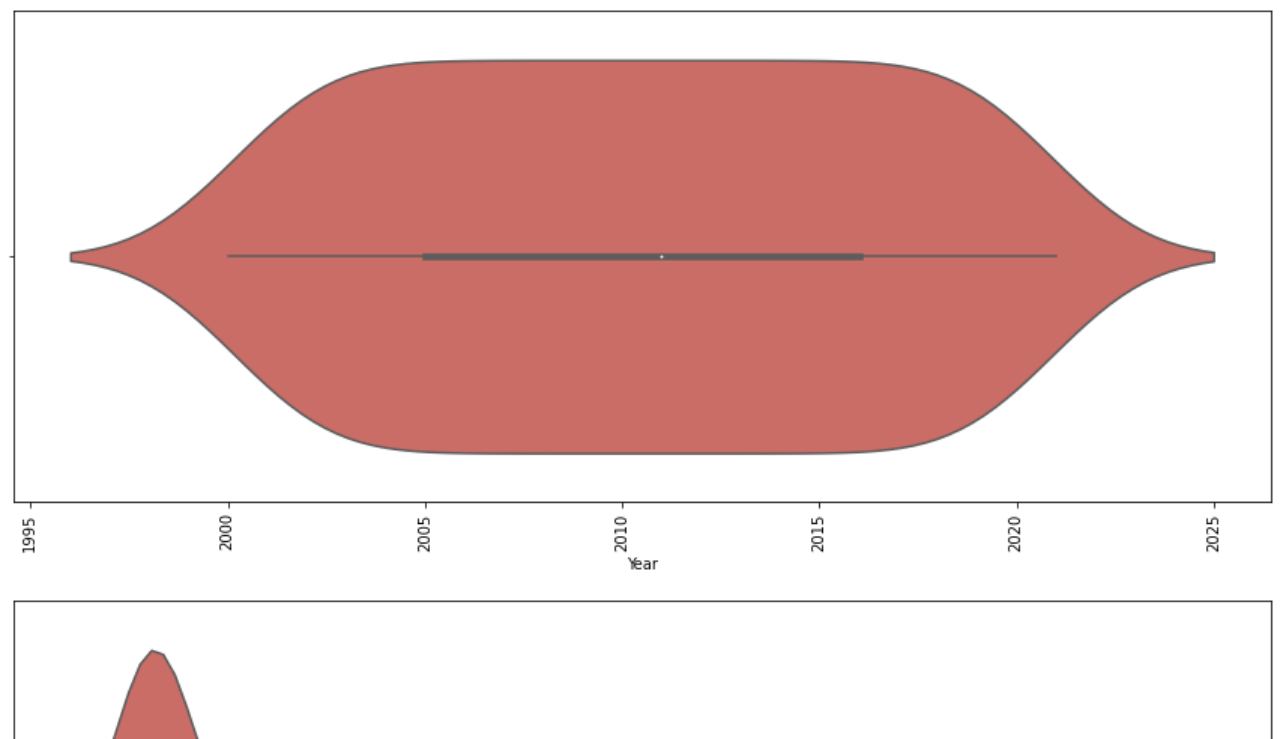
In [20]:

```
for i in df1.columns:
    plt.figure(figsize=(15,6))
    sns.boxplot(df1[i], data = df, palette = 'hls')
    plt.xticks(rotation = 90)
    plt.show()
```

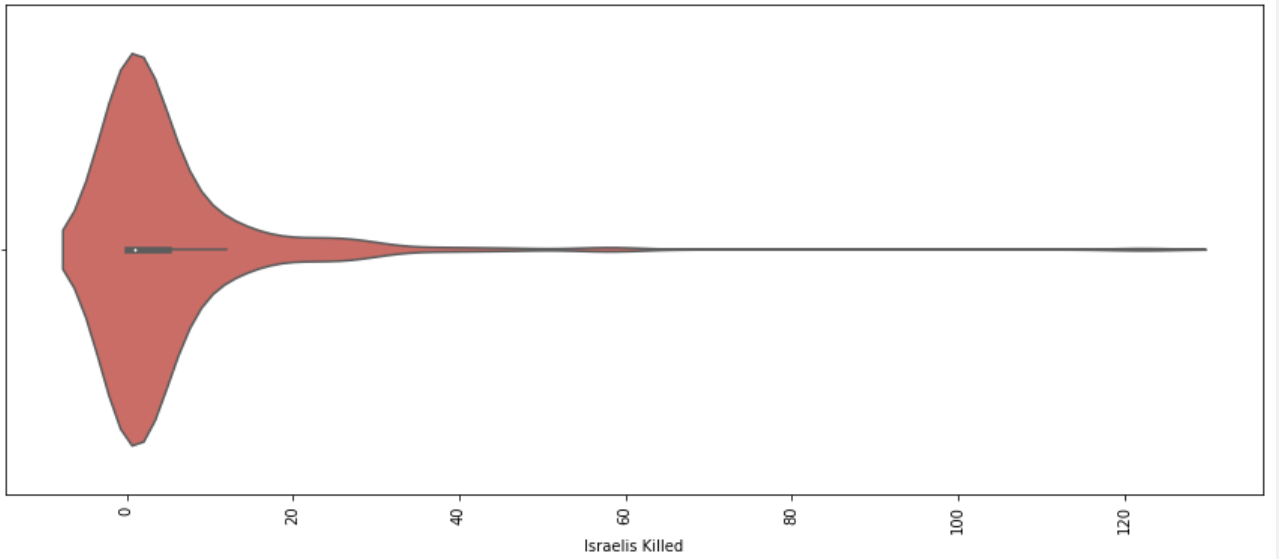
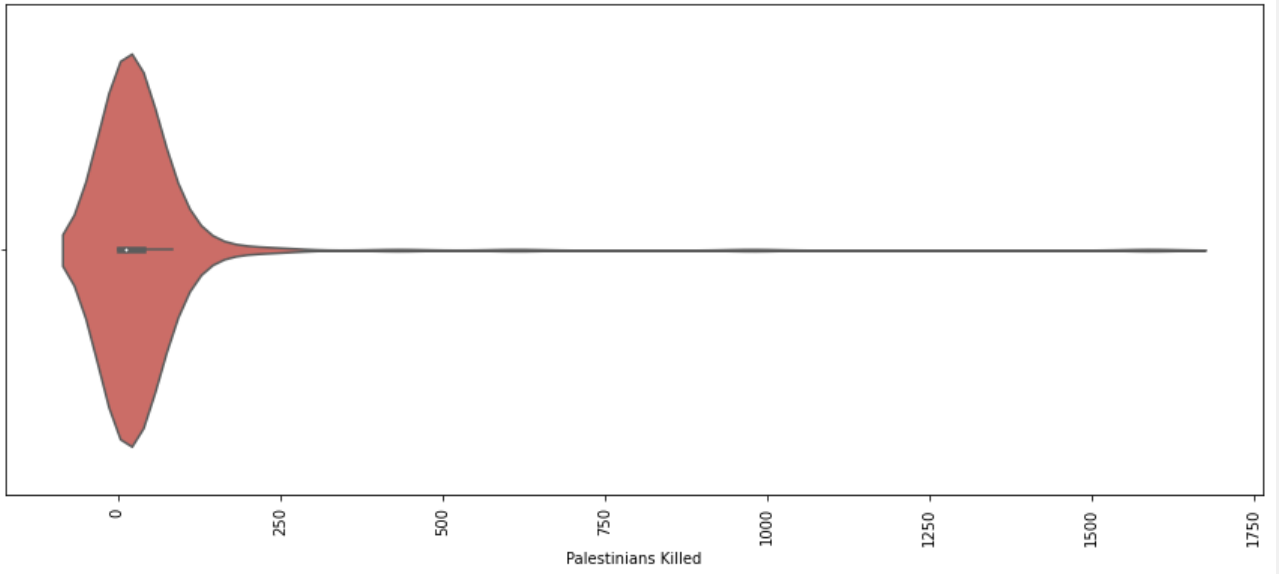
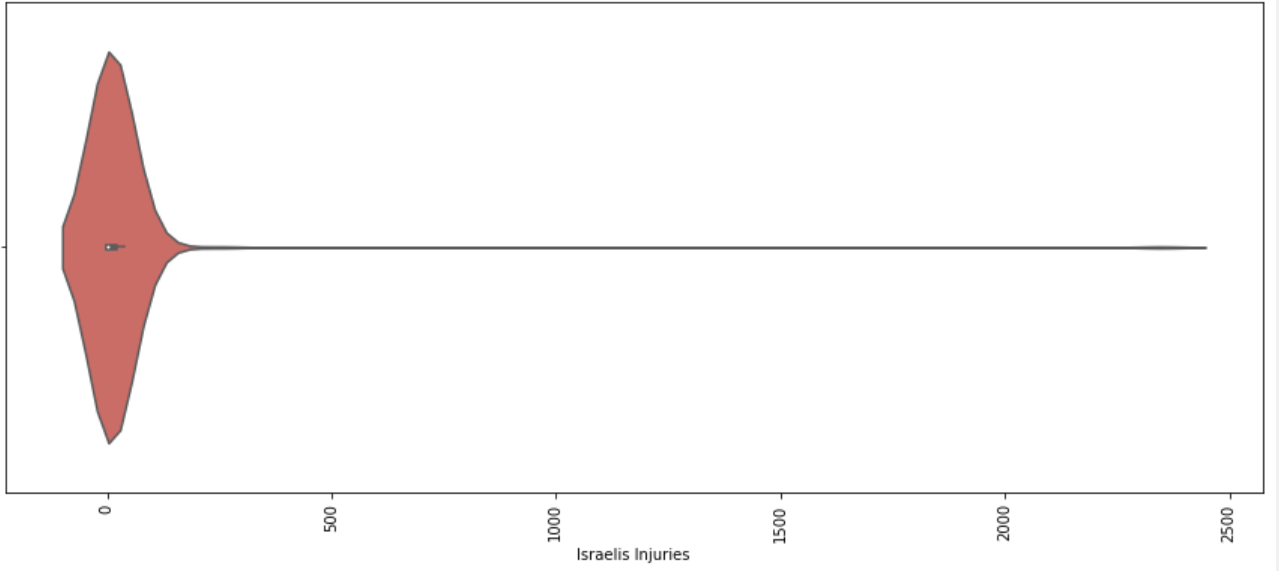
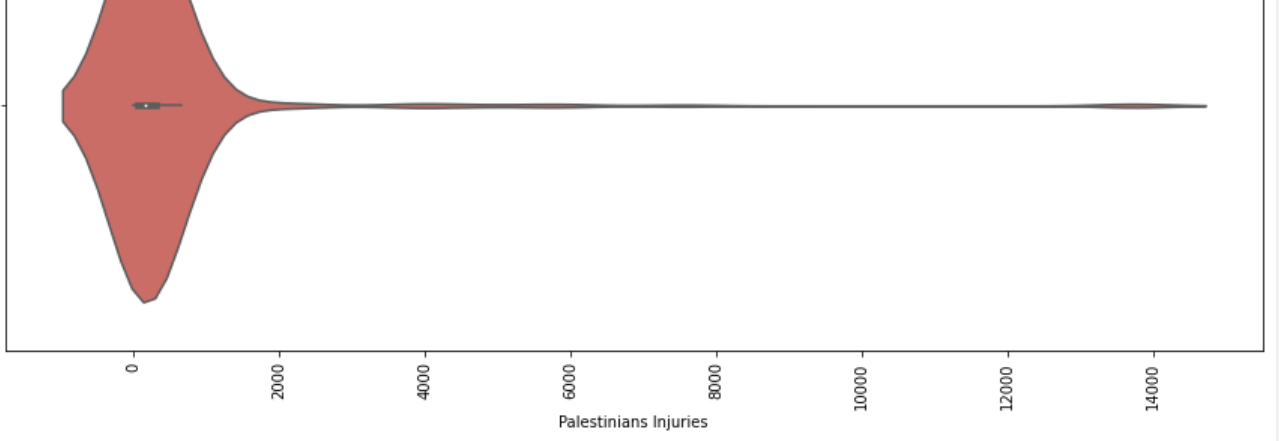




```
In [21]: for i in df1.columns:
plt.figure(figsize=(15,6))
sns.violinplot(df1[i], data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```





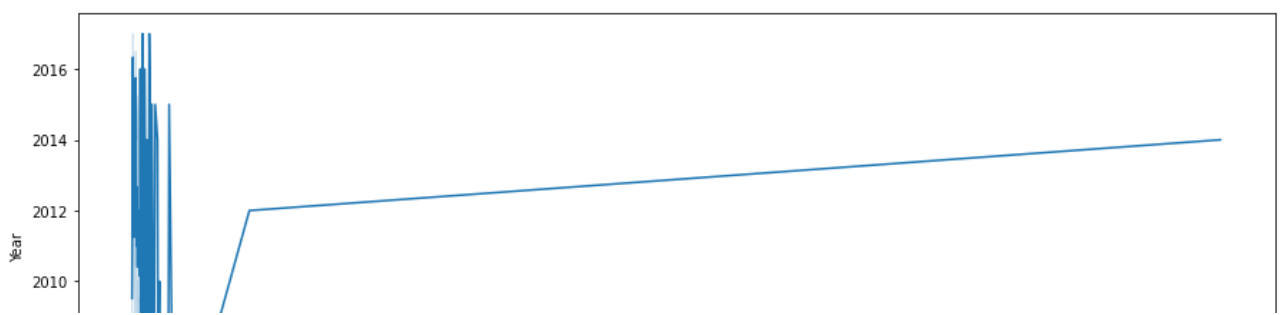
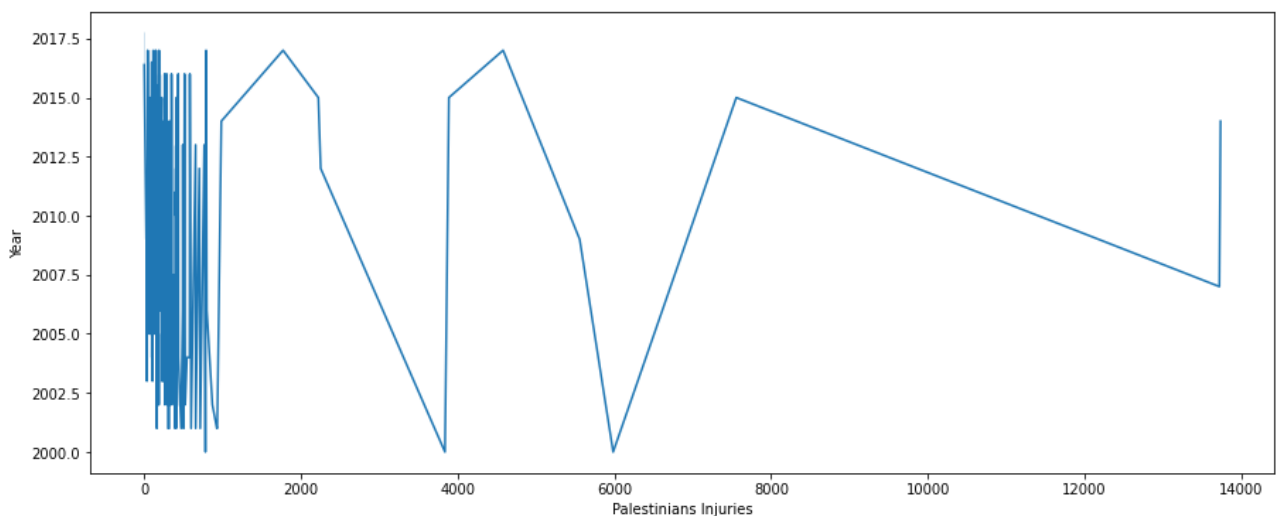


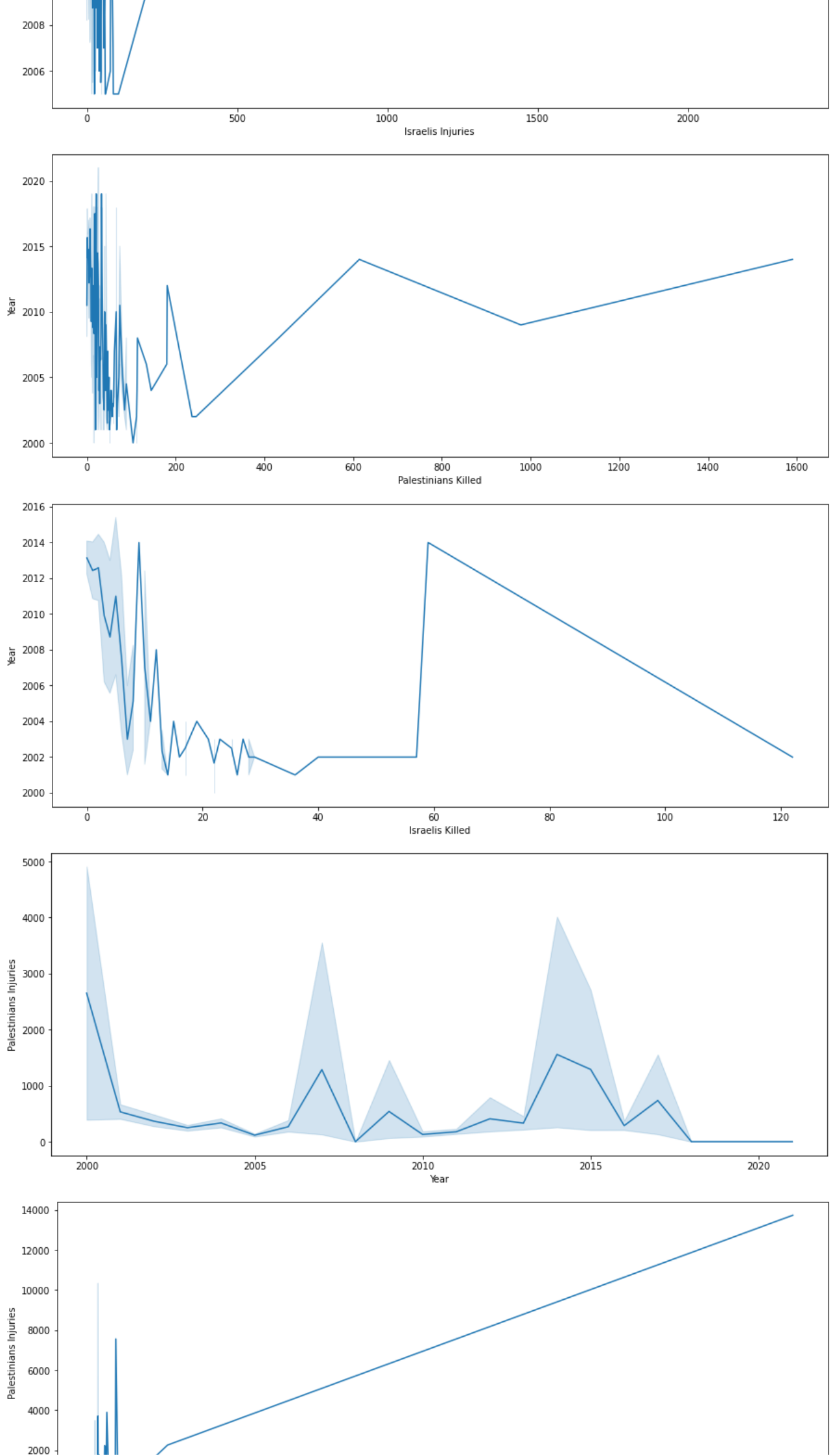
```
In [22]: for i in df.columns:
fig = go.Figure(data=[go.Histogram(x=df[i])])
fig.update_layout(
    title=i,
    xaxis_title=i,
    yaxis_title="Value")
fig.show()
```

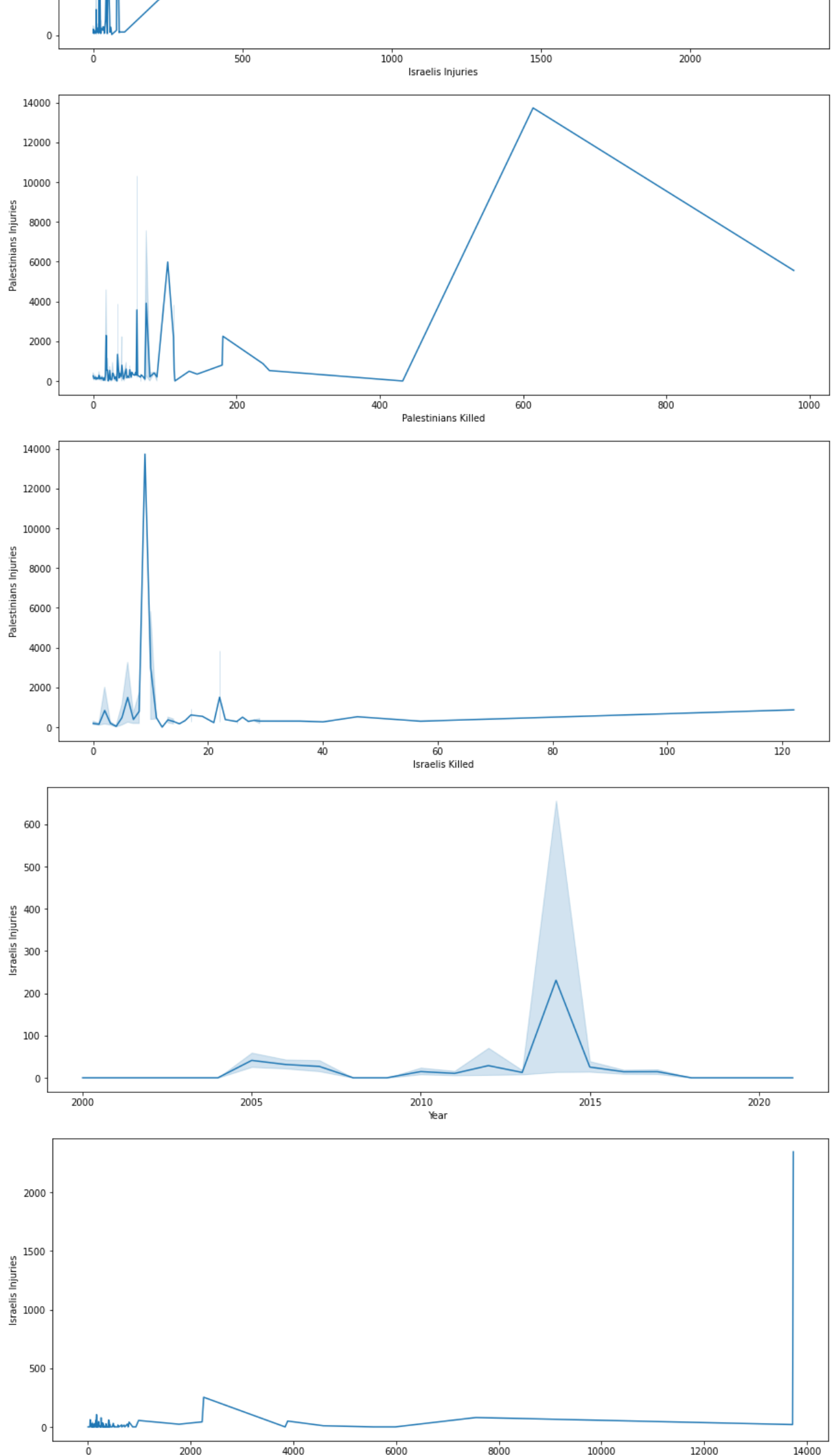
```
In [23]: for i in df1.columns:
fig = go.Figure(data=[go.Box(x=df1[i])])
fig.update_layout(
    title=i,
    xaxis_title=i,
    yaxis_title="Value")
fig.show()
```

```
In [24]: for i in df1.columns:
fig = go.Figure(data=[go.Violin(x=df1[i])])
fig.update_layout(
    title=i,
    xaxis_title=i,
    yaxis_title="Value")
fig.show()
```

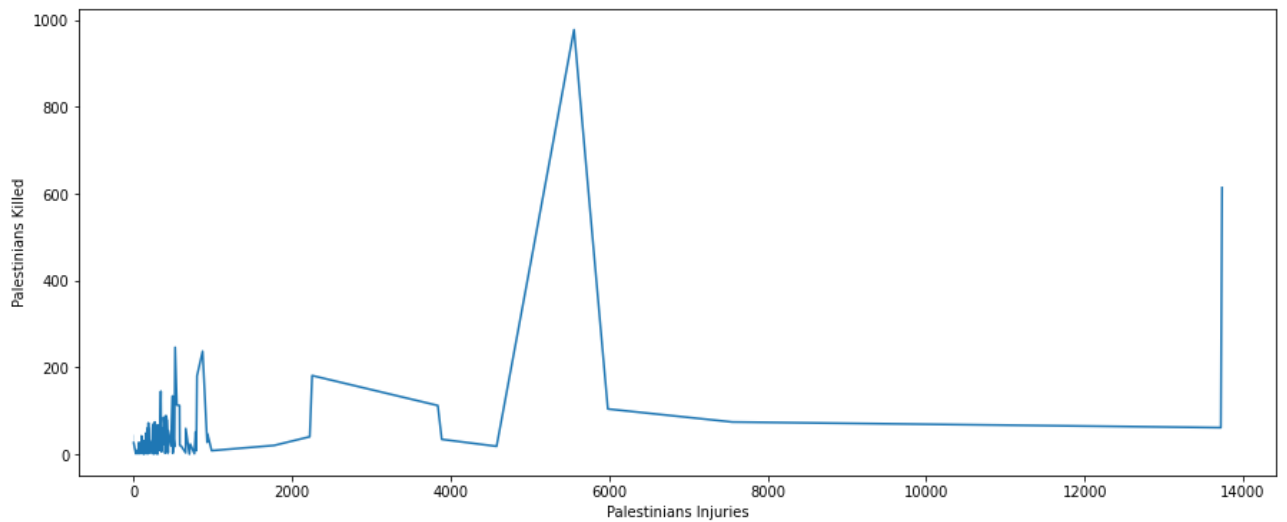
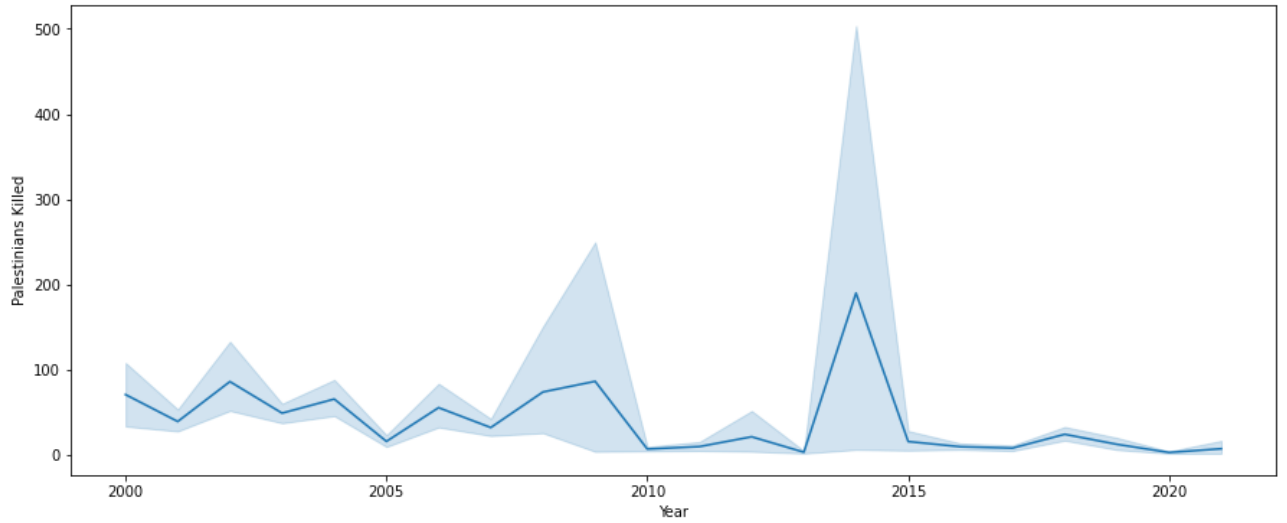
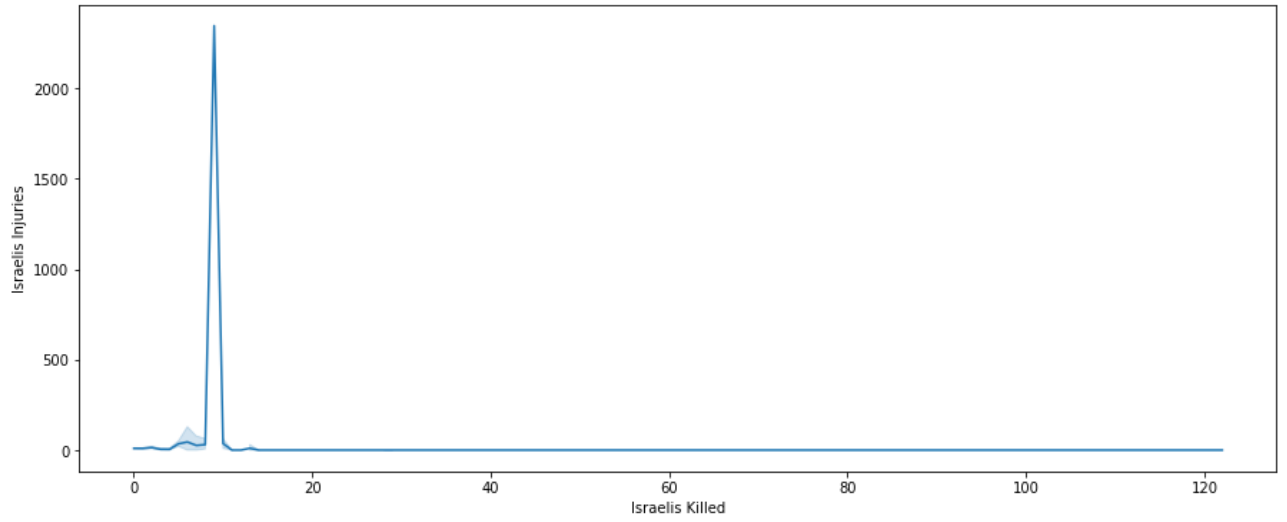
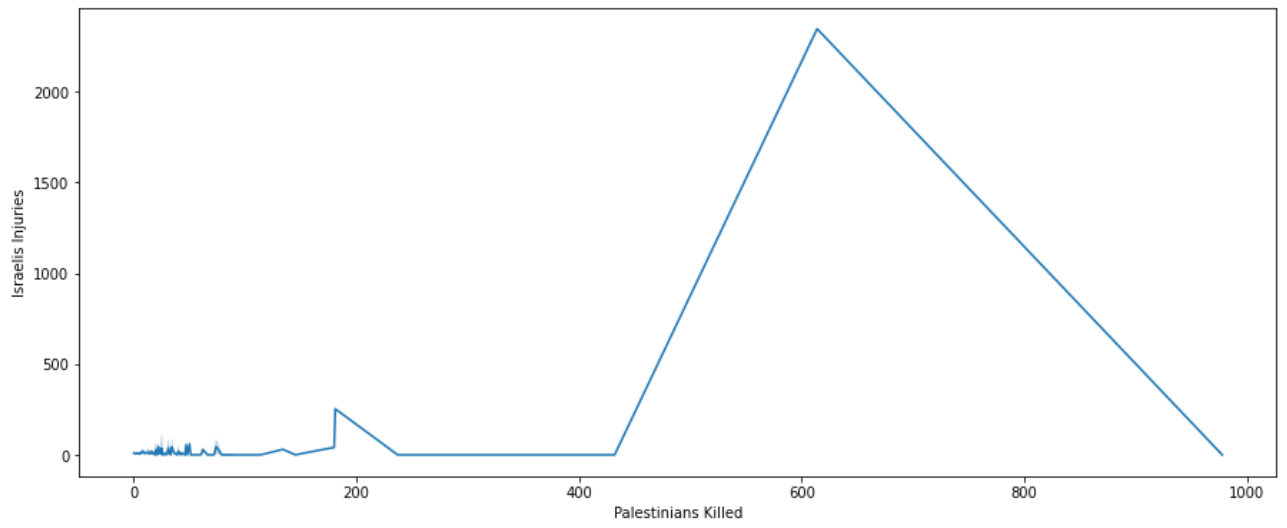
```
In [25]: for i in df1.columns:
for j in df1.columns:
    if i != j:
        plt.figure(figsize=(15,6))
        sns.lineplot(x = df1[j], y = df1[i], data = df1, palette = 'hls')
        plt.show()
```

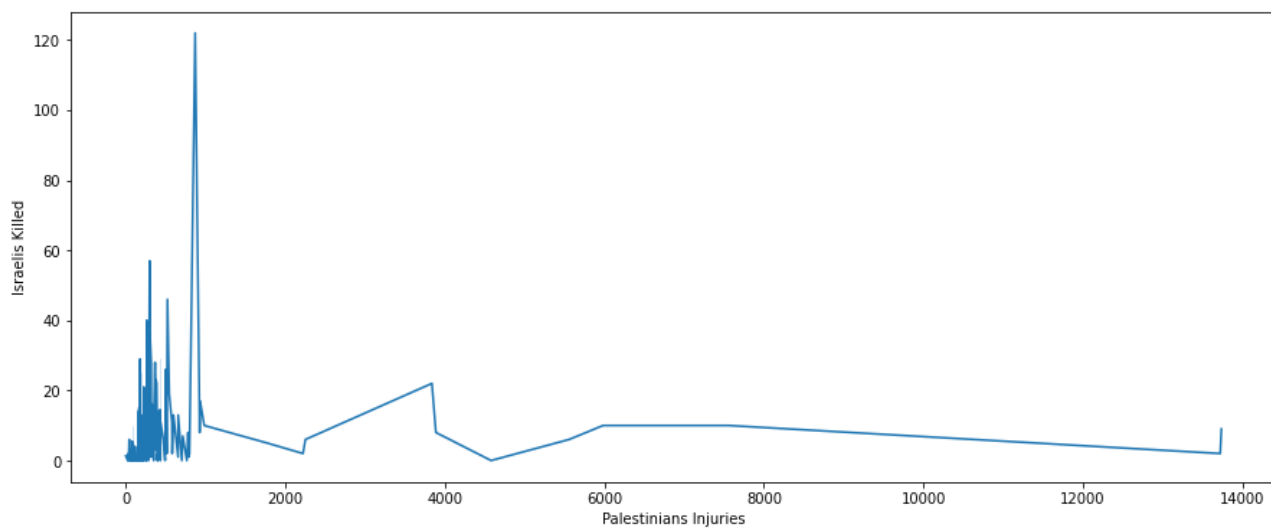
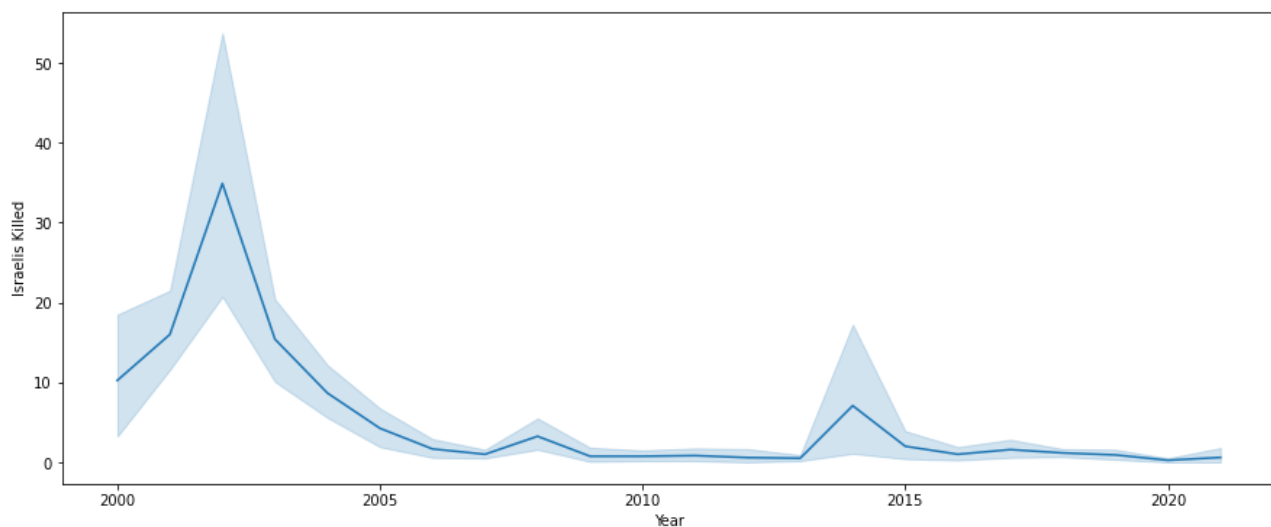
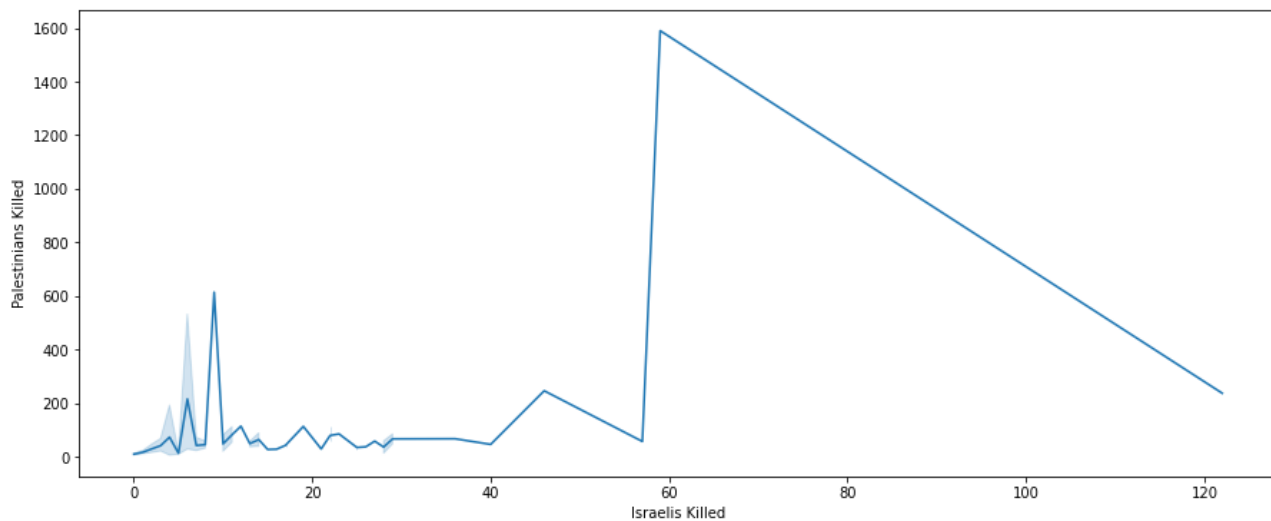
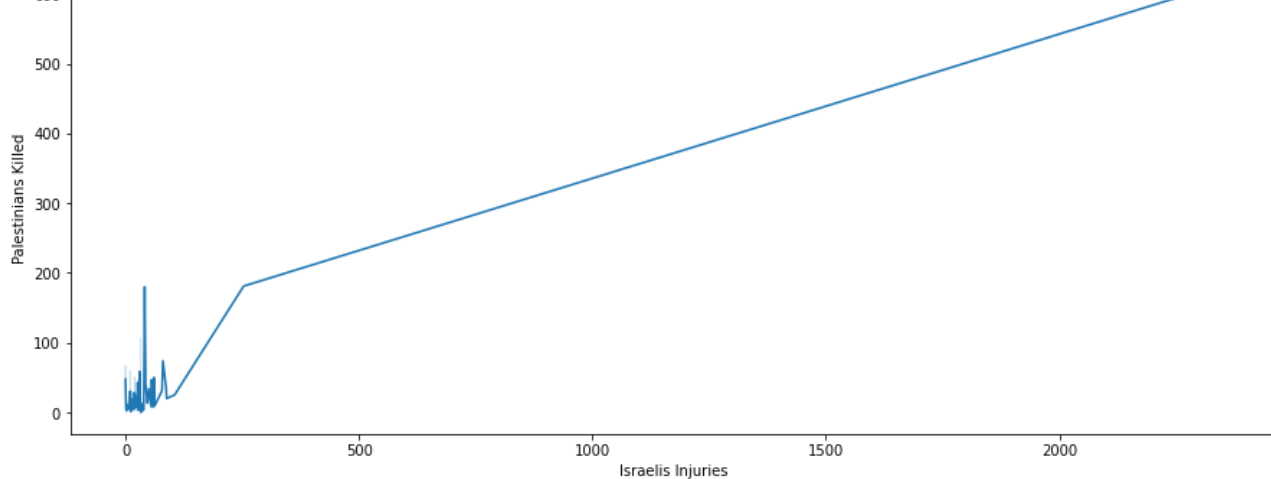


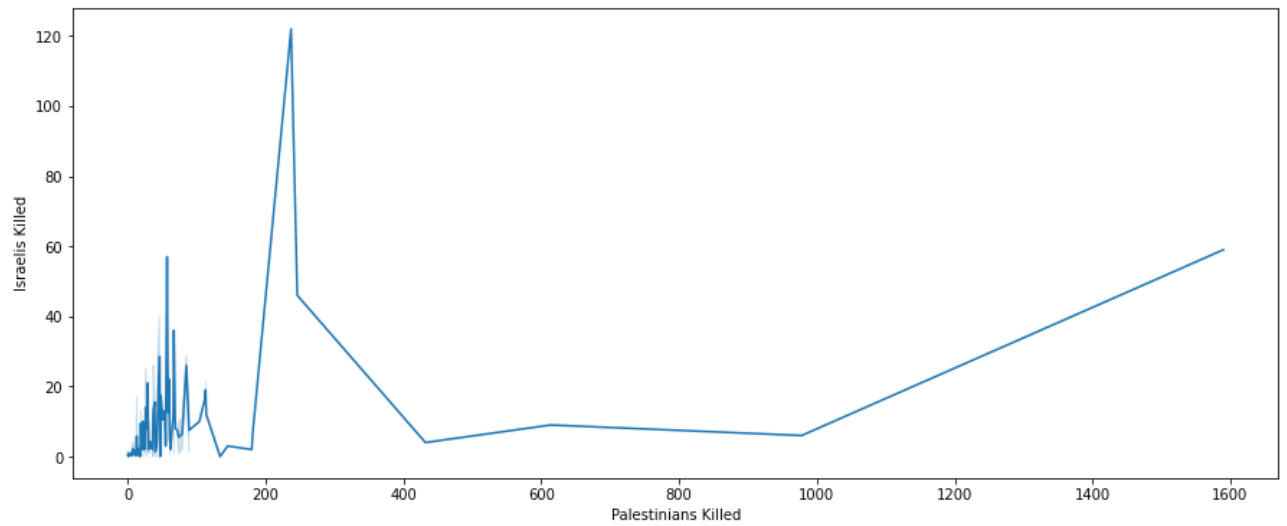
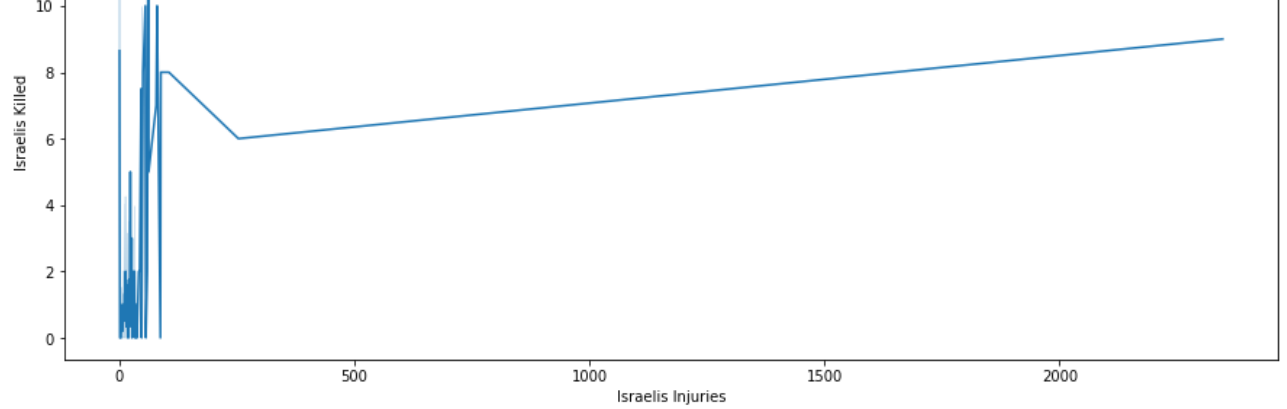




Palestinians Injuries

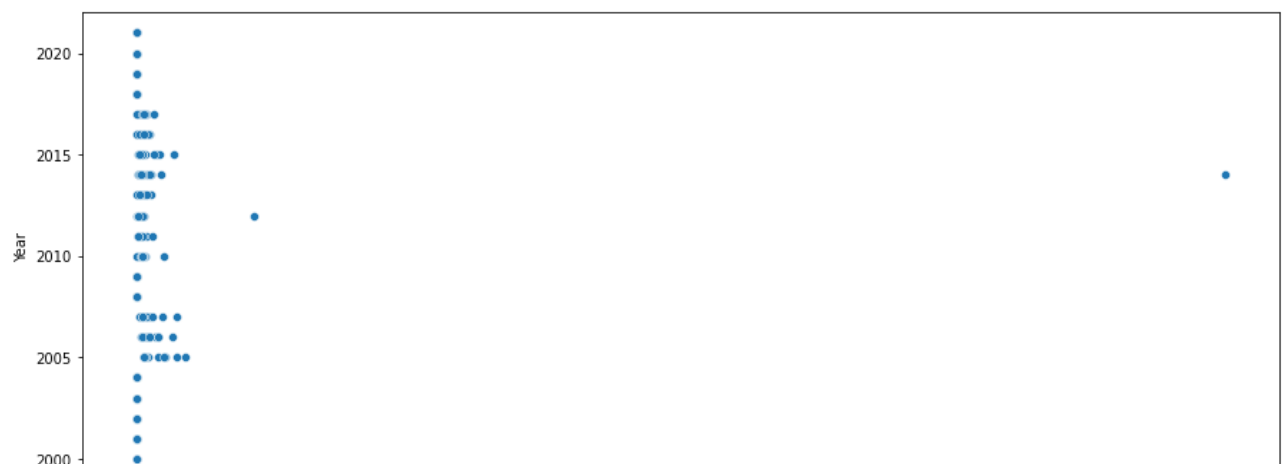
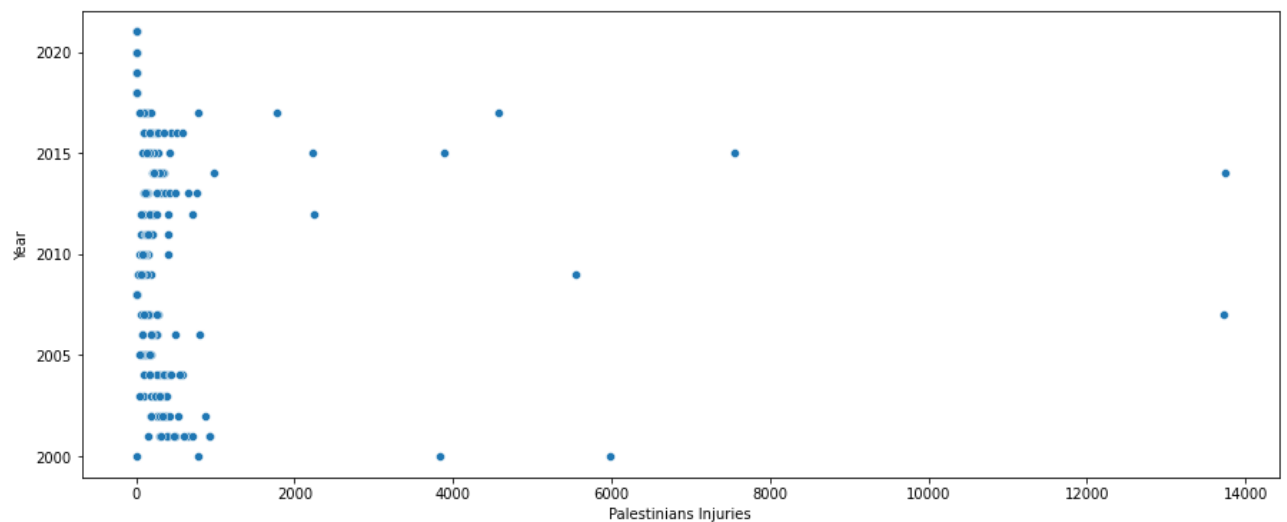


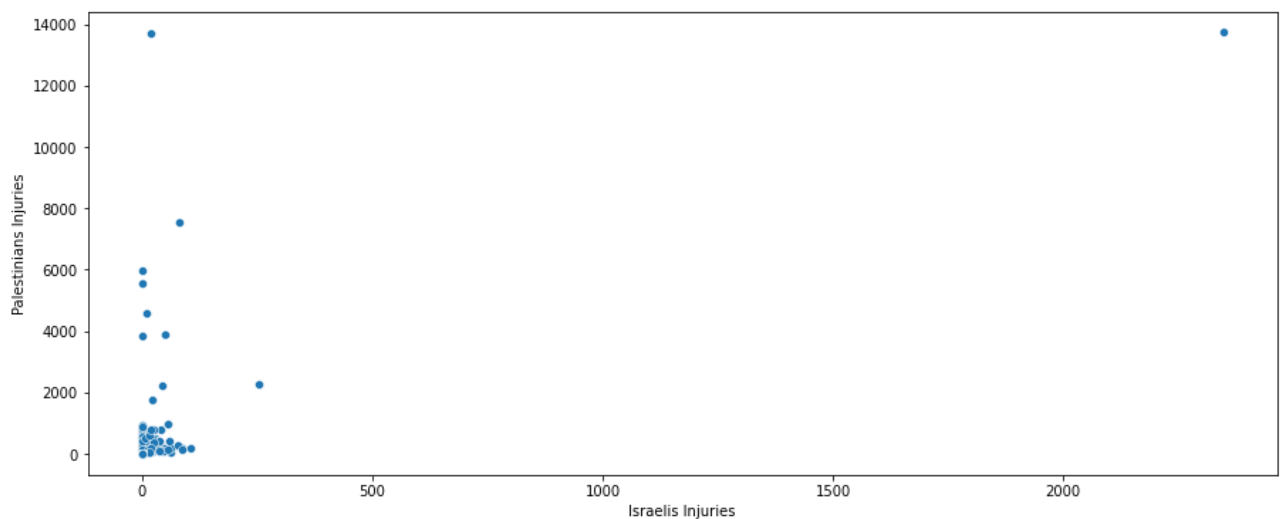
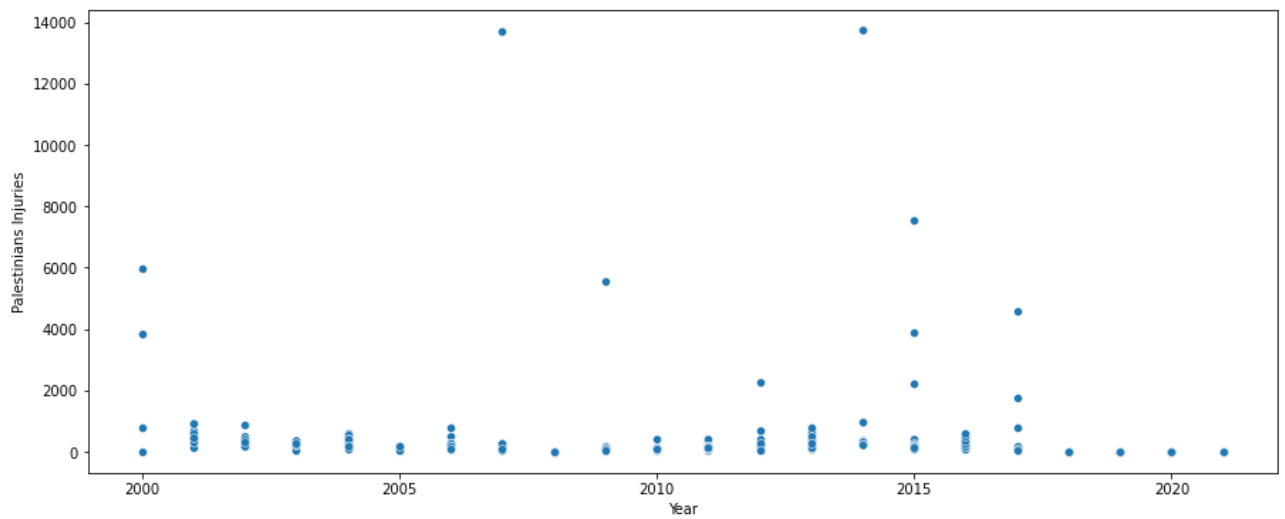
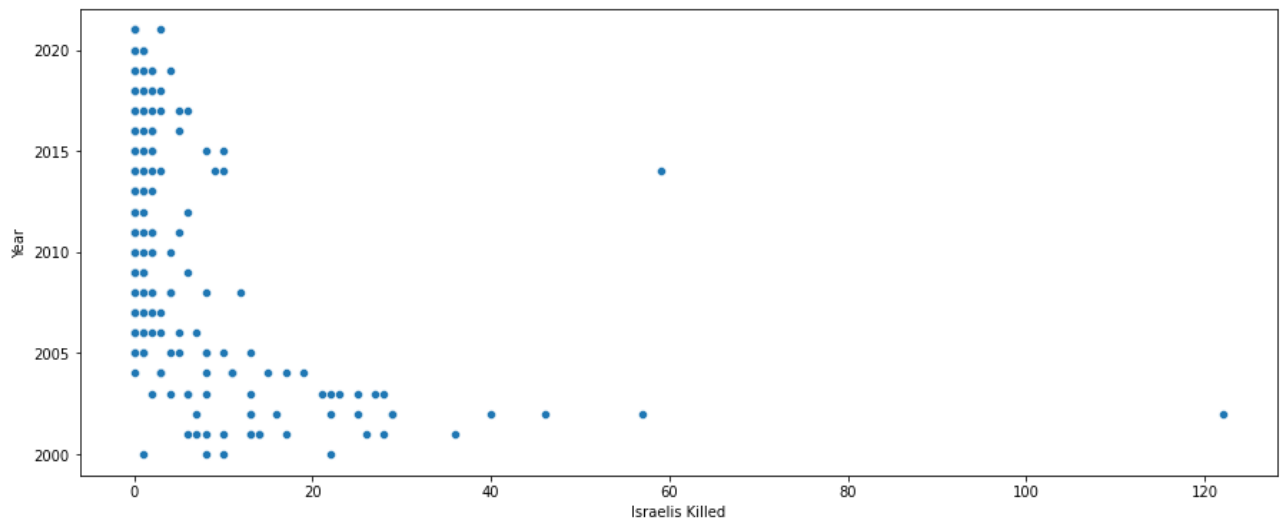
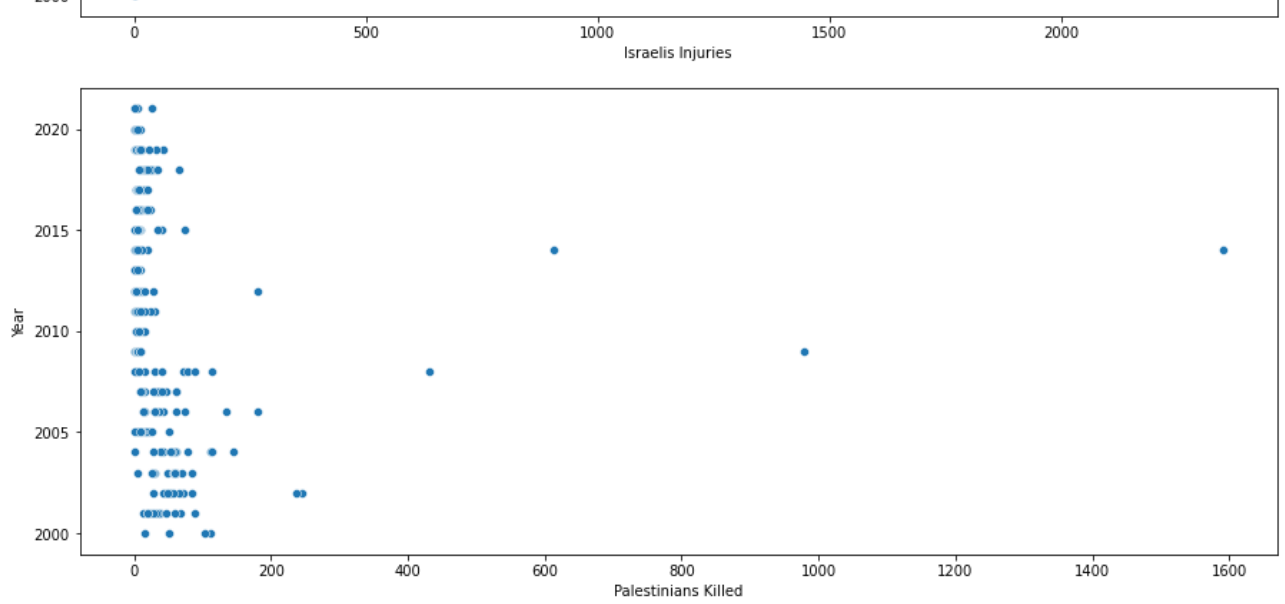




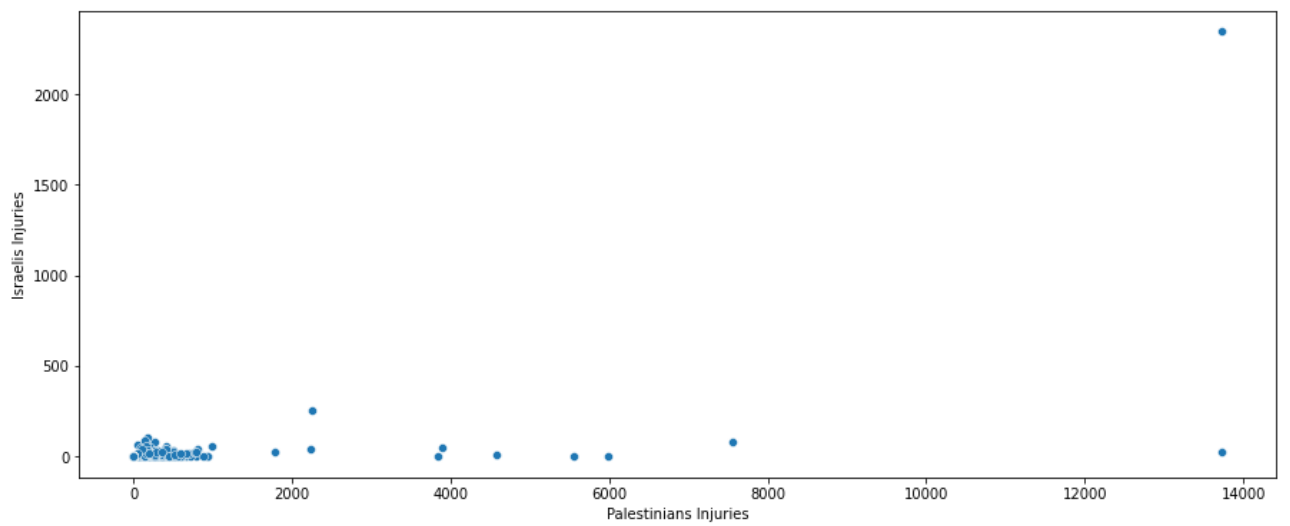
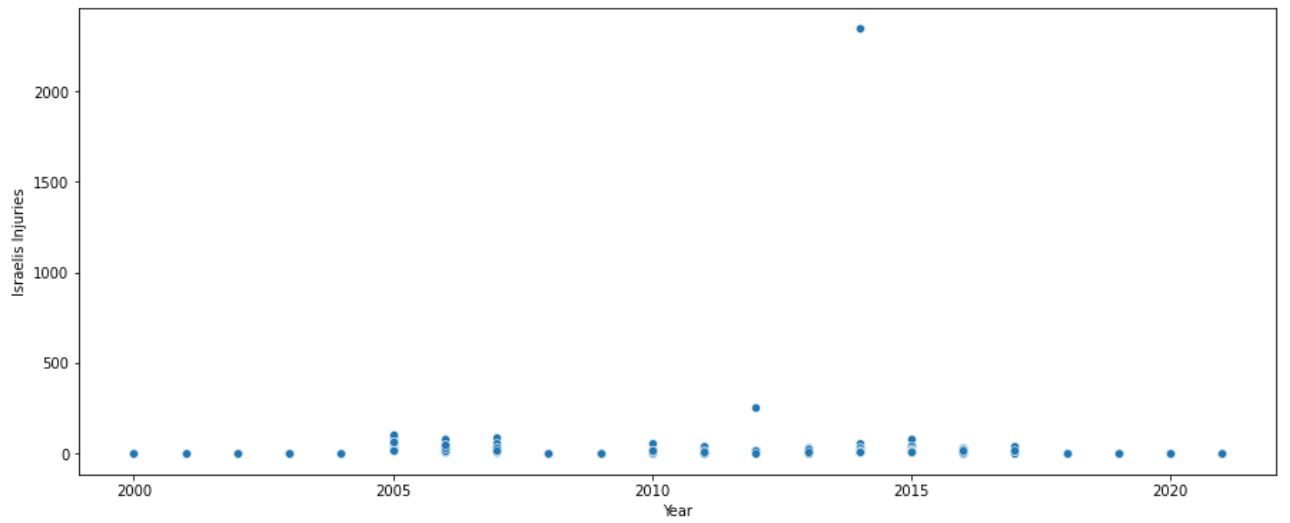
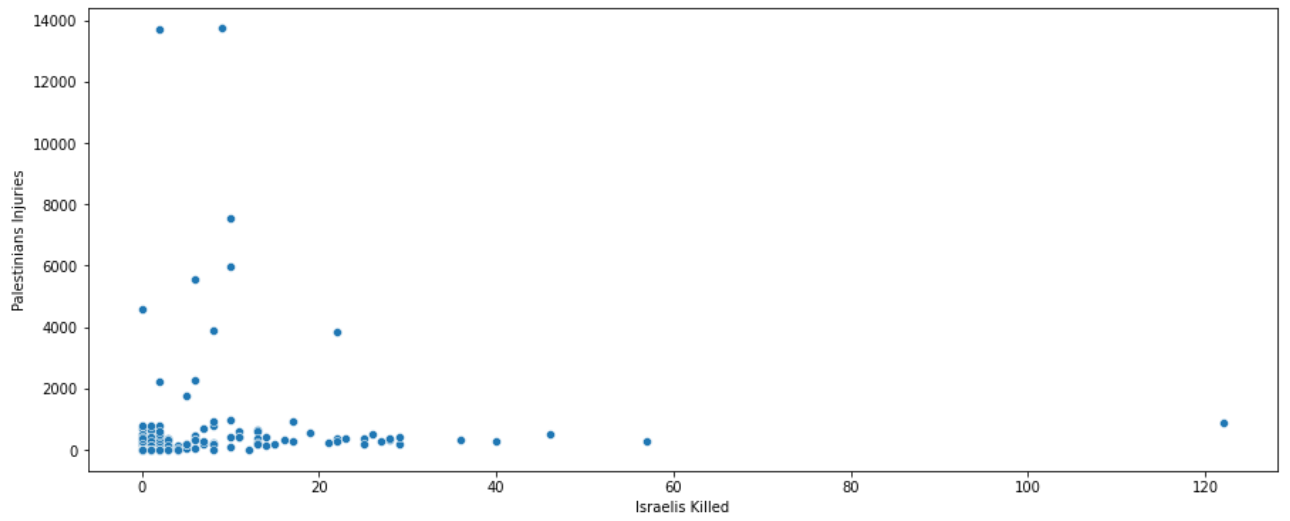
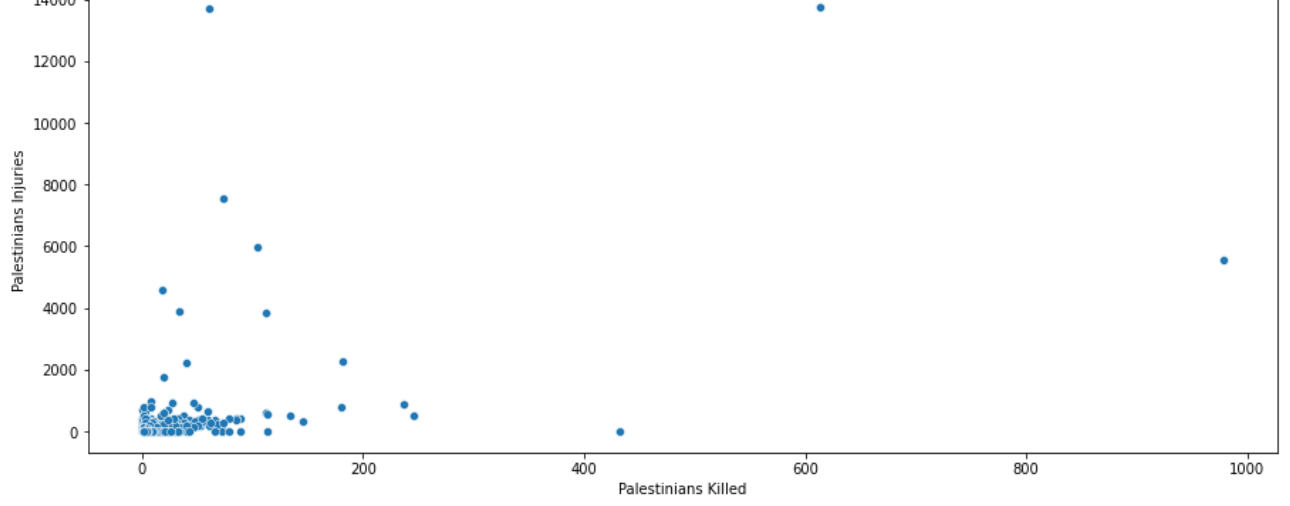
In [26]:

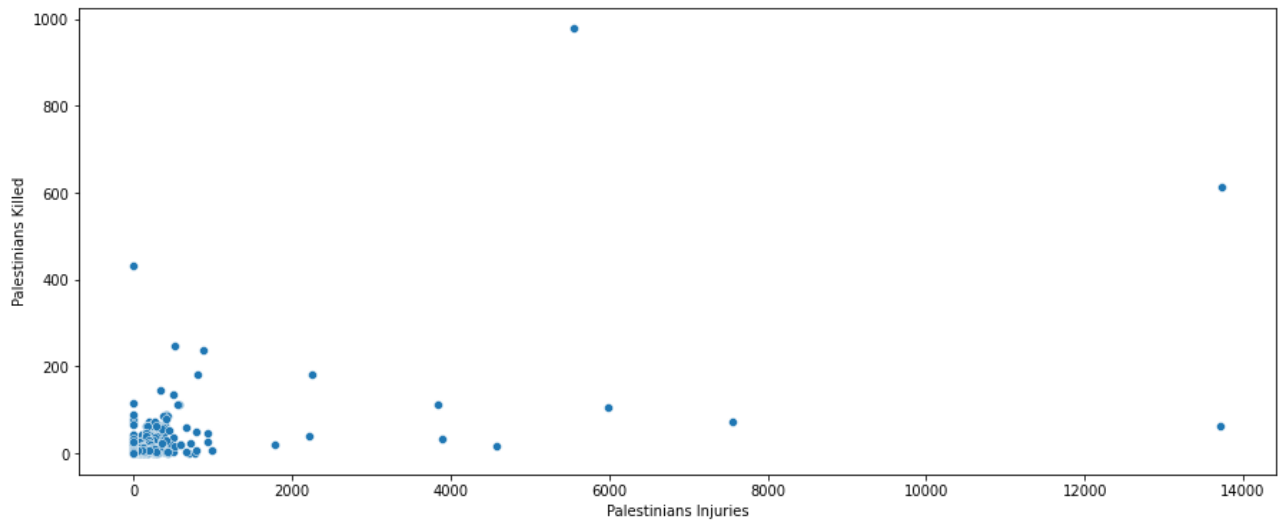
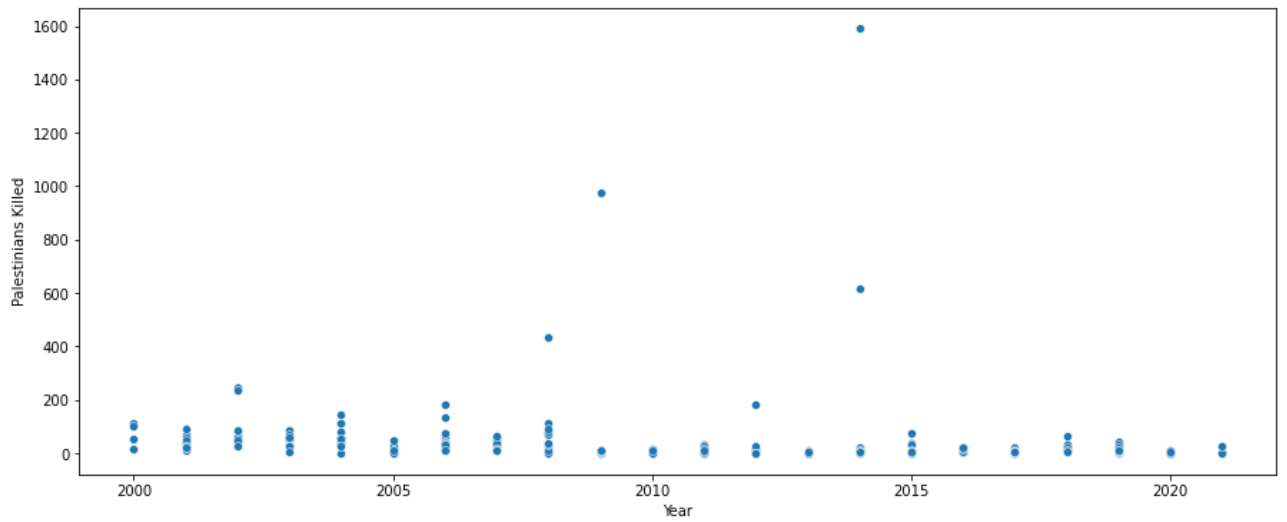
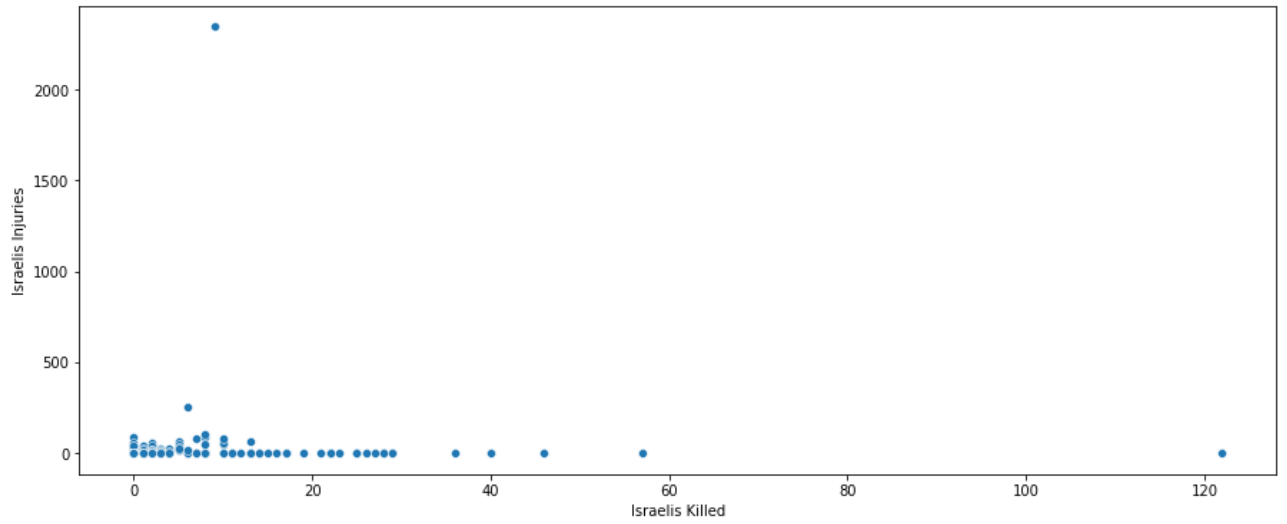
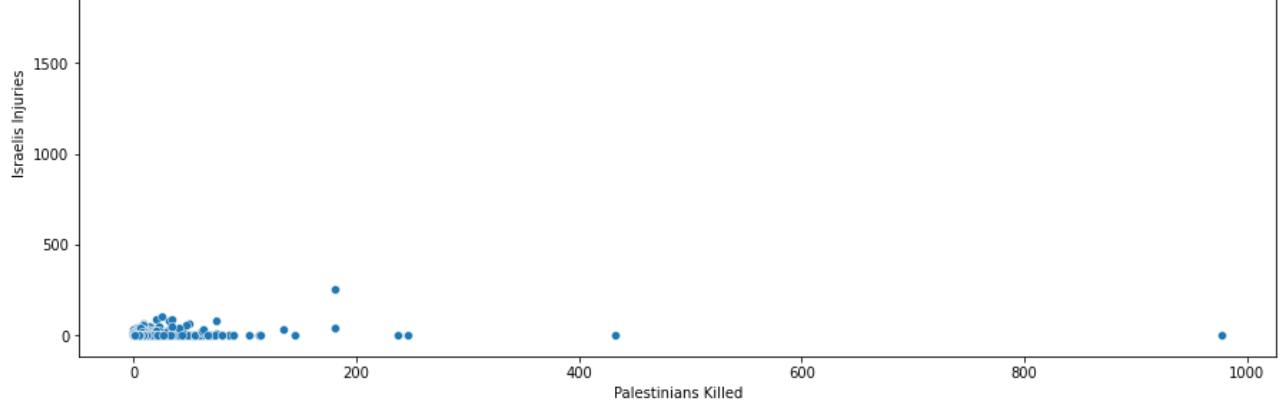
```
for i in df1.columns:
    for j in df1.columns:
        if i != j:
            plt.figure(figsize=(15,6))
            sns.scatterplot(x = df1[j], y = df1[i], data = df1, palette = 'hls')
            plt.show()
```

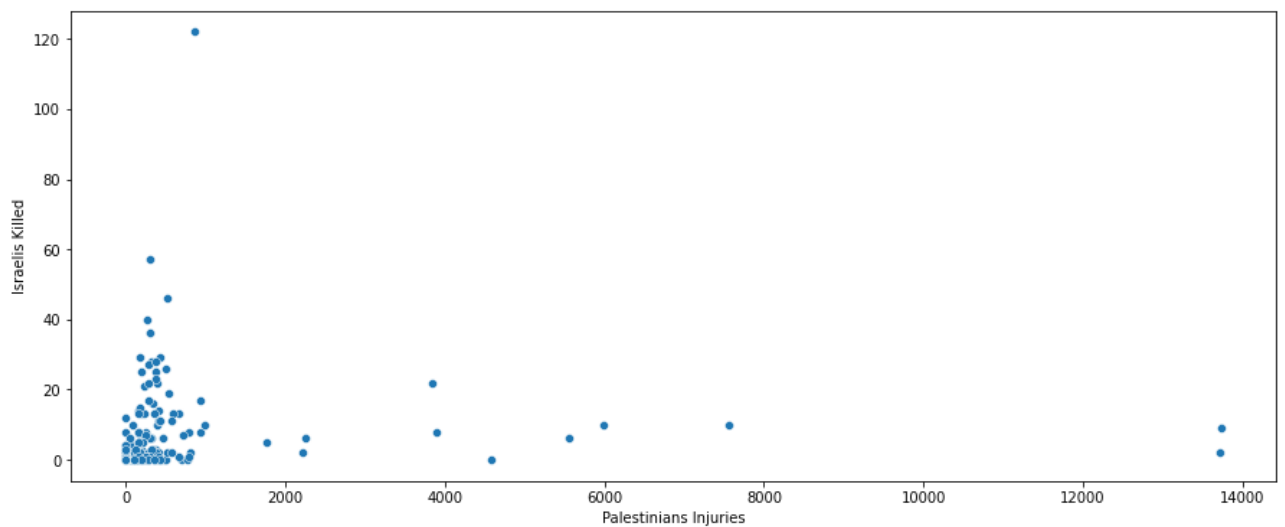
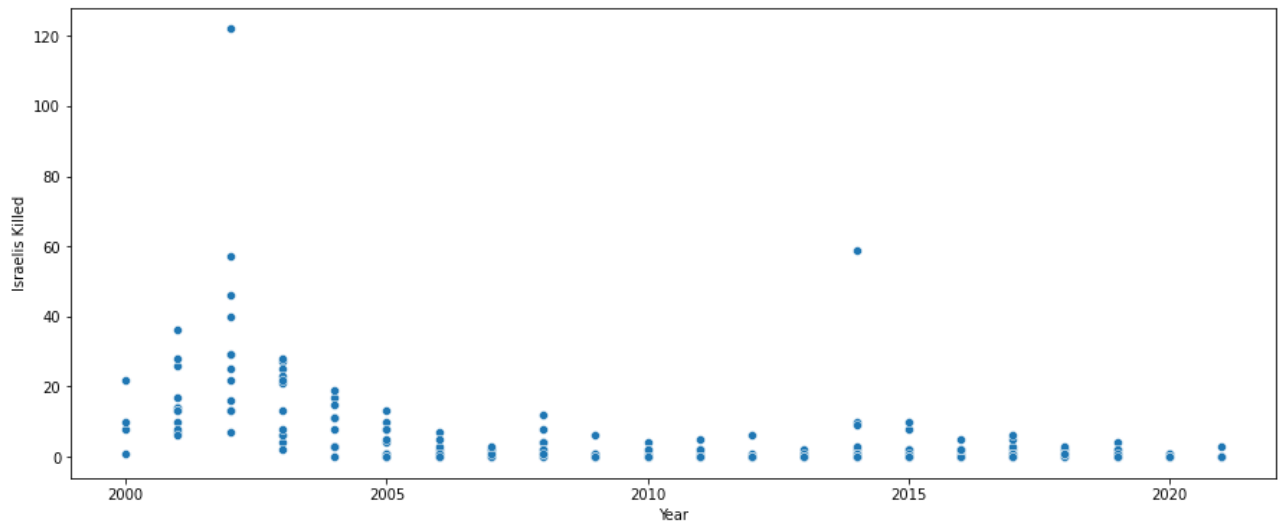
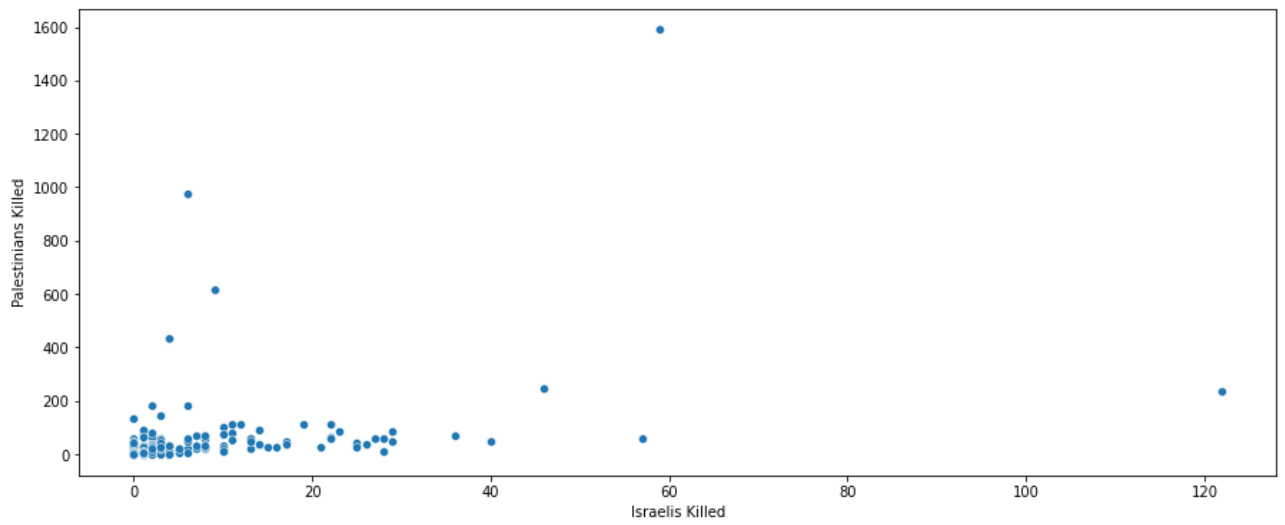
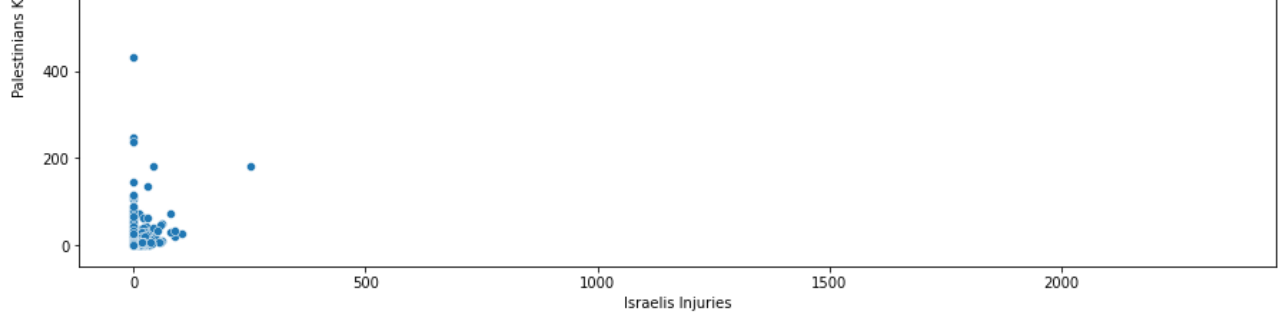


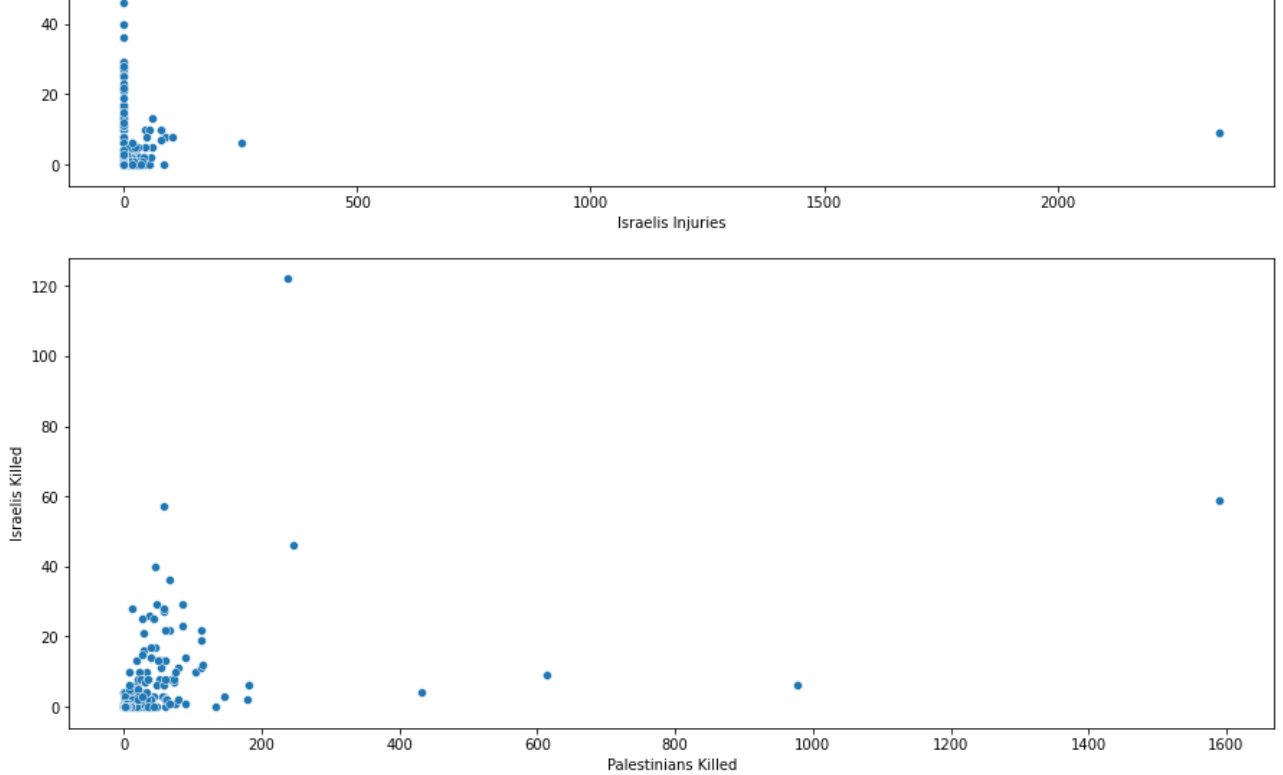










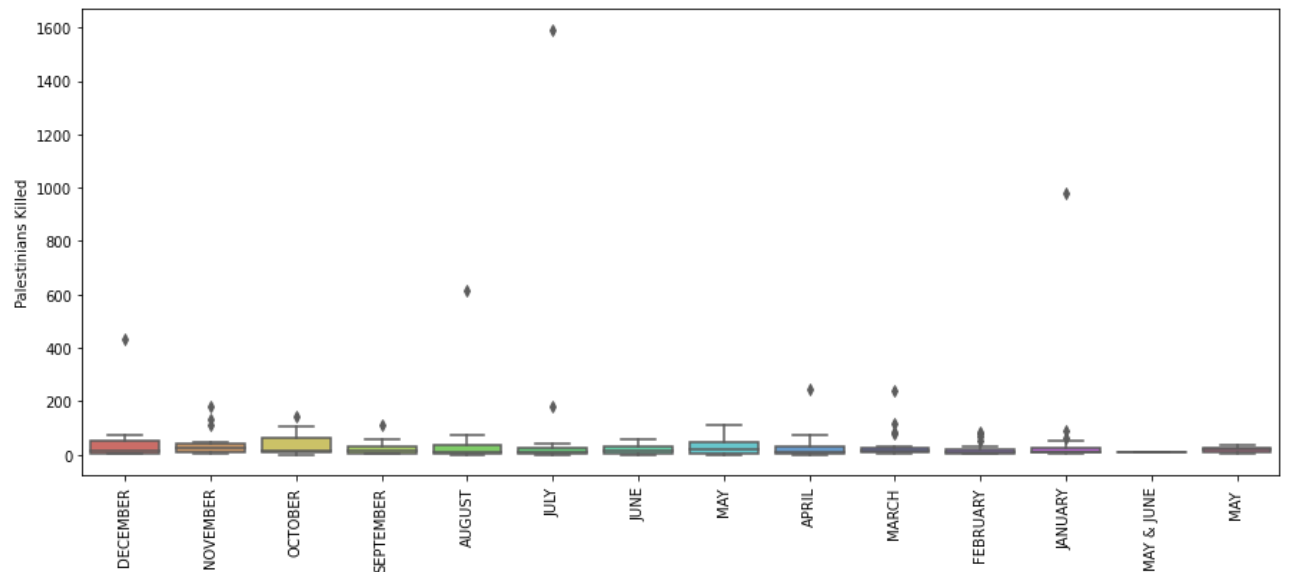
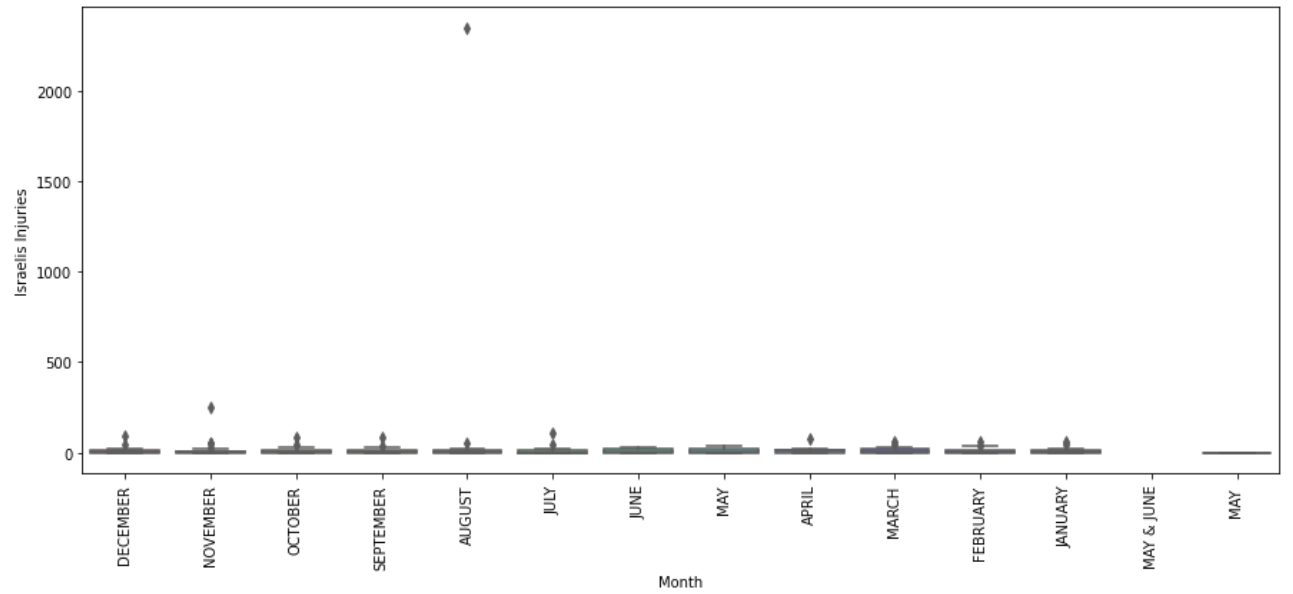
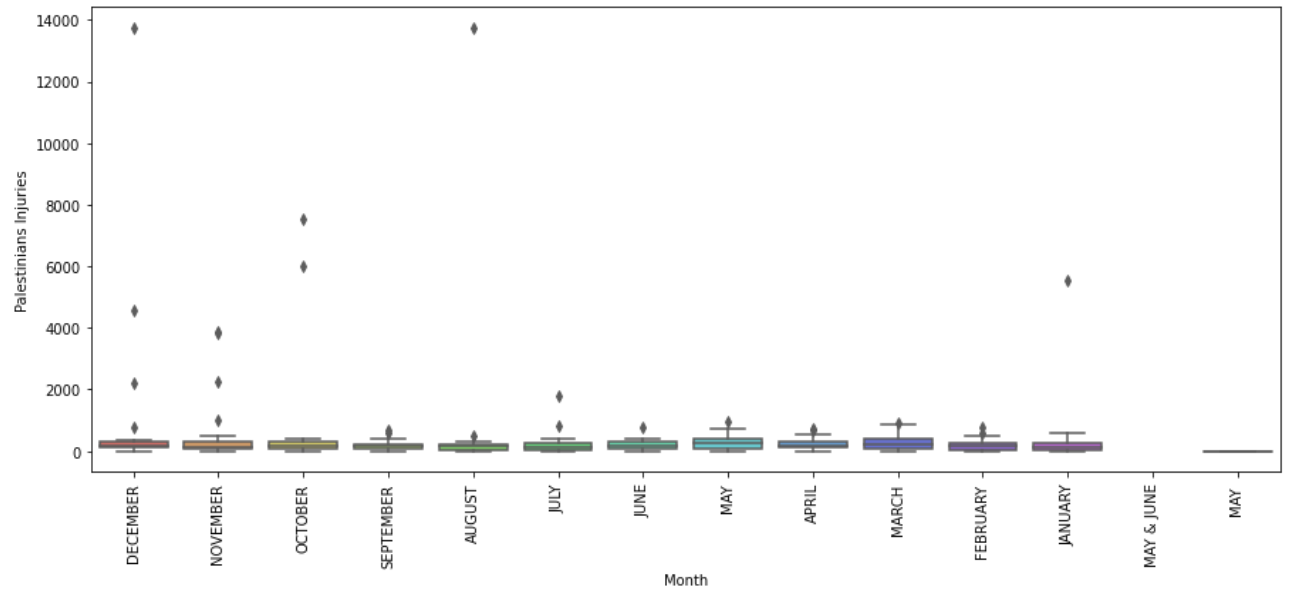
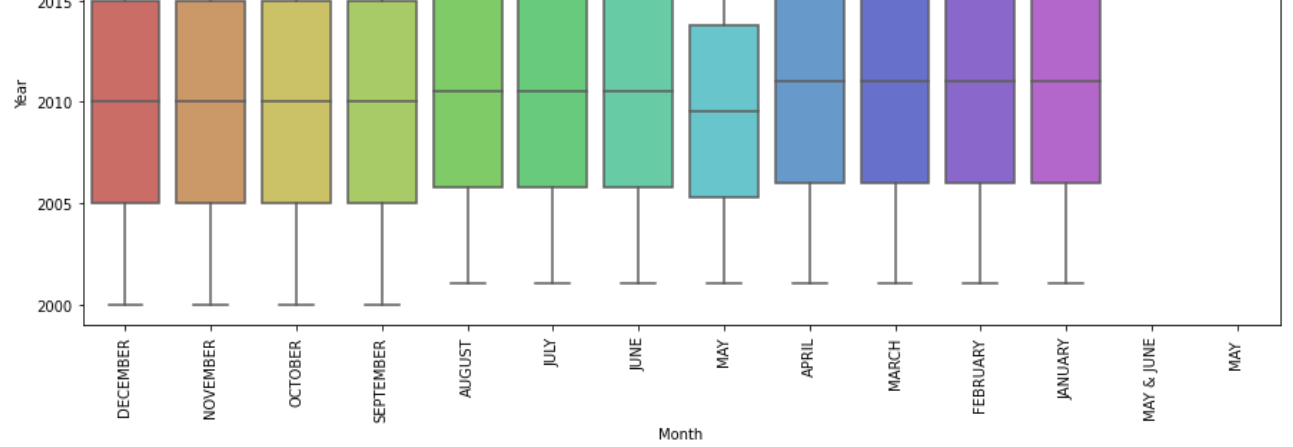


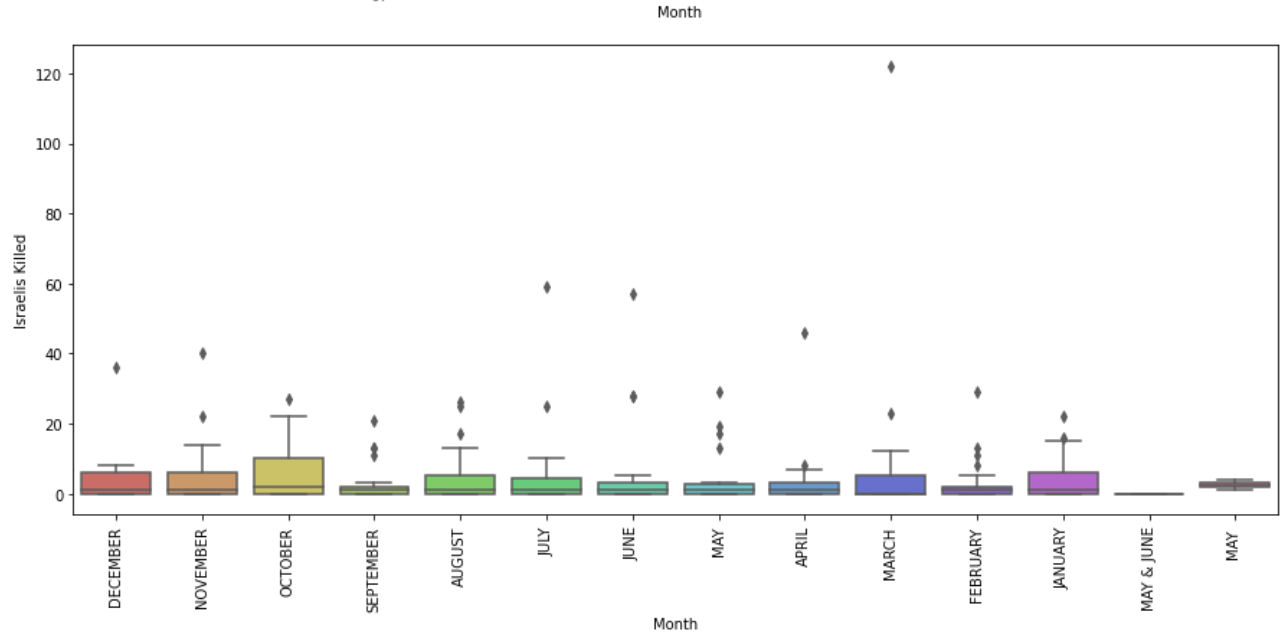
```
In [27]: for i in df1.columns:
          for j in df1.columns:
              if i != j:
                  fig = px.line(df1, x=j, y=i, title=f'Line Plot: {i} vs {j}')
                  fig.show()
```

```
In [28]: for i in df1.columns:
          for j in df1.columns:
              if i != j:
                  fig = px.scatter(df1, x=j, y=i, title=f'Scatter Plot: {i} vs {j}')
                  fig.show()
```

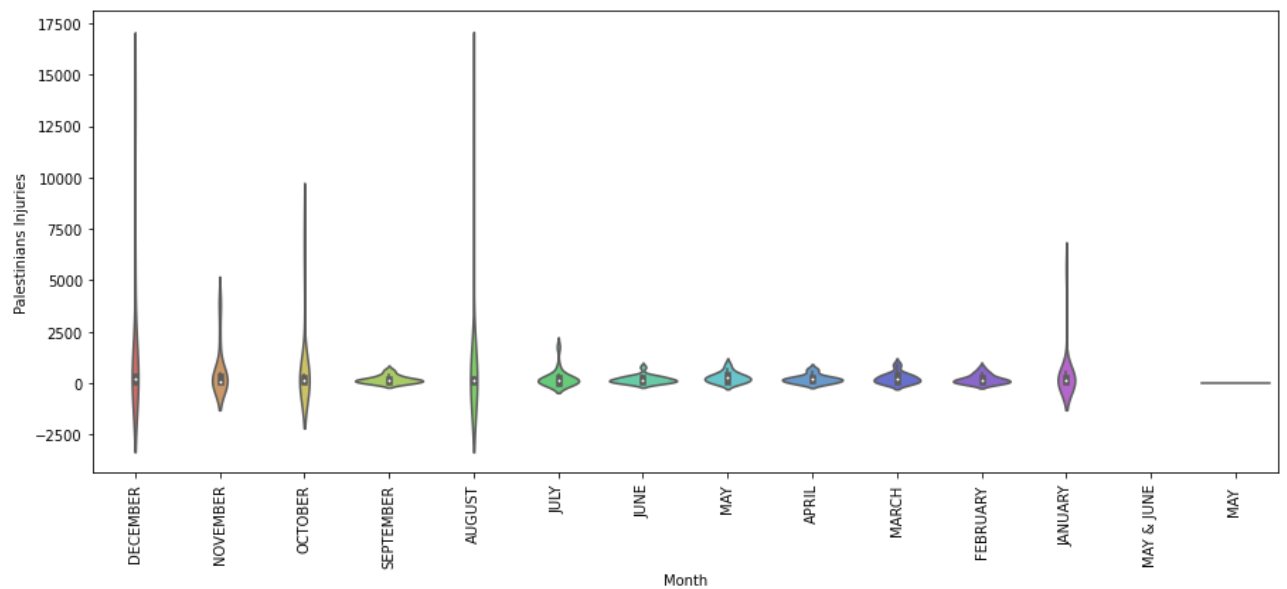
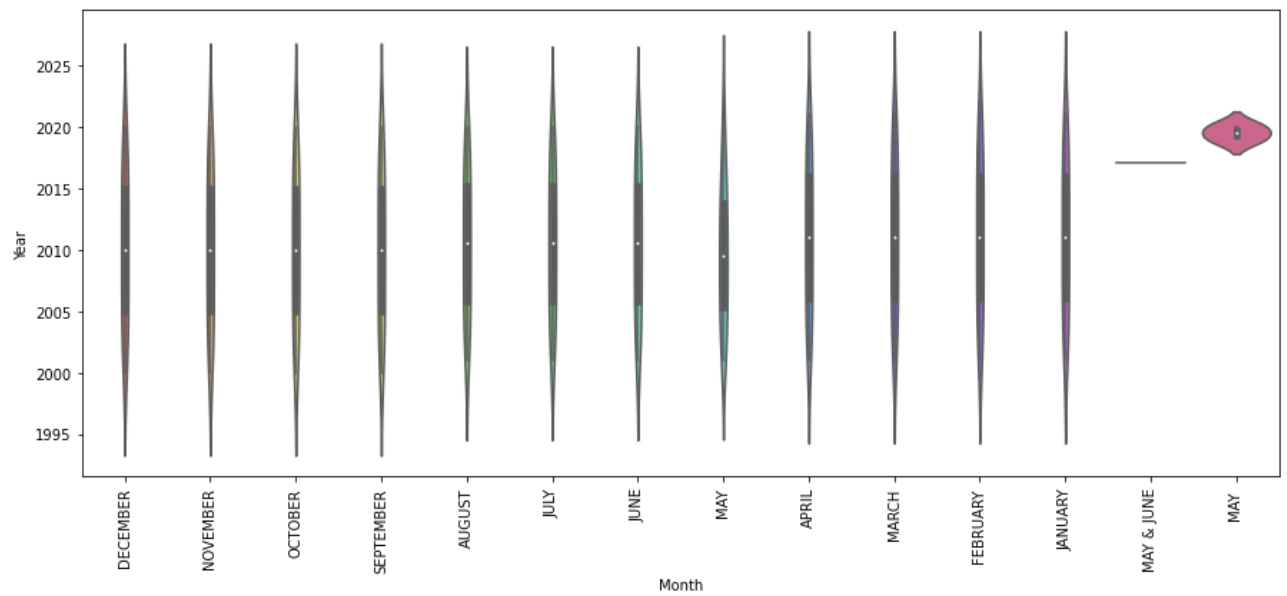
```
In [29]: for i in df1.columns:
          plt.figure(figsize=(15,6))
          sns.boxplot(x = df['Month'] , y = df1[i] , data = df, palette = 'hls')
          plt.xticks(rotation = 90)
          plt.show()
```

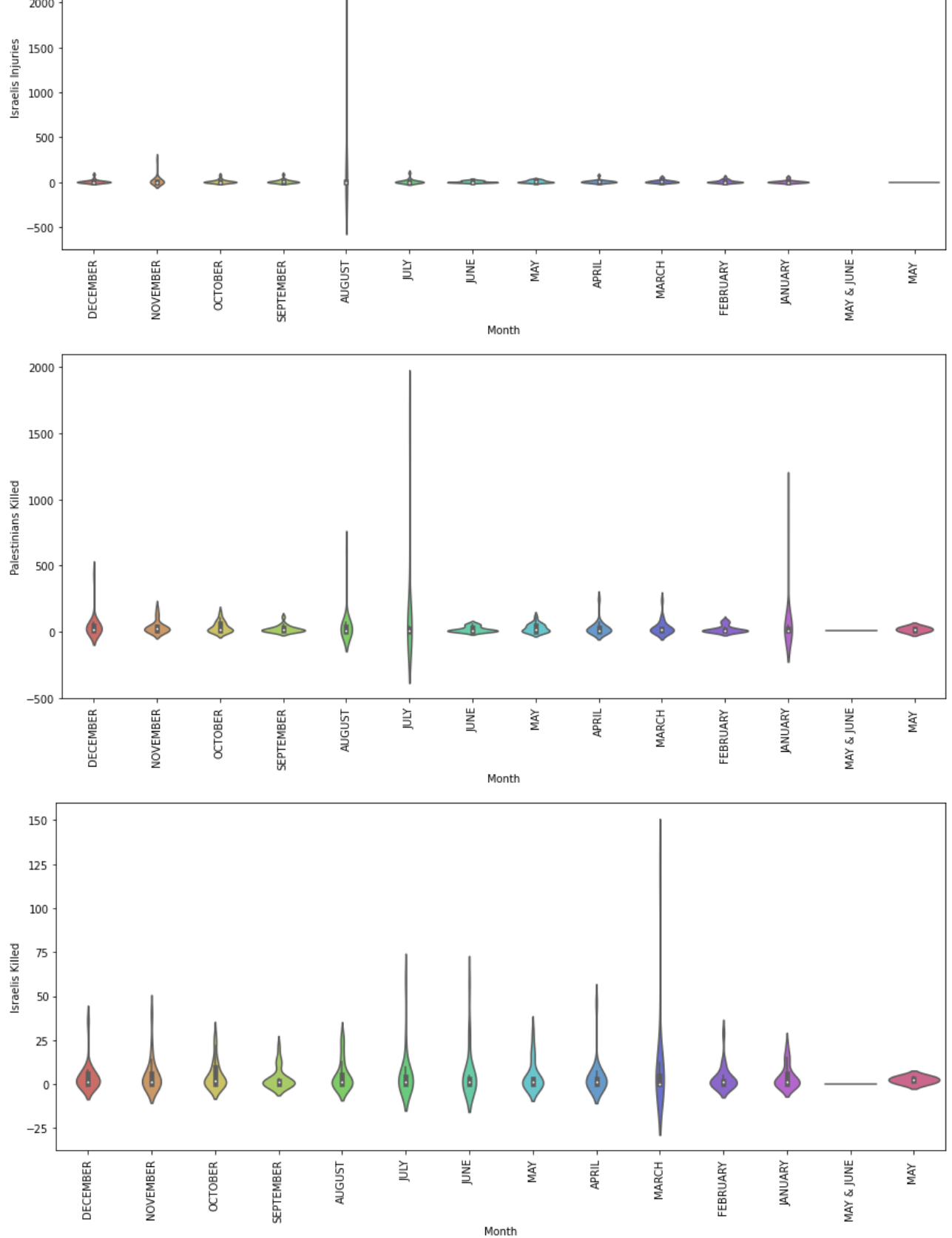






```
In [30]: for i in df1.columns:
plt.figure(figsize=(15,6))
sns.violinplot(x = df['Month'] , y = df1[i] , data = df, palette = 'hls')
plt.xticks(rotation = 90)
plt.show()
```





```
In [31]: for i in df1.columns:
fig = px.box(df1, x=df['Month'], y=i, title=f'Box Plot: {i} by Month')
fig.update_layout(xaxis_tickangle=-45)
fig.show()
```

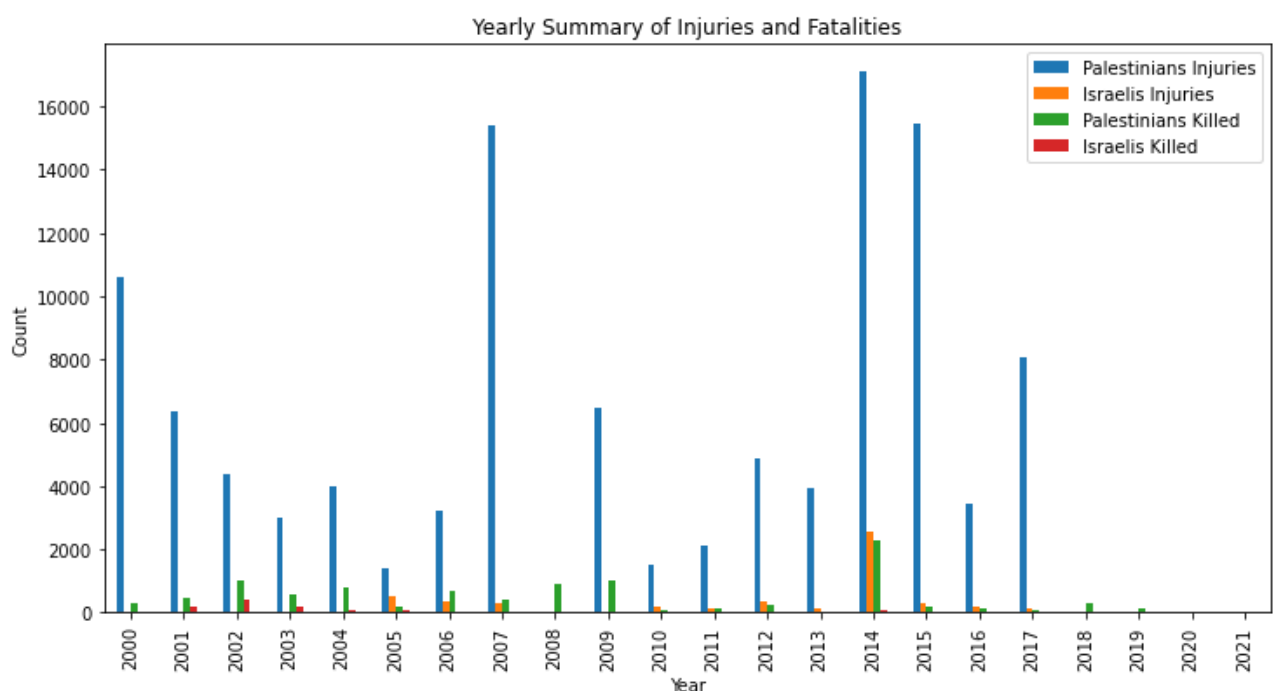
```
In [32]: for i in df1.columns:
fig = px.violin(df1, x=df['Month'], y=i, title=f'Box Plot: {i} by Month')
fig.update_layout(xaxis_tickangle=-45)
fig.show()
```

```
In [33]: fig = px.line(df, x='Year', y=['Palestinians Injuries', 'Israelis Injuries', 'Palestinians Killed', 'Israelis Killed'])
fig.show()
```

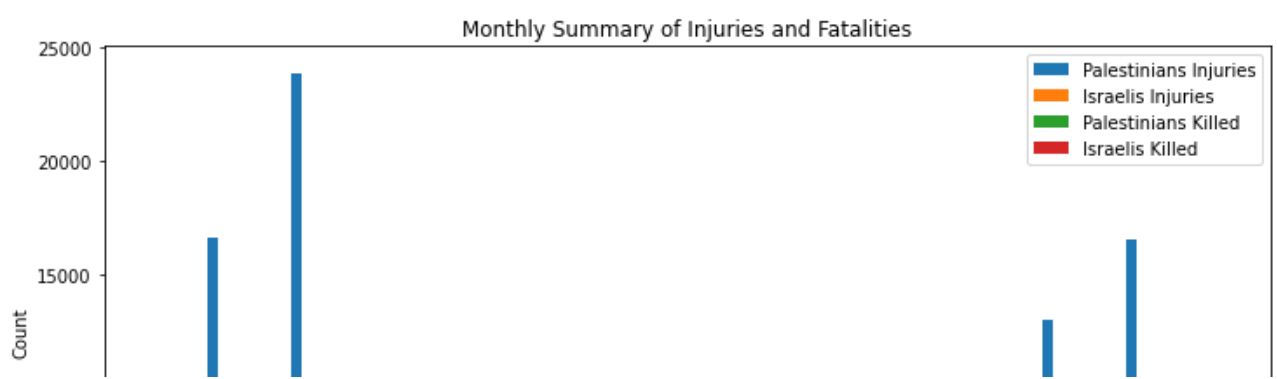
```
In [34]: fig = px.line(df, x='Month', y=['Palestinians Injuries', 'Israelis Injuries', 'Palestinians Killed', 'Israelis Killed'])
fig.show()
```

```
In [35]: for i in ['Palestinians Injuries', 'Israelis Injuries', 'Palestinians Killed', 'Israelis Killed']:
fig = px.box(df, x='Month', y=i, title=f'Box Plot: {i} by Month')
fig.update_layout(xaxis_tickangle=-45)
fig.show()
```

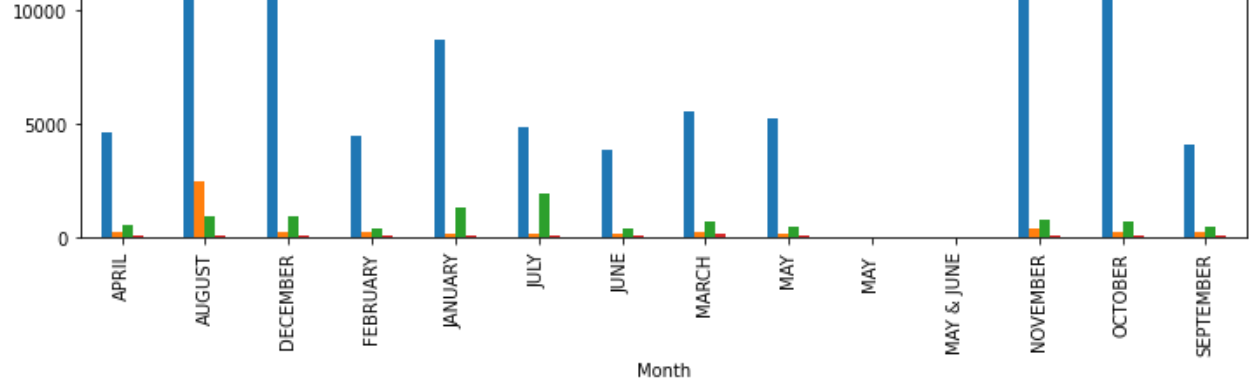
```
In [36]: yearly_summary = df.groupby('Year')[['Palestinians Injuries', 'Israelis Injuries', 'Palestinians Killed', 'Israelis Killed']]
yearly_summary.plot(kind='bar', figsize=(12, 6), title='Yearly Summary of Injuries and Fatalities')
plt.xlabel('Year')
plt.ylabel('Count')
plt.show()
```



```
In [37]: monthly_summary = df.groupby('Month')[['Palestinians Injuries', 'Israelis Injuries', 'Palestinians Killed', 'Israelis Killed']]
monthly_summary.plot(kind='bar', figsize=(12, 6), title='Monthly Summary of Injuries and Fatalities')
plt.xlabel('Month')
plt.ylabel('Count')
plt.show()
```







```
In [38]: fig = go.Figure()

for col in yearly_summary.columns:
    fig.add_trace(go.Bar(x=yearly_summary.index, y=yearly_summary[col], name=col))

fig.update_layout(
    title='Yearly Summary of Injuries and Fatalities',
    xaxis=dict(title='Year'),
    yaxis=dict(title='Count'),
    barmode='stack'
)

fig.show()
```

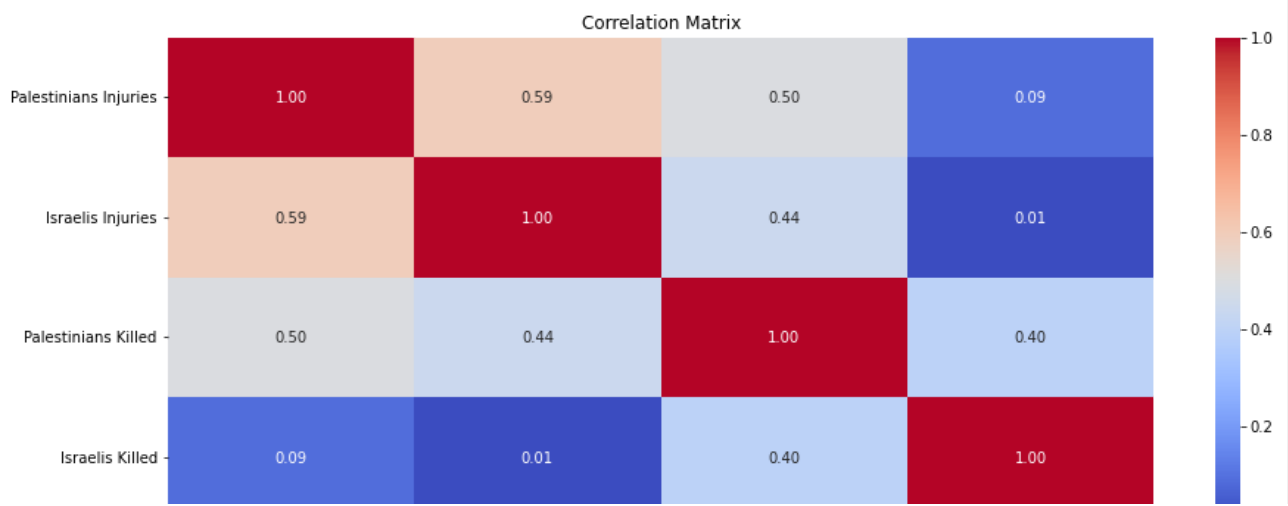
```
In [39]: fig = go.Figure()

for col in monthly_summary.columns:
    fig.add_trace(go.Bar(x=monthly_summary.index, y=monthly_summary[col], name=col))

fig.update_layout(
    title='Monthly Summary of Injuries and Fatalities',
    xaxis=dict(title='Month'),
    yaxis=dict(title='Count'),
    barmode='stack'
)

fig.show()
```

```
In [40]: plt.figure(figsize=(15,6))
correlation_matrix = df[['Palestinians Injuries', 'Israelis Injuries', 'Palestinians Killed', 'Israelis Killed']]
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt='.2f')
plt.title('Correlation Matrix')
plt.show()
```



In [41]:

```
df['Total Incidents'] = df['Palestinians Injuries'] + df['Israelis Injuries'] + df['Palestinian Fatality Rate'] = df['Palestinians Killed'] / df['Total Incidents']
df['Israeli Fatality Rate'] = df['Israelis Killed'] / df['Total Incidents']
```

In [42]:

```
total_incidents = df['Total Incidents'].sum()
total_palestinian_incidents = df['Total Incidents'].sum()
total_israeli_incidents = df['Total Incidents'].sum()
palestinian_proportion = total_palestinian_incidents / total_incidents
israeli_proportion = total_israeli_incidents / total_incidents
```

In [43]:

df

Out[43]:

	Year	Month	Palestinians Injuries	Israelis Injuries	Palestinians Killed	Israelis Killed	Total Incidents	Palestinian Fatality Rate	Israeli Fatality Rate
0	2000	DECEMBER	781.0	0.0	51	8	840.0	0.060714	0.0095
1	2000	NOVEMBER	3838.0	0.0	112	22	3972.0	0.028197	0.0055
2	2000	OCTOBER	5984.0	0.0	104	10	6098.0	0.017055	0.0016
3	2000	SEPTEMBER	0.0	0.0	16	1	17.0	0.941176	0.0588
4	2001	DECEMBER	304.0	0.0	67	36	407.0	0.164619	0.0884
...	...	...	...	...	...	...	...	...	...
244	2021	JANUARY	0.0	0.0	4	0	4.0	1.000000	0.0000
245	2021	FEBRUARY	0.0	0.0	1	0	1.0	1.000000	0.0000
246	2021	MARCH	0.0	0.0	4	0	4.0	1.000000	0.0000
247	2021	APRIL	0.0	0.0	1	0	1.0	1.000000	0.0000
248	2021	MAY	0.0	0.0	26	3	29.0	0.896552	0.1034

249 rows × 9 columns



In [44]:

df.columns

Out[44]:

```
Index(['Year', 'Month', 'Palestinians Injuries', 'Israelis Injuries',
      'Palestinians Killed', 'Israelis Killed', 'Total Incidents',
      'Palestinian Fatality Rate', 'Israeli Fatality Rate'],
      dtype='object')
```

In [45]:

```
df['Group'] = df.apply(lambda row: 'Palestinian' if row['Total Incidents'] <= total_palestinian_incidents else 'Israeli', axis=1)
total_incidents_by_group = df.groupby('Group')[['Total Incidents', 'Palestinians Killed', 'Israelis Killed']].sum()
fatality_rate_by_group = df.groupby('Group')[['Palestinian Fatality Rate', 'Israeli Fatality Rate']].sum()
```

In [46]:

total\_incidents\_by\_group

Out[46]:

	Total Incidents	Palestinians Killed	Israelis Killed
Group			

Israeli	0.0	1596	59
Palestinian	126255.0	8404	1216

```
In [47]: fatality_rate_by_group
```

Out[47]:

	Palestinian Fatality Rate	Israeli Fatality Rate
Group		
Israeli	NaN	NaN
Palestinian	0.262631	0.029522

```
In [48]: yearly_trends = df.groupby('Year')[['Total Incidents', 'Palestinians Killed', 'Israelis Killed', 'Palestinian Fatality Rate', 'Israeli Fatality Rate']]
```

```
In [49]: yearly_trends
```

```
Out[49]:
```

	Total Incidents	Palestinians Killed	Israelis Killed	Palestinian Fatality Rate	Israeli Fatality Rate
Year					
2000	2731.750000	70.750000	10.250000	0.261786	0.018881
2001	587.333333	39.166667	16.000000	0.079316	0.034477
2002	486.083333	86.000000	34.916667	0.168572	0.069055
2003	313.750000	49.000000	15.416667	0.153719	0.049717
2004	408.250000	65.500000	8.666667	0.163074	0.023705
2005	176.583333	15.833333	4.250000	0.084600	0.021419
2006	355.083333	55.416667	1.666667	0.143492	0.005107
2007	1345.416667	32.083333	1.000000	0.130732	0.004812
2008	77.083333	73.833333	3.250000	0.845548	0.154452
2009	626.333333	86.333333	0.750000	0.074554	0.002008
2010	150.500000	6.833333	0.750000	0.050325	0.007751
2011	196.750000	9.750000	0.833333	0.051855	0.003882
2012	458.416667	21.250000	0.583333	0.035463	0.000518
2013	346.583333	3.166667	0.500000	0.014054	0.001962
2014	1852.636364	189.916667	7.083333	0.026243	0.002840
2015	1332.750000	15.666667	2.000000	0.020623	0.002590
2016	310.583333	9.583333	1.000000	0.033059	0.003724
2017	759.181818	8.000000	1.583333	0.033434	0.012858
2018	25.333333	24.166667	1.166667	0.940998	0.059002
2019	13.333333	12.416667	0.916667	0.931109	0.068891
2020	3.083333	2.833333	0.250000	0.934722	0.065278
2021	7.800000	7.200000	0.600000	0.979310	0.020690

```
In [50]: monthly_summary = df.groupby('Month')[['Total Incidents', 'Palestinians Killed', 'Israelis Killed', 'Palestinian Fatality Rate', 'Israeli Fatality Rate']]
```

```
In [51]: monthly_summary
```

```
Out[51]:
```

	Total Incidents	Palestinians Killed	Israelis Killed	Palestinian Fatality Rate	Israeli Fatality Rate
Month					
APRIL	266.095238	28.809524	4.000000	0.285901	0.011376
AUGUST	1010.550000	49.500000	5.150000	0.200155	0.086265
DECEMBER	1194.952381	45.000000	4.095238	0.234496	0.032523
FEBRUARY	250.333333	20.714286	3.619048	0.276699	0.020387
JANUARY	493.190476	64.857143	4.333333	0.291435	0.022612
JULY	291.526316	99.450000	6.000000	0.233914	0.041279
JUNE	230.100000	19.500000	6.850000	0.254669	0.021041
MARCH	319.571429	34.238095	9.190476	0.273422	0.025384
MAY	335.888889	29.222222	4.944444	0.217345	0.021899
MAY	21.000000	18.500000	2.500000	0.845946	0.154054
MAY & JUNE	NaN	6.000000	0.000000	NaN	NaN
NOVEMBER	682.333333	37.238095	5.380952	0.267773	0.015414
OCTOBER	838.380952	36.142857	5.095238	0.262823	0.024661
SEPTEMBER	232.047619	21.666667	3.380952	0.284830	0.021888

```
In [52]: fig = go.Figure()
fig.add_trace(go.Scatter(x=df['Year'], y=df['Palestinian Fatality Rate'], mode='lines'))
fig.add_trace(go.Scatter(x=df['Year'], y=df['Israeli Fatality Rate'], mode='lines', name='Israeli Fatality Rate'))
fig.update_layout(title='Fatality Rates Over Time', xaxis_title='Year', yaxis_title='Fatality Rate')
fig.show()
```

```
In [53]: total_incidents = df['Total Incidents'].sum()
total_palestinian_incidents = df[df['Group'] == 'Palestinian']['Total Incidents'].sum()
total_israeli_incidents = df[df['Group'] == 'Israeli']['Total Incidents'].sum()
palestinian_proportion = total_palestinian_incidents / total_incidents
israeli_proportion = total_israeli_incidents / total_incidents
```

```
In [54]: print('Total Incidents:', total_incidents)
print('Total Palestinian Incidents:', total_palestinian_incidents)
print('Total Israeli Incidents:', total_israeli_incidents)
print('Proportion of Palestinian Incidents:', palestinian_proportion)
print('Proportion of Israeli Incidents:', israeli_proportion)
```

```
Total Incidents: 126255.0
Total Palestinian Incidents: 126255.0
Total Israeli Incidents: 0.0
Proportion of Palestinian Incidents: 1.0
Proportion of Israeli Incidents: 0.0
```

Thanks !!!

In [ ]: