Imports

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [25]:
```
import pandas as pd
import numpy as np
import cufflinks as cf
import chart_studio.plotly as py

# contains functions that can create entire figures at once
import plotly.express as px

import seaborn as sns
%matplotlib inline

# allows to create graph objects for making more customized plots
import plotly.graph_objects as go

# for plotly jupyter support
from plotly.offline import download_plotlyjs, init_notebook_mode, plot, iplot
init_notebook_mode(connected=True)

# use plotly locally
cf.go_offline()
```

Load Dataset

The dataset is collected from Centers of Disease control and prevention data.cdc.gov under the category of Vaccination Coverage among Pregnancy Women

In [2]:
```
# Read the data
data = pd.read_csv('Vaccination_Coverage_among_Pregnant_Women.csv')
```

In [3]:
```
# Display Features
data.columns
```

Out[3]:
```
Index(['Vaccine', 'Geography Type', 'Geography',
       'Survey Year/Influenza Season', 'Dimension Type', 'Dimension',
       'Estimate (%)', '95% CI (%)', 'Sample Size'],
      dtype='object')
```

In [4]:
```
# Display Values
data
```

Out[4]:

	Vaccine	Geography Type	Geography	Survey Year/Influenza Season	Dimension Type	Dimension	Estimate (%)	95% CI (%)	Sample Size
0	Influenza	States	Alaska	2012	Age	≥18 Years	49.2	45.3 to 53.1	852.0
1	Influenza	States	Arkansas	2012	Age	≥18 Years	46.6	40.7 to 52.5	756.0
2	Influenza	States	Colorado	2012	Age	≥18 Years	56.1	52.1 to 60.0	1170.0
3	Influenza	States	Delaware	2012	Age	≥18 Years	41.6	38.4 to 44.8	981.0
4	Influenza	States	Georgia	2012	Age	≥18 Years	33.6	29.6 to 37.7	1007.0
...	...	...	...	...	...	...	...	...	...
4132	Tdap	States	Utah	2020	Race/Ethnicity	White, Non-Hispanic	80.1	77.0 to 83.0	979.0
4133	Tdap	States	Vermont	2020	Race/Ethnicity	White, Non-Hispanic	86.4	83.6 to 88.9	696.0
4134	Tdap	States	Virginia	2020	Race/Ethnicity	White, Non-Hispanic	83.1	76.9 to 88.2	503.0
4135	Tdap	States	Washington	2020	Race/Ethnicity	White, Non-Hispanic	80.9	76.2 to 85.0	352.0
4136	Tdap	States	Wisconsin	2020	Race/Ethnicity	White, Non-Hispanic	82.8	78.4 to 86.7	364.0

4137 rows × 9 columns

In [5]:
```
# Display Dimension
data.shape
```

Out[5]:
```
(4137, 9)
```

In [6]:
```
# Display Information
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4137 entries, 0 to 4136
Data columns (total 9 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Vaccine                       4137 non-null   object
 1   Geography Type                4137 non-null   object
 2   Geography                     4137 non-null   object
 3   Survey Year/Influenza Season  4137 non-null   int64
 4   Dimension Type                4137 non-null   object
 5   Dimension                     4137 non-null   object
 6   Estimate (%)                  4137 non-null   object
 7   95% CI (%)                    4137 non-null   object
 8   Sample Size                   3933 non-null   float64
dtypes: float64(1), int64(1), object(7)
memory usage: 291.0+ KB
```

In [7]:
```
# Display the Unique values
data['Vaccine'].value_counts()
```

Out[7]:
```
Influenza    2891
Tdap         1246
Name: Vaccine, dtype: int64
```

In [8]:
```
# Display top 3 values
data.head(3)
```

Out[8]:

	Vaccine	Geography Type	Geography	Survey Year/Influenza Season	Dimension Type	Dimension	Estimate (%)	95% CI (%)	Sample Size
0	Influenza	States	Alaska	2012	Age	≥18 Years	49.2	45.3 to 53.1	852.0
1	Influenza	States	Arkansas	2012	Age	≥18 Years	46.6	40.7 to 52.5	756.0
2	Influenza	States	Colorado	2012	Age	≥18 Years	56.1	52.1 to 60.0	1170.0

In [9]:
```
data['Survey Year/Influenza Season'].unique()
```

Out[9]:
```
array([2012, 2020, 2013, 2014, 2015, 2016, 2017, 2018, 2019])
```

In [10]:
```
# Make a new copy
new_data = data.copy()
```

In [11]:
```
# Display the presence of missing values
new_data.isnull().sum()
```

Out[11]:
```
Vaccine                         0
Geography Type                  0
Geography                       0
Survey Year/Influenza Season    0
Dimension Type                  0
Dimension                       0
Estimate (%)                    0
95% CI (%)                      0
Sample Size                   204
dtype: int64
```

In [12]:
```
new_data.describe()
```

Out[12]:

	Survey Year/Influenza Season	Sample Size
count	4137.000000	3933.000000
mean	2016.230602	805.390796
std	2.663058	2658.305251
min	2012.000000	30.000000
25%	2014.000000	169.000000
50%	2017.000000	325.000000
75%	2019.000000	659.000000

max	2020.000000	43737.000000

In [13]:
```
type(new_data['Estimate (%)'][0])
```

Out[13]:
```
str
```

In [14]:
```
new_data['Estimate (%)'].unique()
```

Out[14]:
```
array(['49.2', '46.6', '56.1', '41.6', '33.6', '42.0', '49.1', '53.0',
       '47.9', '66.1', '42.8', '66.0', '45.5', '58.8', '38.6', '37.8',
       '39.5', '43.6', '54.3', '47.3', '47.4', '60.4', '44.1', '48.9',
       '57.5', '60.9', '43.4', '58.6', '39.1', '49.6', '64.0', '57.3',
       '58.2', '74.7', '73.5', '62.9', '73.1', '41.3', '40.9', '68.7',
       '65.1', '77.1', '71.2', '53.7', '72.4', '70.5', '79.8', '58.4',
       '68.2', '48.1', '64.8', '68.5', '76.0', '75.0', '60.8', '67.6',
       '65.0', '74.1', '67.1', '64.5', '34.8', '61.1', '76.1', '54.9',
       '67.2', '64.4', '74.0', '64.7', '70.7', '63.3', '39.0', '51.3',
       '33.4', '27.6', '38.5', '42.5', '49.0', '41.0', '51.0', '37.0',
       '59.4', '32.6', '51.6', '30.7', '50.6', '29.5', '50.0', '38.1',
       '39.8', '56.7', '38.9', '41.9', '51.7', '53.2', '39.7', '52.4',
       '32.0', '40.5', '66.8', '56.4', '67.8', '63.5', '51.1', '49.7',
       '25.9', '29.9', '72.5', '50.3', '73.3', '43.9', '40.4', '69.5',
       '58.3', '67.0', '45.1', 'NR*', '37.3', '60.1', '65.3', '55.2',
       '65.6', '58.0', '69.9', '62.8', '38.3', '50.2', '65.2', '51.5',
       '70.2', '59.1', '58.7', '61.7', '48.3', '46.9', '35.7', '42.6',
       '48.5', '53.1', '49.9', '45.4', '66.4', '51.8', '60.7', '40.1',
       '48.7', '37.7', '44.4', '46.7', '54.7', '49.8', '61.4', '45.2',
       '58.5', '64.9', '57.9', '53.4', '62.7', '57.8', '74.6', '74.8',
       '64.2', '67.4', '42.9', '72.6', '57.4', '57.1', '72.2', '79.1',
       '61.6', '68.6', '65.9', '69.8', '77.9', '76.8', '68.4', '67.5',
       '31.2', '75.6', '69.4', '73.2', '73.8', '65.5', '39.4', '37.4',
       '44.7', '60.0', '50.5', '68.1', '72.9', '54.1', '40.7', '46.2',
       '45.6', '52.1', '62.5', '64.1', '57.2', '61.0', '82.0', '76.4',
       '71.1', '90.8', '50.9', '50.8', '71.6', '72.1', '81.7', '77.6',
       '59.8', '75.1', '69.6', '85.8', '63.8', '57.6', '66.7', '75.9',
       '77.7', '68.8', '77.2', '65.4', '80.5', '66.9', '76.9', '78.5',
       '70.0', '28.3', '20.3', '37.5', '39.6', '33.8', '60.2', '35.3',
       '50.1', '33.1', '26.5', '41.7', '48.8', '56.0', '36.1', '56.5',
       '29.2', '63.4', '64.3', '54.4', '45.7', '24.8', '23.3', '36.2',
       '62.6', '53.5', '59.2', '34.7', '53.8', '44.6', '55.9', '48.4',
       '77.0', '35.6', '45.9', '53.3', '30.6', '47.7', '35.0', '46.8',
       '41.4', '36.3', '51.9', '67.7', '59.5', '61.5', '57.0', '68.3',
       '90.9', '36.0', '32.9', '61.9', '76.3', '71.3', '80.4', '34.5',
       '71.0', '45.3', '40.2', '63.7', '37.6', '43.5', '47.0', '69.3',
       '61.3', '78.0', '83.9', '82.6', '81.3', '71.5', '70.8', '56.2',
       '43.3', '44.2', '29.8', '52.2', '51.4', '44.0', '59.7', '40.8',
       '46.5', '55.3', '46.4', '49.5', '43.8', '59.3', '38.7', '74.9',
       '78.4', '95.1', '69.7', '79.6', '54.0', '80.8', '70.3', '53.9',
       '70.9', '76.6', '63.9', '77.3', '64.6', '73.4', '23.4', '55.4',
       '48.2', '43.2', '54.6', '72.7', '58.1', '62.4', '50.4', '65.7',
       '42.4', '61.8', '52.3', '65.8', '60.6', '52.5', '63.2', '55.5',
       '52.8', '54.8', '75.7', '59.6', '66.3', '59.9', '66.5', '57.7',
       '45.8', '52.9', '52.0', '56.3', '58.9', '47.5', '62.3', '73.7',
       '51.2', '75.5', '55.0', '59.0', '70.4', '70.1', '25.0', '75.3',
       '72.0', '40.3', '61.2', '55.7', '49.4', '70.6', '31.0', '74.3',
       '72.3', '48.0', '69.2', '56.8', '66.2', '73.9', '82.2', '14.7',
       '44.3', '60.3', '40.6', '43.0', '46.3', '42.2', '60.5', '39.2',
       '56.9', '36.5', '54.2', '47.6', '38.2', '68.0', '35.4', '53.6',
       '54.5', '36.6', '63.0', '33.5', '55.1', '30.5', '41.1', '35.8',
       '71.4', '29.3', '36.8', '36.9', '69.0', '44.8', '76.7', '55.8',
       '41.5', '25.3', '71.8', '62.1', '79.2', '69.1', '47.2', '50.7',
       '73.0', '67.9', '75.4', '62.2', '52.6', '52.7', '55.6', '75.2',
       '67.3', '63.1', '46.1', '63.6', '21.7', '68.9', '41.8', '78.1',
       '56.6', '71.7', '32.3', '81.5', '20.1', '76.5', '73.6', '81.6',
       '77.4', '74.5', '20.7', '44.9', '82.1', '49.3', '81.4', '78.7',
       '17.1', '83.3', '81.9', '78.2', '82.9', '62.0', '87.1', '78.8',
       '72.8', '16.6', '39.9', '40.0', '30.8', '79.7', '34.0', '48.6',
       '35.9', '83.5', '79.4', '38.0', '43.1', '24.7', '42.1', '27.8',
       '26.6', '38.4', '44.5', '66.6', '75.8', '74.2', '25.2', '86.8',
       '71.9', '76.2', '84.4', '42.3', '84.6', '85.0', '79.3', '83.0',
       '80.3', '81.8', '84.2', '78.6', '80.2', '29.6', '87.0', '91.5',
       '42.7', '79.5', '82.7', '20.5', '8.2', '15.5', '14.0', '15.8',
       '9.1', '18.8', '25.6', '31.3', '26.4', '27.1', '28.0', '32.8',
       '47.8', '84.1', '86.5', '86.0', '74.4', '81.2', '83.6', '88.6',
       '85.6', '83.2', '90.2', '86.9', '85.9', '86.3', '89.5', '85.1',
       '82.8', '78.9', '88.4', '86.1', '87.7', '89.2', '87.2', '90.4',
       '81.0', '86.2', '83.7', '21.6', '7.7', '12.1', '18.3', '14.5',
       '15.1', '25.5', '20.4', '25.4', '29.7', '39.3', '84.7', '86.7',
       '77.5', '91.6', '87.9', '77.8', '80.9', '87.3', '85.3', '83.8',
       '89.3', '87.4', '87.6', '89.7', '90.1', '18.7', '8.4', '15.9',
       '10.8', '18.0', '8.1', '14.3', '23.1', '26.8', '31.6', '27.0',
       '46.0', '84.0', '80.7', '83.4', '88.1', '84.5', '81.1', '90.0',
       '80.0', '88.0', '84.8', '84.3', '82.3', '89.1', '85.5', '89.0',
       '88.2', '92.1', '83.1', '24.9', '8.5', '19.0', '17.7', '15.7',
```

```
       '21.4', '13.8', '25.7', '23.9', '30.9', '24.1', '88.5', '91.7',
       '90.6', '87.5', '91.8', '82.4', '84.9', '87.8', '89.6', '80.6',
       '11.2', '21.8', '31.1', '29.0', '19.9', '32.7', '79.0', '18.5',
       '26.7', '22.9', '30.3', '37.2', '85.7', '88.7', '86.4', '91.3',
       '79.9', '85.4', '14.9', '23.6', '80.1', '93.7', '82.5', '93.0',
       '98.2', '88.8', '18.6', '5.2', '13.7', '13.6', '13.4', '26.2',
       '27.9', '31.4', '47.1', '91.0', '91.4', '78.3', '89.9'],
      dtype=object)
```

In [15]:

```
# There is some unwanted values so replacing it with NaN for easy cleaning of data
new_data['Estimate (%)'] = new_data['Estimate (%)'].replace('NR*', 'NaN')
```

In [16]:

```
new_data['Estimate (%)'].unique()
```

Out[16]:

```
array(['49.2', '46.6', '56.1', '41.6', '33.6', '42.0', '49.1', '53.0',
       '47.9', '66.1', '42.8', '66.0', '45.5', '58.8', '38.6', '37.8',
       '39.5', '43.6', '54.3', '47.3', '47.4', '60.4', '44.1', '48.9',
       '57.5', '60.9', '43.4', '58.6', '39.1', '49.6', '64.0', '57.3',
       '58.2', '74.7', '73.5', '62.9', '73.1', '41.3', '40.9', '68.7',
       '65.1', '77.1', '71.2', '53.7', '72.4', '70.5', '79.8', '58.4',
       '68.2', '48.1', '64.8', '68.5', '76.0', '75.0', '60.8', '67.6',
       '65.0', '74.1', '67.1', '64.5', '34.8', '61.1', '76.1', '54.9',
       '67.2', '64.4', '74.0', '64.7', '70.7', '63.3', '39.0', '51.3',
       '33.4', '27.6', '38.5', '42.5', '49.0', '41.0', '51.0', '37.0',
       '59.4', '32.6', '51.6', '30.7', '50.6', '29.5', '50.0', '38.1',
       '39.8', '56.7', '38.9', '41.9', '51.7', '53.2', '39.7', '52.4',
       '32.0', '40.5', '66.8', '56.4', '67.8', '63.5', '51.1', '49.7',
       '25.9', '29.9', '72.5', '50.3', '73.3', '43.9', '40.4', '69.5',
       '58.3', '67.0', '45.1', 'NaN', '37.3', '60.1', '65.3', '55.2',
       '65.6', '58.0', '69.9', '62.8', '38.3', '50.2', '65.2', '51.5',
       '70.2', '59.1', '58.7', '61.7', '48.3', '46.9', '35.7', '42.6',
       '48.5', '53.1', '49.9', '45.4', '66.4', '51.8', '60.7', '40.1',
       '48.7', '37.7', '44.4', '46.7', '54.7', '49.8', '61.4', '45.2',
       '58.5', '64.9', '57.9', '53.4', '62.7', '57.8', '74.6', '74.8',
       '64.2', '67.4', '42.9', '72.6', '57.4', '57.1', '72.2', '79.1',
       '61.6', '68.6', '65.9', '69.8', '77.9', '76.8', '68.4', '67.5',
       '31.2', '75.6', '69.4', '73.2', '73.8', '65.5', '39.4', '37.4',
       '44.7', '60.0', '50.5', '68.1', '72.9', '54.1', '40.7', '46.2',
       '45.6', '52.1', '62.5', '64.1', '57.2', '61.0', '82.0', '76.4',
       '71.1', '90.8', '50.9', '50.8', '71.6', '72.1', '81.7', '77.6',
       '59.8', '75.1', '69.6', '85.8', '63.8', '57.6', '66.7', '75.9',
       '77.7', '68.8', '77.2', '65.4', '80.5', '66.9', '76.9', '78.5',
       '70.0', '28.3', '20.3', '37.5', '39.6', '33.8', '60.2', '35.3',
       '50.1', '33.1', '26.5', '41.7', '48.8', '56.0', '36.1', '56.5',
       '29.2', '63.4', '64.3', '54.4', '45.7', '24.8', '23.3', '36.2',
       '62.6', '53.5', '59.2', '34.7', '53.8', '44.6', '55.9', '48.4',
       '77.0', '35.6', '45.9', '53.3', '30.6', '47.7', '35.0', '46.8',
       '41.4', '36.3', '51.9', '67.7', '59.5', '61.5', '57.0', '68.3',
       '90.9', '36.0', '32.9', '61.9', '76.3', '71.3', '80.4', '34.5',
       '71.0', '45.3', '40.2', '63.7', '37.6', '43.5', '47.0', '69.3',
       '61.3', '78.0', '83.9', '82.6', '81.3', '71.5', '70.8', '56.2',
       '43.3', '44.2', '29.8', '52.2', '51.4', '44.0', '59.7', '40.8',
       '46.5', '55.3', '46.4', '49.5', '43.8', '59.3', '38.7', '74.9',
       '78.4', '95.1', '69.7', '79.6', '54.0', '80.8', '70.3', '53.9',
       '70.9', '76.6', '63.9', '77.3', '64.6', '73.4', '23.4', '55.4',
       '48.2', '43.2', '54.6', '72.7', '58.1', '62.4', '50.4', '65.7',
       '42.4', '61.8', '52.3', '65.8', '60.6', '52.5', '63.2', '55.5',
       '52.8', '54.8', '75.7', '59.6', '66.3', '59.9', '66.5', '57.7',
       '45.8', '52.9', '52.0', '56.3', '58.9', '47.5', '62.3', '73.7',
       '51.2', '75.5', '55.0', '59.0', '70.4', '70.1', '25.0', '75.3',
       '72.0', '40.3', '61.2', '55.7', '49.4', '70.6', '31.0', '74.3',
       '72.3', '48.0', '69.2', '56.8', '66.2', '73.9', '82.2', '14.7',
       '44.3', '60.3', '40.6', '43.0', '46.3', '42.2', '60.5', '39.2',
       '56.9', '36.5', '54.2', '47.6', '38.2', '68.0', '35.4', '53.6',
       '54.5', '36.6', '63.0', '33.5', '55.1', '30.5', '41.1', '35.8',
       '71.4', '29.3', '36.8', '36.9', '69.0', '44.8', '76.7', '55.8',
       '41.5', '25.3', '71.8', '62.1', '79.2', '69.1', '47.2', '50.7',
       '73.0', '67.9', '75.4', '62.2', '52.6', '52.7', '55.6', '75.2',
       '67.3', '63.1', '46.1', '63.6', '21.7', '68.9', '41.8', '78.1',
       '56.6', '71.7', '32.3', '81.5', '20.1', '76.5', '73.6', '81.6',
       '77.4', '74.5', '20.7', '44.9', '82.1', '49.3', '81.4', '78.7',
       '17.1', '83.3', '81.9', '78.2', '82.9', '62.0', '87.1', '78.8',
       '72.8', '16.6', '39.9', '40.0', '30.8', '79.7', '34.0', '48.6',
       '35.9', '83.5', '79.4', '38.0', '43.1', '24.7', '42.1', '27.8',
       '26.6', '38.4', '44.5', '66.6', '75.8', '74.2', '25.2', '86.8',
       '71.9', '76.2', '84.4', '42.3', '84.6', '85.0', '79.3', '83.0',
       '80.3', '81.8', '84.2', '78.6', '80.2', '29.6', '87.0', '91.5',
       '42.7', '79.5', '82.7', '20.5', '8.2', '15.5', '14.0', '15.8',
       '9.1', '18.8', '25.6', '31.3', '26.4', '27.1', '28.0', '32.8',
       '47.8', '84.1', '86.5', '86.0', '74.4', '81.2', '83.6', '88.6',
       '85.6', '83.2', '90.2', '86.9', '85.9', '86.3', '89.5', '85.1',
       '82.8', '78.9', '88.4', '86.1', '87.7', '89.2', '87.2', '90.4',
       '81.0', '86.2', '83.7', '21.6', '7.7', '12.1', '18.3', '14.5',
       '15.1', '25.5', '20.4', '25.4', '29.7', '39.3', '84.7', '86.7',
       '77.5', '91.6', '87.9', '77.8', '80.9', '87.3', '85.3', '83.8',
```

```
       '89.3', '87.4', '87.6', '89.7', '90.1', '18.7', '8.4', '15.9',
       '10.8', '18.0', '8.1', '14.3', '23.1', '26.8', '31.6', '27.0',
       '46.0', '84.0', '80.7', '83.4', '88.1', '84.5', '81.1', '90.0',
       '80.0', '88.0', '84.8', '84.3', '82.3', '89.1', '85.5', '89.0',
       '88.2', '92.1', '83.1', '24.9', '8.5', '19.0', '17.7', '15.7',
       '21.4', '13.8', '25.7', '23.9', '30.9', '24.1', '88.5', '91.7',
       '90.6', '87.5', '91.8', '82.4', '84.9', '87.8', '89.6', '80.6',
       '11.2', '21.8', '31.1', '29.0', '19.9', '32.7', '79.0', '18.5',
       '26.7', '22.9', '30.3', '37.2', '85.7', '88.7', '86.4', '91.3',
       '79.9', '85.4', '14.9', '23.6', '80.1', '93.7', '82.5', '93.0',
       '98.2', '88.8', '18.6', '5.2', '13.7', '13.6', '13.4', '26.2',
       '27.9', '31.4', '47.1', '91.0', '91.4', '78.3', '89.9'],
      dtype=object)
```

In [17]:
```
new_data['Estimate (%)'] = new_data['Estimate (%)'].dropna()
```

In [18]:
```
# The column is in str so typecasting it to float for numerical computations
new_data['Estimate (%)'] = new_data['Estimate (%)'].astype(float)
```

In [19]:
```
new_data['Estimate (%)'][0]
```

Out[19]:
```
49.2
```

In [20]:
```
new_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4137 entries, 0 to 4136
Data columns (total 9 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Vaccine                       4137 non-null   object
 1   Geography Type                4137 non-null   object
 2   Geography                     4137 non-null   object
 3   Survey Year/Influenza Season  4137 non-null   int64
 4   Dimension Type                4137 non-null   object
 5   Dimension                     4137 non-null   object
 6   Estimate (%)                  3715 non-null   float64
 7   95% CI (%)                    4137 non-null   object
 8   Sample Size                   3933 non-null   float64
dtypes: float64(2), int64(1), object(6)
memory usage: 291.0+ KB
```

In [21]:
```
# Dropping all the null values
new_data = new_data.dropna()
```

In [22]:
```
new_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 3715 entries, 0 to 4136
Data columns (total 9 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Vaccine                       3715 non-null   object
 1   Geography Type                3715 non-null   object
 2   Geography                     3715 non-null   object
 3   Survey Year/Influenza Season  3715 non-null   int64
 4   Dimension Type                3715 non-null   object
 5   Dimension                     3715 non-null   object
 6   Estimate (%)                  3715 non-null   float64
 7   95% CI (%)                    3715 non-null   object
 8   Sample Size                   3715 non-null   float64
dtypes: float64(2), int64(1), object(6)
memory usage: 290.2+ KB
```

In [23]:
```
new_data.describe()
```

Out[23]:

	Survey Year/Influenza Season	Estimate (%)	Sample Size
count	3715.000000	3715.000000	3715.000000
mean	2016.241184	61.275074	849.202153
std	2.648391	15.169773	2728.862515
min	2012.000000	5.200000	32.000000
25%	2014.000000	52.000000	191.000000
50%	2017.000000	62.700000	346.000000
75%	2019.000000	72.100000	685.500000
max	2020.000000	98.200000	43737.000000

In [24]:
```
new_data.head()
```

Out[24]:

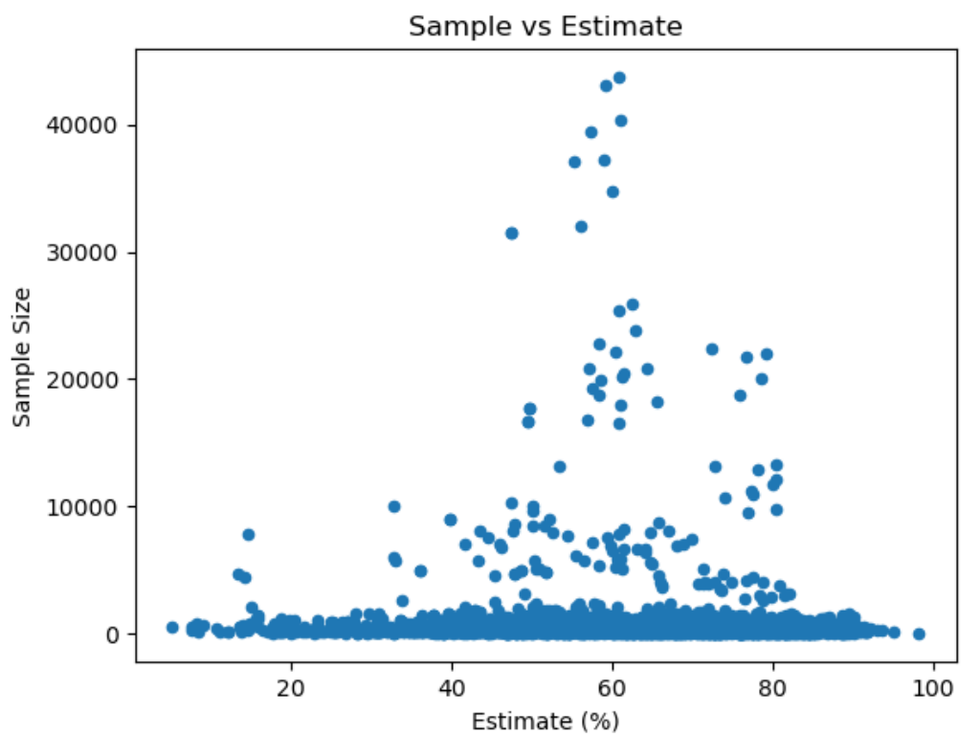
	Vaccine	Geography Type	Geography	Survey Year/Influenza Season	Dimension Type	Dimension	Estimate (%)	95% CI (%)	Sample Size
0	Influenza	States	Alaska	2012	Age	≥18 Years	49.2	45.3 to 53.1	852.0
1	Influenza	States	Arkansas	2012	Age	≥18 Years	46.6	40.7 to 52.5	756.0
2	Influenza	States	Colorado	2012	Age	≥18 Years	56.1	52.1 to 60.0	1170.0
3	Influenza	States	Delaware	2012	Age	≥18 Years	41.6	38.4 to 44.8	981.0
4	Influenza	States	Georgia	2012	Age	≥18 Years	33.6	29.6 to 37.7	1007.0

In [32]:

```
# plots the correlations between two variables
new_data.plot.scatter(x='Estimate (%)',
                      y='Sample Size',
                      title='Sample vs Estimate')
```

Out[32]:

```
<AxesSubplot: title={'center': 'Sample vs Estimate'}, xlabel='Estimate (%)', ylabel='Sample Size'>
```

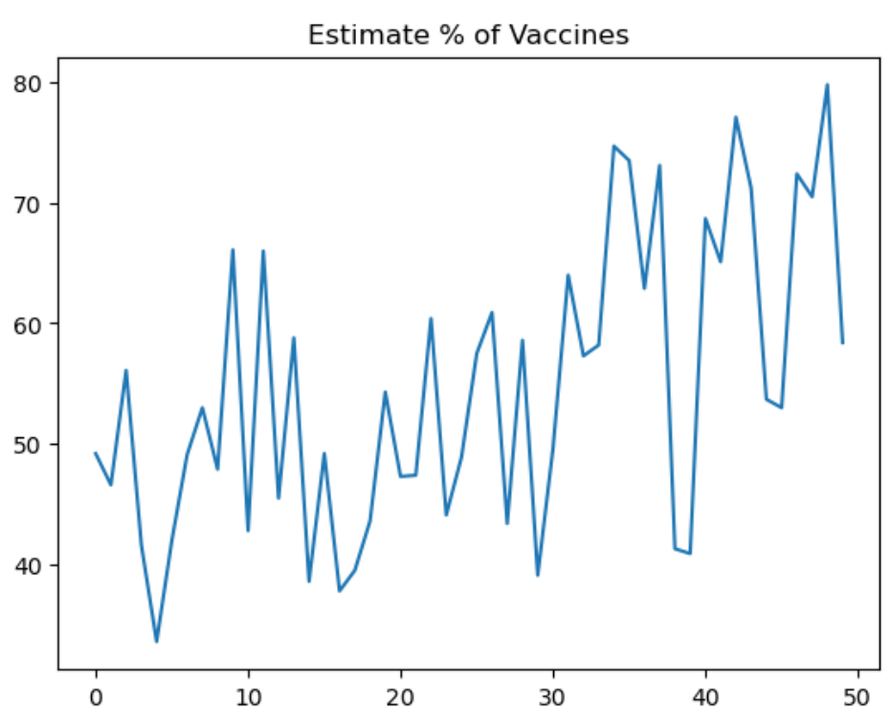


In [33]:

```
new_data['Estimate (%)'].head(50).plot.line(title="Estimate % of Vaccines")
```

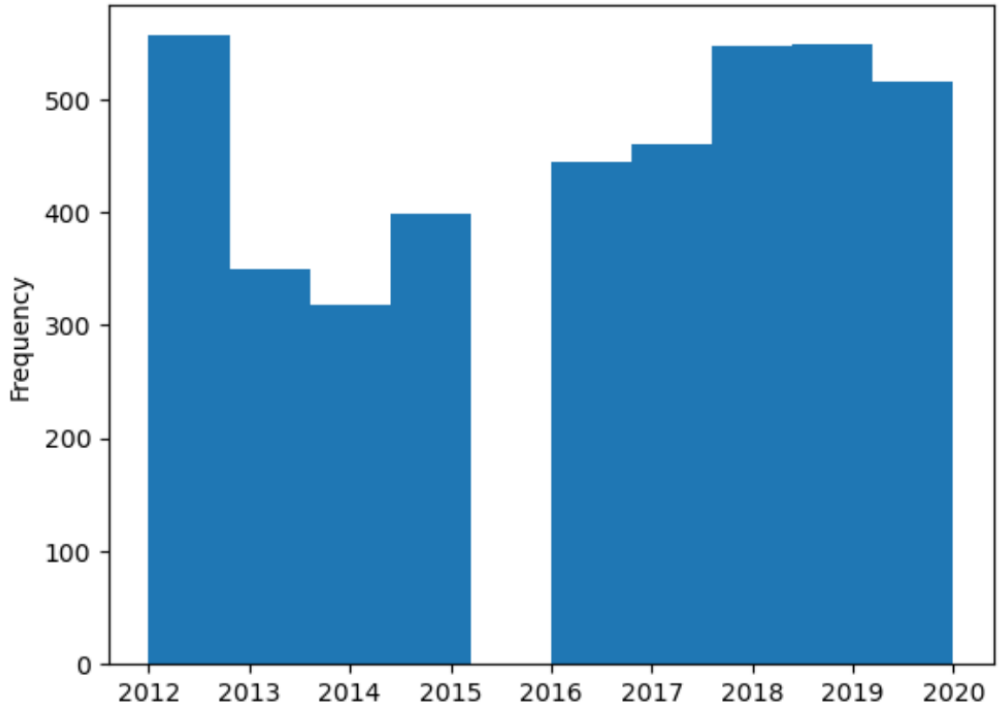
Out[33]:

```
<AxesSubplot: title={'center': 'Estimate % of Vaccines'}>
```



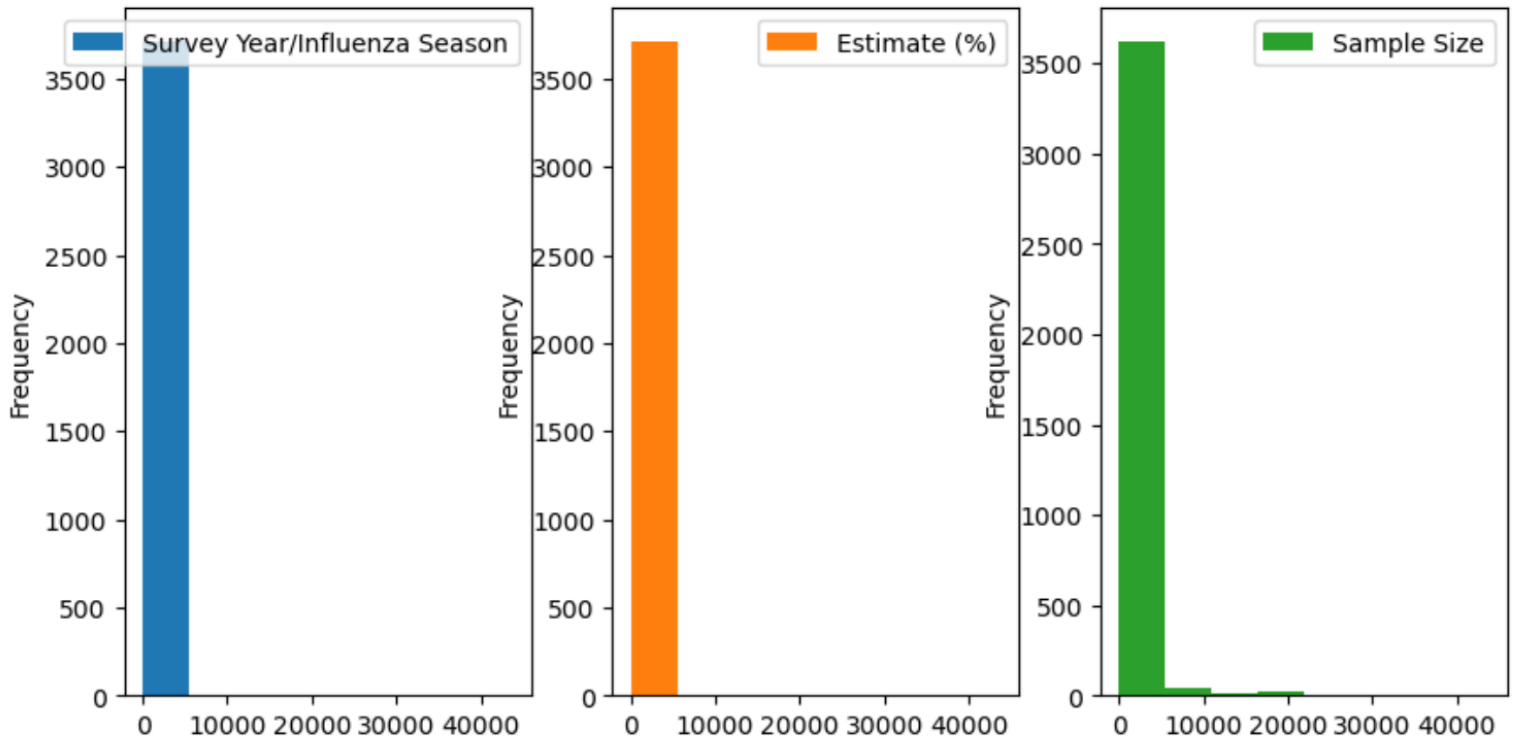
In [79]:
```
# Returns the distribution of the data
data['Survey Year/Influenza Season'].plot.hist()
```

Out[79]:
```
<AxesSubplot: ylabel='Frequency'>
```



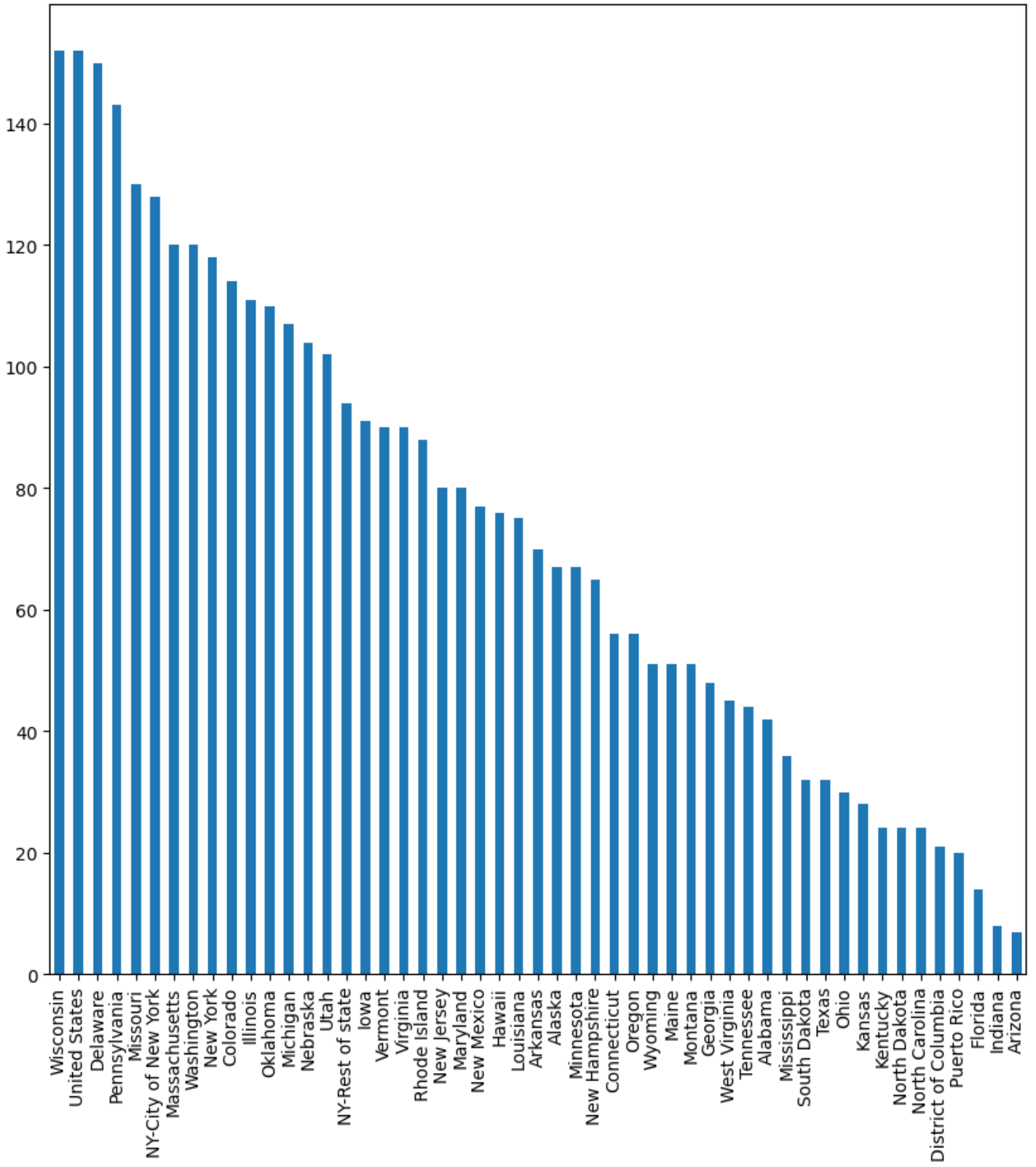
In [78]:
```
# hist returns the distribution of each data
new_data.plot.hist(subplots=True, layout=(1, 3), figsize=(10, 5), bins=8)
```

Out[78]:
```
array([[<AxesSubplot: ylabel='Frequency'>,
        <AxesSubplot: ylabel='Frequency'>,
        <AxesSubplot: ylabel='Frequency'>]], dtype=object)
```



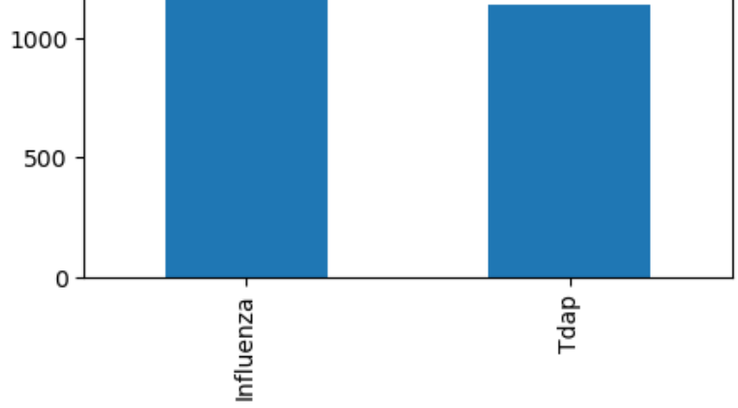
In [45]:
```
# plots the vertical bar chart
new_data['Geography'].value_counts().plot.bar(figsize=(10, 10))
```

Out[45]:
```
<AxesSubplot: >
```



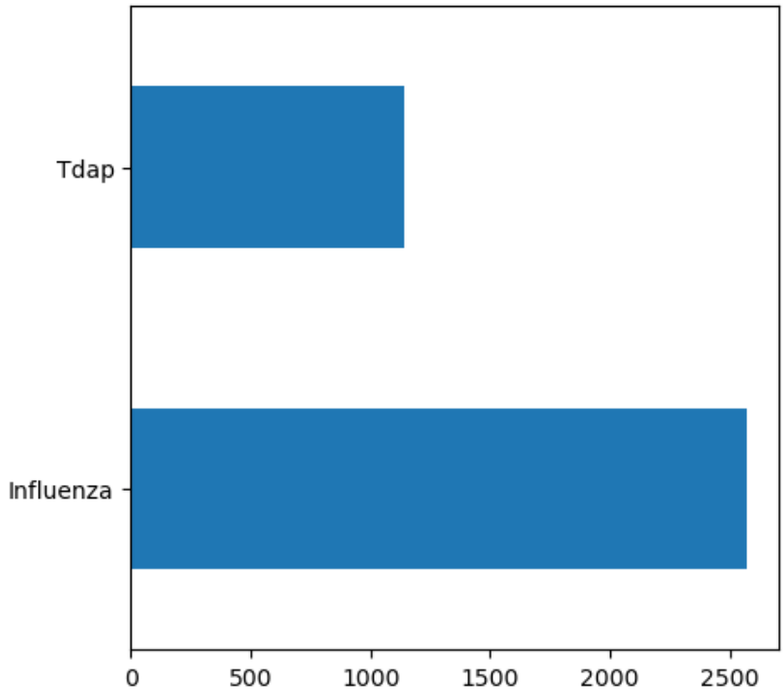
In [51]:
```
# Plots the vertical bar chart
new_data['Vaccine'].value_counts().sort_index().plot.bar(figsize=(5, 5))
```

Out[51]:
```
<AxesSubplot: >
```



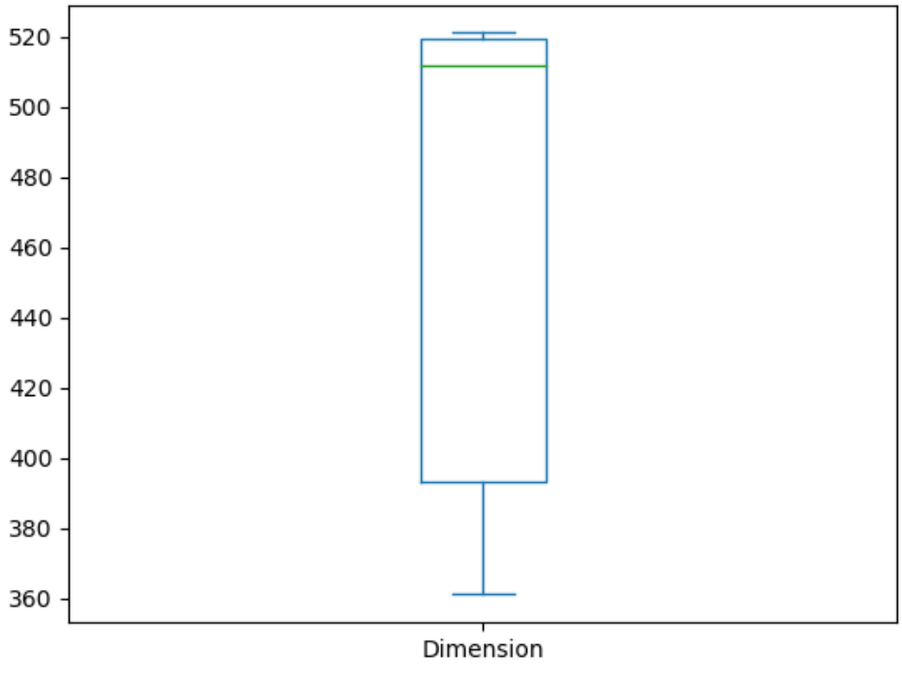
In [77]:
```
# Barh plot returns the horizontal bar chart
new_data['Vaccine'].value_counts().sort_index().plot.barh(figsize=(5, 5))
```

Out[77]: <AxesSubplot: >



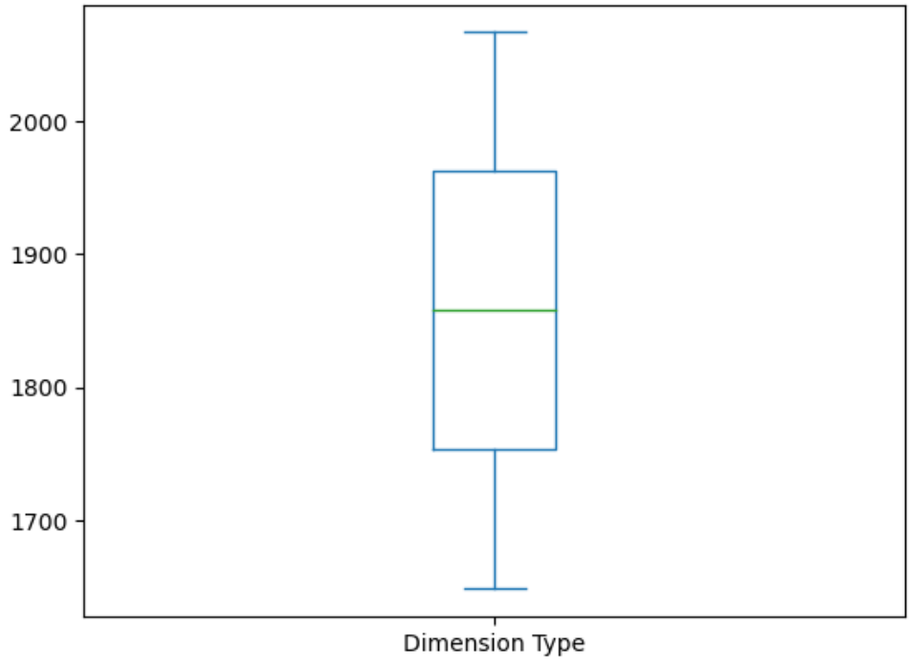
In [76]:
```
# Box plot plots the numeric data based on their quartiles
new_data['Dimension'].value_counts().plot.box()
```

Out[76]: <AxesSubplot: >



In [58]:
```
new_data['Dimension Type'].value_counts().plot.box()
```

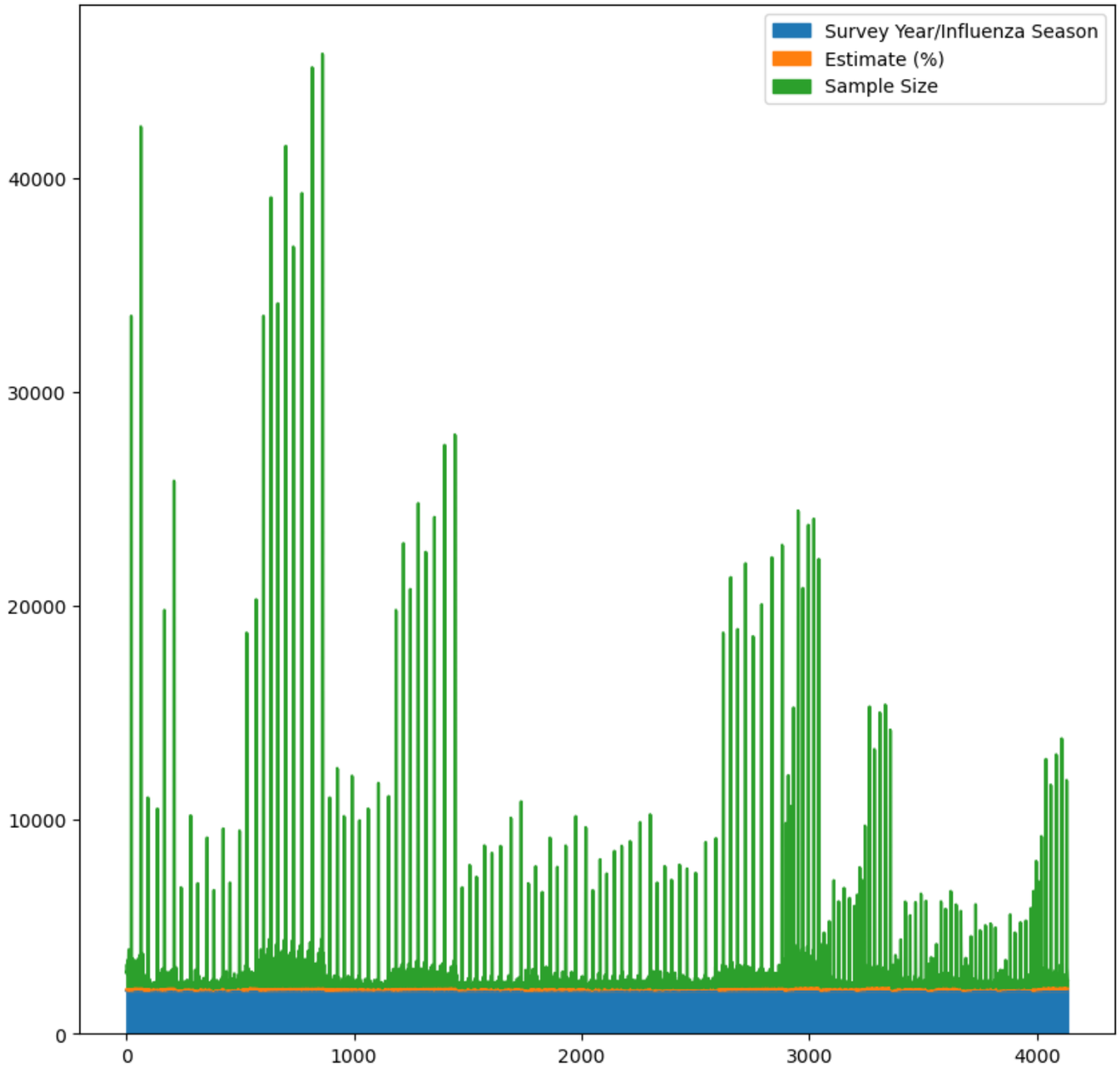
Out[58]: <AxesSubplot: >



Additional Tasks

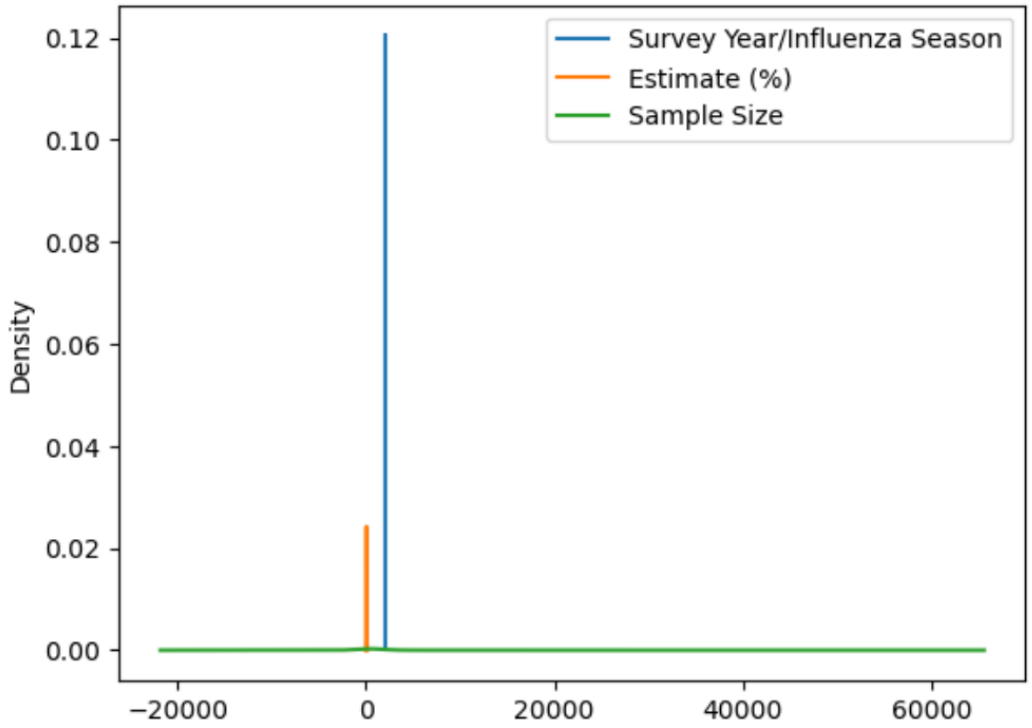
In [64]:
```
# Area plot displays the quantitative data visually.
new_data.plot.area(figsize=(10, 10))
```

Out[64]:
```
<AxesSubplot: >
```



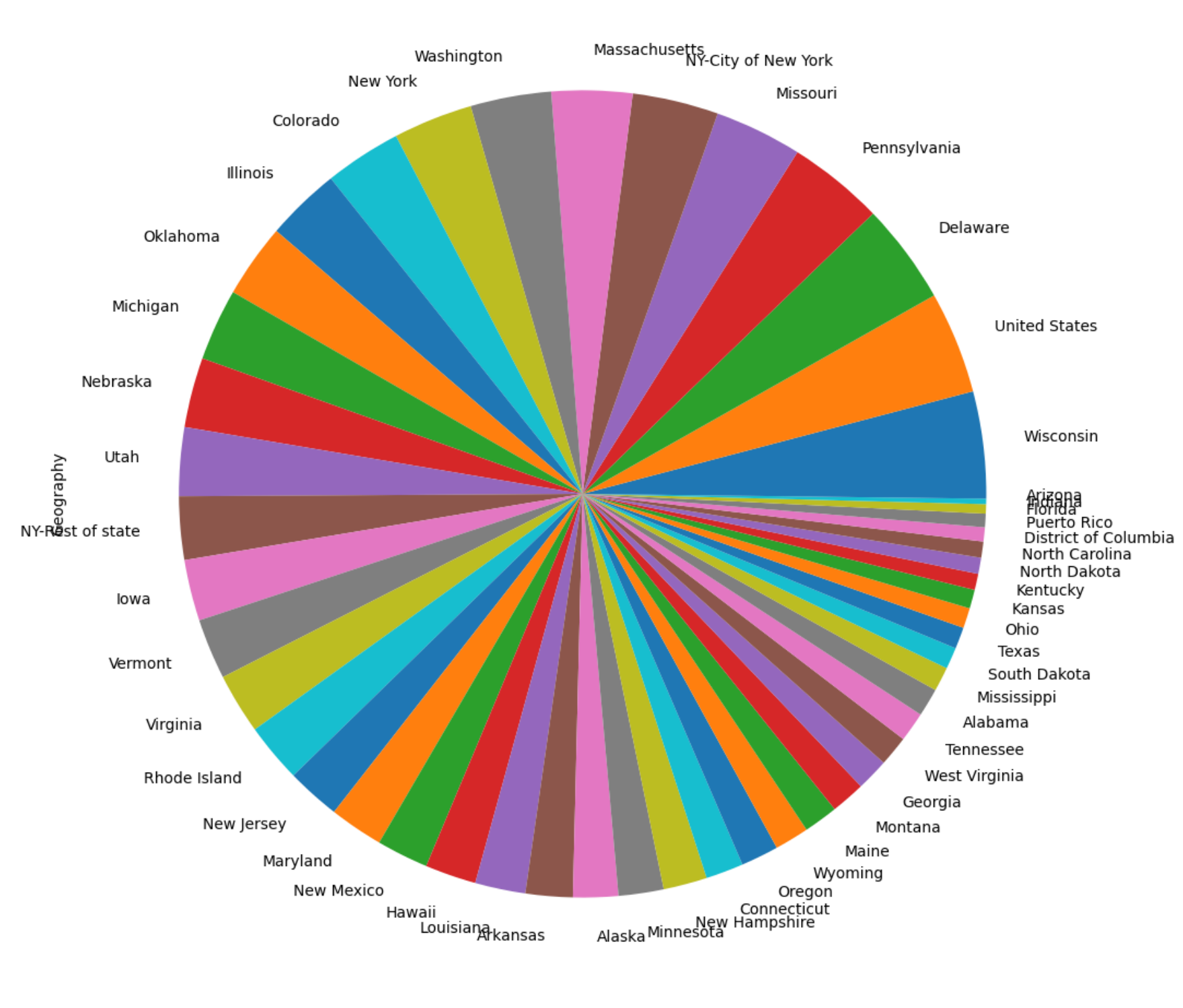
In [69]:
```
# KDE is used to find the probability density function which uses gaussian kernels.
new_data.plot.kde(bw_method=0.5)
```

Out[69]:
```
<AxesSubplot: ylabel='Density'>
```



In [75]:
```
# pie plot used to return the proportional representation of the data
new_data['Geography'].value_counts().plot.pie(figsize=(12, 12))
```

Out[75]: <AxesSubplot: ylabel='Geography'>



In [ ]: