In [1]:

```
import pandas as pd
import numpy as np
import random
import matplotlib.pyplot as plt
from matplotlib.ticker import FuncFormatter
```

In [2]:

```
data = pd.read_csv('/Week-5-Data-Visualization/world-development-indicators/Indicators.csv')
data.shape
```

Out[2]:

```
(5656458, 6)
```

In [3]:

```
data.head(10)
```

Out[3]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
0	Arab World	ARB	Adolescent fertility rate (births per 1,000 wo...	SP.ADO.TFRT	1960	1.335609e+02
1	Arab World	ARB	Age dependency ratio (% of working-age populat...	SP.POP.DPND	1960	8.779760e+01
2	Arab World	ARB	Age dependency ratio, old (% of working-age po...	SP.POP.DPND.OL	1960	6.634579e+00
3	Arab World	ARB	Age dependency ratio, young (% of working-age ...	SP.POP.DPND.YG	1960	8.102333e+01
4	Arab World	ARB	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1960	3.000000e+06
5	Arab World	ARB	Arms imports (SIPRI trend indicator values)	MS.MIL.MPRT.KD	1960	5.380000e+08
6	Arab World	ARB	Birth rate, crude (per 1,000 people)	SP.DYN.CBRT.IN	1960	4.769789e+01
7	Arab World	ARB	CO2 emissions (kt)	EN.ATM.CO2E.KT	1960	5.956399e+04
8	Arab World	ARB	CO2 emissions (metric tons per capita)	EN.ATM.CO2E.PC	1960	6.439635e-01
9	Arab World	ARB	CO2 emissions from gaseous fuel consumption (%...	EN.ATM.CO2E.GF.ZS	1960	5.041292e+00

What is the range of years?

In [4]:

```
years = data['Year'].unique().tolist()
print(min(years), '-',max(years))
```

```
1960 - 2015
```

What are the unique Country names and codes, and how many are there?

In [5]:

```
# List unique countries and the count or length of list
countries = data['CountryName'].unique().tolist()
countryCode = data['CountryCode'].unique().tolist()


print(countries, countryCode, len(countries), len(countryCode))
```

```
['Arab World', 'Caribbean small states', 'Central Europe and the Baltics', 'East Asia & Pacific (a
ll income levels)', 'East Asia & Pacific (developing only)', 'Euro area', 'Europe & Central Asia (
all income levels)', 'Europe & Central Asia (developing only)', 'European Union', 'Fragile and con
```

```
flict affected situations', 'Heavily indebted poor countries (HIPC)', 'High income', 'High income:
nonOECD', 'High income: OECD', 'Latin America & Caribbean (all income levels)', 'Latin America & C
aribbean (developing only)', 'Least developed countries: UN classification', 'Low & middle
income', 'Low income', 'Lower middle income', 'Middle East & North Africa (all income levels)', 'M
iddle East & North Africa (developing only)', 'Middle income', 'North America', 'OECD members', 'O
ther small states', 'Pacific island small states', 'Small states', 'South Asia', 'Sub-Saharan Afri
ca (all income levels)', 'Sub-Saharan Africa (developing only)', 'Upper middle income', 'World', '
Afghanistan', 'Albania', 'Algeria', 'American Samoa', 'Andorra', 'Angola', 'Antigua and Barbuda',
'Argentina', 'Armenia', 'Aruba', 'Australia', 'Austria', 'Azerbaijan', 'Bahamas, The', 'Bahrain',
'Bangladesh', 'Barbados', 'Belarus', 'Belgium', 'Belize', 'Benin', 'Bermuda', 'Bhutan', 'Bolivia',
'Bosnia and Herzegovina', 'Botswana', 'Brazil', 'Brunei Darussalam', 'Bulgaria', 'Burkina Faso', '
Burundi', 'Cabo Verde', 'Cambodia', 'Cameroon', 'Canada', 'Cayman Islands', 'Central African Repub
lic', 'Chad', 'Channel Islands', 'Chile', 'China', 'Colombia', 'Comoros', 'Congo, Dem. Rep.', 'Con
go, Rep.', 'Costa Rica', "Cote d'Ivoire", 'Croatia', 'Cuba', 'Curacao', 'Cyprus', 'Czech
Republic', 'Denmark', 'Djibouti', 'Dominica', 'Dominican Republic', 'Ecuador', 'Egypt, Arab Rep.',
'El Salvador', 'Equatorial Guinea', 'Eritrea', 'Estonia', 'Ethiopia', 'Faeroe Islands', 'Fiji', 'F
inland', 'France', 'French Polynesia', 'Gabon', 'Gambia, The', 'Georgia', 'Germany', 'Ghana', 'Gre
ece', 'Greenland', 'Grenada', 'Guam', 'Guatemala', 'Guinea', 'Guinea-Bissau', 'Guyana', 'Haiti', '
Honduras', 'Hong Kong SAR, China', 'Hungary', 'Iceland', 'India', 'Indonesia', 'Iran, Islamic
Rep.', 'Iraq', 'Ireland', 'Isle of Man', 'Israel', 'Italy', 'Jamaica', 'Japan', 'Jordan',
'Kazakhstan', 'Kenya', 'Kiribati', 'Korea, Dem. Rep.', 'Korea, Rep.', 'Kosovo', 'Kuwait', 'Kyrgyz
Republic', 'Lao PDR', 'Latvia', 'Lebanon', 'Lesotho', 'Liberia', 'Libya', 'Liechtenstein',
'Lithuania', 'Luxembourg', 'Macao SAR, China', 'Macedonia, FYR', 'Madagascar', 'Malawi',
'Malaysia', 'Maldives', 'Mali', 'Malta', 'Marshall Islands', 'Mauritania', 'Mauritius', 'Mexico',
'Micronesia, Fed. Sts.', 'Moldova', 'Monaco', 'Mongolia', 'Montenegro', 'Morocco', 'Mozambique', '
Myanmar', 'Namibia', 'Nepal', 'Netherlands', 'New Caledonia', 'New Zealand', 'Nicaragua', 'Niger',
'Nigeria', 'Northern Mariana Islands', 'Norway', 'Oman', 'Pakistan', 'Palau', 'Panama', 'Papua New
Guinea', 'Paraguay', 'Peru', 'Philippines', 'Poland', 'Portugal', 'Puerto Rico', 'Qatar',
'Romania', 'Russian Federation', 'Rwanda', 'Samoa', 'San Marino', 'Sao Tome and Principe', 'Saudi
Arabia', 'Senegal', 'Serbia', 'Seychelles', 'Sierra Leone', 'Singapore', 'Sint Maarten (Dutch
part)', 'Slovak Republic', 'Slovenia', 'Solomon Islands', 'Somalia', 'South Africa', 'South Sudan'
, 'Spain', 'Sri Lanka', 'St. Kitts and Nevis', 'St. Lucia', 'St. Martin (French part)', 'St.
Vincent and the Grenadines', 'Sudan', 'Suriname', 'Swaziland', 'Sweden', 'Switzerland', 'Syrian Ar
ab Republic', 'Tajikistan', 'Tanzania', 'Thailand', 'Timor-Leste', 'Togo', 'Tonga', 'Trinidad and
Tobago', 'Tunisia', 'Turkey', 'Turkmenistan', 'Turks and Caicos Islands', 'Tuvalu', 'Uganda', 'Ukr
aine', 'United Arab Emirates', 'United Kingdom', 'United States', 'Uruguay', 'Uzbekistan',
'Vanuatu', 'Venezuela, RB', 'Vietnam', 'Virgin Islands (U.S.)', 'West Bank and Gaza', 'Yemen, Rep.
', 'Zambia', 'Zimbabwe'] ['ARB', 'CSS', 'CEB', 'EAS', 'EAP', 'EMU', 'ECS', 'ECA', 'EUU', 'FCS', 'H
PC', 'HIC', 'NOC', 'OEC', 'LCN', 'LAC', 'LDC', 'LMY', 'LIC', 'LMC', 'MEA', 'MNA', 'MIC', 'NAC', 'O
ED', 'OSS', 'PSS', 'SST', 'SAS', 'SSF', 'SSA', 'UMC', 'WLD', 'AFG', 'ALB', 'DZA', 'ASM', 'ADO', 'A
GO', 'ATG', 'ARG', 'ARM', 'ABW', 'AUS', 'AUT', 'AZE', 'BHS', 'BHR', 'BGD', 'BRB', 'BLR', 'BEL', 'B
LZ', 'BEN', 'BMU', 'BTN', 'BOL', 'BIH', 'BWA', 'BRA', 'BRN', 'BGR', 'BFA', 'BDI', 'CPV', 'KHM', 'C
MR', 'CAN', 'CYM', 'CAF', 'TCD', 'CHI', 'CHL', 'CHN', 'COL', 'COM', 'ZAR', 'COG', 'CRI', 'CIV', 'H
RV', 'CUB', 'CUW', 'CYP', 'CZE', 'DNK', 'DJI', 'DMA', 'DOM', 'ECU', 'EGY', 'SLV', 'GNQ', 'ERI', 'E
ST', 'ETH', 'FRO', 'FJI', 'FIN', 'FRA', 'PYF', 'GAB', 'GMB', 'GEO', 'DEU', 'GHA', 'GRC', 'GRL', 'G
RD', 'GUM', 'GTM', 'GIN', 'GNB', 'GUY', 'HTI', 'HND', 'HKG', 'HUN', 'ISL', 'IND', 'IDN', 'IRN', 'I
RQ', 'IRL', 'IMY', 'ISR', 'ITA', 'JAM', 'JPN', 'JOR', 'KAZ', 'KEN', 'KIR', 'PRK', 'KOR', 'KSV', 'K
WT', 'KGZ', 'LAO', 'LVA', 'LBN', 'LSO', 'LBR', 'LBY', 'LIE', 'LTU', 'LUX', 'MAC', 'MKD', 'MDG', 'M
WI', 'MYS', 'MDV', 'MLI', 'MLT', 'MHL', 'MRT', 'MUS', 'MEX', 'FSM', 'MDA', 'MCO', 'MNG', 'MNE', 'M
AR', 'MOZ', 'MMR', 'NAM', 'NPL', 'NLD', 'NCL', 'NZL', 'NIC', 'NER', 'NGA', 'MNP', 'NOR', 'OMN', 'P
AK', 'PLW', 'PAN', 'PNG', 'PRY', 'PER', 'PHL', 'POL', 'PRT', 'PRI', 'QAT', 'ROM', 'RUS', 'RWA', 'W
SM', 'SMR', 'STP', 'SAU', 'SEN', 'SRB', 'SYC', 'SLE', 'SGP', 'SXM', 'SVK', 'SVN', 'SLB', 'SOM', 'Z
AF', 'SSD', 'ESP', 'LKA', 'KNA', 'LCA', 'MAF', 'VCT', 'SDN', 'SUR', 'SWZ', 'SWE', 'CHE', 'SYR', 'T
JK', 'TZA', 'THA', 'TMP', 'TGO', 'TON', 'TTO', 'TUN', 'TUR', 'TKM', 'TCA', 'TUV', 'UGA', 'UKR', 'A
RE', 'GBR', 'USA', 'URY', 'UZB', 'VUT', 'VEN', 'VNM', 'VIR', 'WBG', 'YEM', 'ZMB', 'ZWE'] 247 247
```

Checking for null values

In [6]:

```
data.isnull().any()
```

Out[6]:

```
CountryName      False
CountryCode      False
IndicatorName    False
IndicatorCode    False
Year             False
Value            False
dtype: bool
```

Value Statistics - use to evaluate overall country exports from 1980 - 2015

In [7]:

```
data['Value'].describe()
```

Out[7]:

```
count    5.656458e+06
mean     1.070501e+12
std      4.842469e+13
min     -9.824821e+15
25%      5.566242e+00
50%      6.357450e+01
75%      1.346722e+07
max      1.103367e+16
Name: Value, dtype: float64
```

In [8]:

```
data.std(axis=0)
```

Out[8]:

```
Year     1.387895e+01
Value    4.842469e+13
dtype: float64
```

In [9]:

```
data['CountryName'].count()
```

Out[9]:

```
5656458
```

Most common value in column 'Value'

In [10]:

```
data['Value'].mode()
```

Out[10]:

```
0    0.0
dtype: float64
```

Lowest value in column 'Value'

In [11]:

```
data['Value'].min()
```

Out[11]:

```
-9824821297572060.0
```

Highest value in column 'Value'

In [12]:

```
data['Value'].max()
```

Out[12]:

```
11033666000000000.0
```

Remove Unwanted CountryCode rows

Find grouped countries via the country code

In [13]:

```
data.columns
```

Out[13]:

```
Index(['CountryName', 'CountryCode', 'IndicatorName', 'IndicatorCode', 'Year',
       'Value'],
      dtype='object')
```

In [14]:

```
data.set_index('CountryCode', inplace=True, drop=False)
```

In [15]:

```
data = data.drop(['HIC', 'OEC', 'OED', 'NOC', 'CEB', 'EAP', 'EMU', 'ECS', 'ECA', 'EUU', 'LCN', 'FCS
', 'LAC', 'LMY', 'MEA', 'MNA', 'MIC', 'NAC', 'SSF', 'UMC', 'SSA', 'LMC', 'EAS', 'HPC', 'LDC', 'LIC'
], axis=0)
```

In [16]:

```
data = data.reset_index(drop=True)
```

In [17]:

```
data.shape
```

Out[17]:

```
(5059963, 6)
```

Select Arms Exports from all countries

In [99]:

```
arms_stage = data[data['IndicatorName'].str.contains('Arms exports \(SIPRI')]
```

In [100]:

```
arms_stage.shape
```

Out[100]:

```
(2024, 6)
```

In [101]:

```
arms_stage.head()
```

Out[101]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4664484	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2014	1.019400e+10
4606252	Russian		Arms exports (SIPRI trend indicator			

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
	Federation	RUS	values)	MS.MIL.XPRT.KD	2014	5.971000e+09
4472579	France	FRA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2014	1.978000e+09
4453682	United Kingdom	GBR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2014	1.704000e+09
4408557	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2014	1.200000e+09

Filter for yearly USA exports

In [95]:

```
hist_indicator = 'Arms exports \(SIPRI'
hist_year = 2014
hist_country = 'USA'

mask1 = data['IndicatorName'].str.contains(hist_indicator)
mask2 = data['Year'].between(1960, 1980)
mask3 = data['CountryCode'].str.contains(hist_country)


# stage is just those indicators matching the 1980 for year and Arms export over time.
usa_stage = data[mask1 & mask3]
usa_67 = data[mask1 & mask2 & mask3]
```

In [96]:

```
usa_stage.head(11)
```

Out[96]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4664484	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2014	1.019400e+10
4629943	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2013	7.384000e+09
4651699	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2012	9.018000e+09
4652810	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2011	9.111000e+09
4640880	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2010	8.169000e+09
4621048	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2009	6.822000e+09
4620931	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2008	6.814000e+09
4636237	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2007	7.834000e+09
4631888	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2006	7.521000e+09
4620019	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2005	6.758000e+09
4619906	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	2004	6.752000e+09

In [23]:

```
type(usa_stage)
```

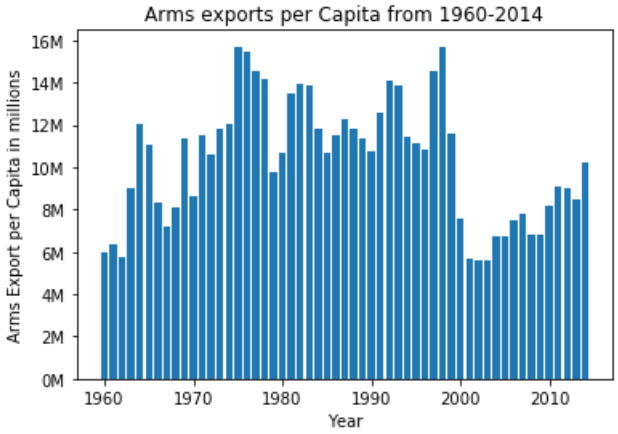
Out[23]:

```
pandas.core.frame.DataFrame
```

Bar Chart Arms Export per Capita

In [93]:

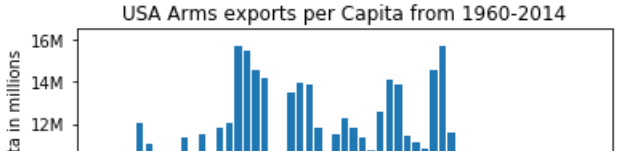
```
years = arms_stage['Year'].values
arms = arms_stage['Value'].values

plt.bar(years,arms)
plt.title("Arms exports per Capita from 1960-2014")
plt.xlabel("Year")
plt.ylabel("Arms Export per Capita in millions")

ax = plt.gca()
ax.yaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.yaxis.set_major_formatter(formatter)

plt.show()
```

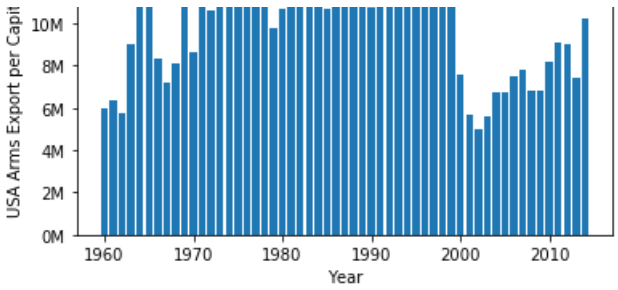


Bar chart of yearly USA arms exports

In [97]:

```
years = usa_stage['Year'].values
arms = usa_stage['Value'].values

plt.bar(years,arms)
plt.title("USA Arms exports per Capita from 1960-2014")
plt.xlabel("Year")
plt.ylabel("USA Arms Export per Capita in millions")

ax = plt.gca()
ax.yaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.yaxis.set_major_formatter(formatter)

plt.show()
```



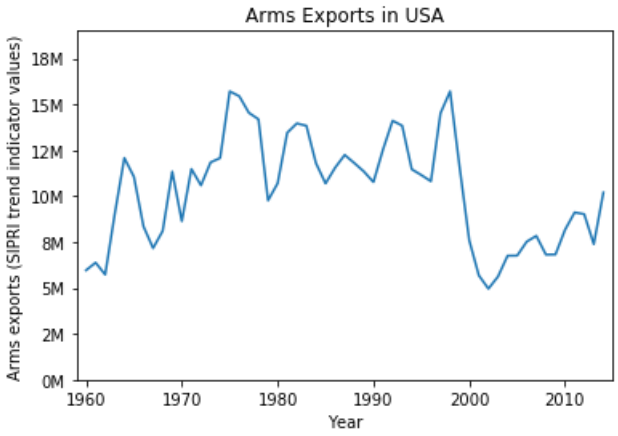


Notable years: 2002, 2013 There is an increase in global exports compared to USA

Line Graph of USA arms exports annual

In [30]:

```
plt.plot(usa_stage['Year'].values, usa_stage['Value'].values)

plt.xlabel('Year')
plt.ylabel(usa_stage['IndicatorName'].iloc[0])

plt.title('Arms Exports in USA')

plt.axis([1959, 2015, 0, 1.9e10])

ax = plt.gca()
ax.yaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.yaxis.set_major_formatter(formatter)

plt.show()
```

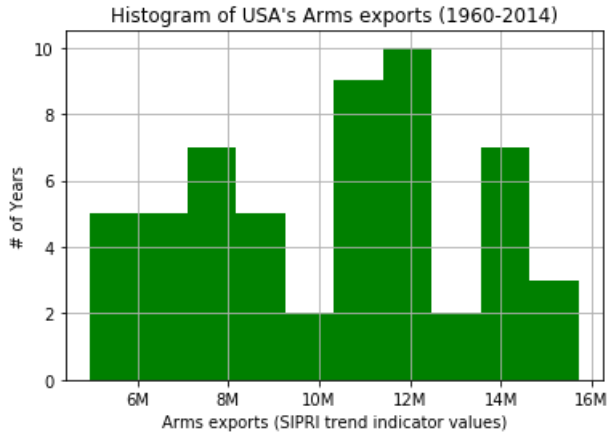


Histogram of Global and USA Arms exports annual

In [31]:

```
hist_data = usa_stage['Value'].values
plt.hist(usa_stage['Value'].values, 10, normed=False, facecolor='green')

plt.xlabel(usa_stage['IndicatorName'].iloc[0])
plt.ylabel('# of Years')
plt.title("Histogram of USA's Arms exports (1960-2014)")

ax = plt.gca()
ax.xaxis.get_major_formatter().set_scientific(False)
```

```
def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.xaxis.set_major_formatter(formatter)

plt.grid(True)

plt.show()
```



So the USA has many years where it exported between 10M-12M arms per capita with outliers on either side.

In [32]:

```
print(hist_data)
```

```
[  5.96100000e+09   6.37600000e+09   5.72500000e+09   9.02900000e+09
   1.20770000e+10   1.10540000e+10   8.34900000e+09   7.16500000e+09
   8.10100000e+09   1.13340000e+10   8.63400000e+09   1.14780000e+10
   1.05850000e+10   1.18390000e+10   1.20740000e+10   1.57080000e+10
   1.54400000e+10   1.45370000e+10   1.41860000e+10   9.76400000e+09
   1.06970000e+10   1.34510000e+10   1.39600000e+10   1.38340000e+10
   1.17960000e+10   1.06890000e+10   1.15480000e+10   1.22430000e+10
   1.18010000e+10   1.13420000e+10   1.07620000e+10   1.25400000e+10
   1.41070000e+10   1.38360000e+10   1.14610000e+10   1.11460000e+10
   1.08080000e+10   1.45180000e+10   1.57080000e+10   1.15530000e+10
   7.59100000e+09   5.68200000e+09   4.95500000e+09   5.61800000e+09
   6.75200000e+09   6.75800000e+09   7.52100000e+09   7.83400000e+09
   6.81400000e+09   6.82200000e+09   8.16900000e+09   9.11100000e+09
   9.01800000e+09   7.38400000e+09   1.01940000e+10]
```

How does USA compare to other countries

In [120]:

```
data = data.sort_values(by=['Year', 'Value'], ascending=False)
data.head(10)
```

Out[120]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4918852	South Asia	SAS	Disbursements on external debt, long-term (DIS...	DT.DIS.DLXF.CD	2015	2.287139e+11
4914010	Pakistan	PAK	Disbursements on external debt, long-term (DIS...	DT.DIS.DLXF.CD	2015	2.111025e+11
4913622	South Asia	SAS	PPG, private creditors (DIS, current US$)	DT.DIS.PRVT.CD	2015	2.097367e+11
4913619	South Asia	SAS	PPG, commercial banks (DIS, current US$)	DT.DIS.PCBK.CD	2015	2.097213e+11
4913319	Pakistan	PAK	PPG, private creditors (DIS, current US$)	DT.DIS.PRVT.CD	2015	2.087984e+11

4913320	[illegible]	[illegible]	PPG, commercial banks (DIS, current US$)	[illegible]	2015	2.087984e+10
4730595	Romania	ROM	Principal repayments on external debt, long-te...	DT.AMT.DLXF.CD	2015	2.014780e+10
4727366	Mexico	MEX	Principal repayments on external debt, long-te...	DT.AMT.DLXF.CD	2015	1.946834e+10
4724948	South Asia	SAS	PPG, official creditors (DIS, current US$)	DT.DIS.OFFT.CD	2015	1.897722e+10
4721109	Mexico	MEX	PPG, private creditors (AMT, current US$)	DT.AMT.PRVT.CD	2015	1.821751e+10

In [121]:

```
hist_indicator = 'Arms exports \(SIPRI'
hist_year = 1990

mask1 = data['IndicatorName'].str.contains(hist_indicator)
mask2 = data['Year'].isin([hist_year])
mask3 = data['Year'].between(1973, 1981)
mask4 = data['Year'].between(1989, 1996)

arms_1990 = data[mask1 & mask2]
arms_range1 = data[mask1 & mask3].head(20)
arms_range2 = data[mask1 & mask4].head(20)
arms_1990.head(5)
```

Out[121]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4670076	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.076200e+10
4465903	United Kingdom	GBR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.877000e+09
4462962	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.834000e+09
4453239	France	FRA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.698000e+09
4375760	China	CHN	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	9.410000e+08

In [122]:

```
arms_range1
```

Out[122]:

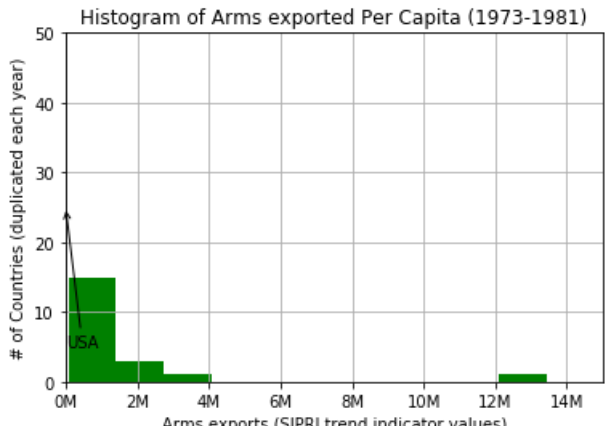
	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4692070	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	1.345100e+10
4553128	France	FRA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	3.786000e+09
4496997	United Kingdom	GBR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	2.403000e+09
4475814	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	2.029000e+09
4452661	Italy	ITA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	1.690000e+09
4355588	Netherlands	NLD	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	8.120000e+08
4323869	China	CHN	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	6.420000e+08
4323240	Switzerland	CHE	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	6.390000e+08
4240877	Poland	POL	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	3.460000e+08
4211955	Norway	NOR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	2.780000e+08
4178697	Israel	ISR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	2.170000e+08

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4178696	Arab World	ARB	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	2.170000e+08
4117226	Sweden	SWE	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	1.380000e+08
4109226	Korea, Rep.	KOR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	1.300000e+08
4109194	Spain	ESP	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	1.300000e+08
4104846	Canada	CAN	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	1.260000e+08
4083097	Libya	LBY	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	1.070000e+08
4061197	Macedonia, FYR	MKD	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	9.100000e+07
4038655	Egypt, Arab Rep.	EGY	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	7.700000e+07
4031566	Austria	AUT	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1981	7.300000e+07

Histogram of Top 20 arms contributors from 1973-1981

In [113]:

```
fig, ax = plt.subplots()

ax.annotate("USA",
            xy=(20, 25), xycoords='data',
            xytext=(15, 5), textcoords='data',
            arrowprops=dict(arrowstyle="->",
                            connectionstyle="arc3"),
            )

plt.hist(arms_range1['Value'], 10, normed=False, facecolor='green')

plt.xlabel(arms_range1['IndicatorName'].iloc[0])
plt.ylabel('# of Countries (duplicated each year)')
plt.title('Histogram of Arms exported Per Capita (1973-1981)')

plt.axis([0, 1.5e10, 0, 50])
plt.grid(True)

ax = plt.gca()
ax.xaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.xaxis.set_major_formatter(formatter)


plt.show()
```



In [88]:

```
arms_range2
```

Out[88]:

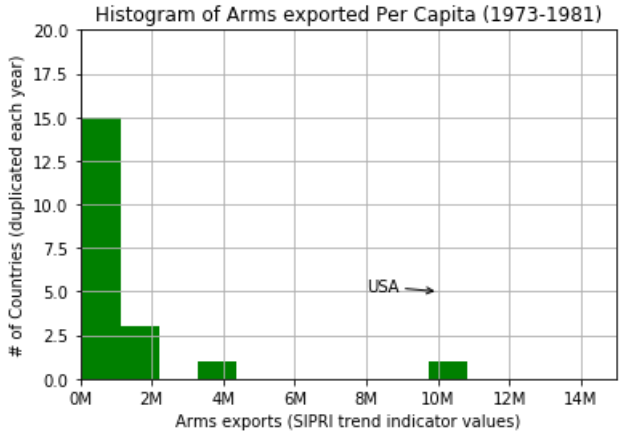
	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
4696661	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1992	1.410700e+10
4694834	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1993	1.383600e+10
4685231	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1991	1.254000e+10
4676393	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1994	1.146100e+10
4675317	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1989	1.134200e+10
4673572	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1995	1.114600e+10
4670520	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1996	1.080800e+10
4670076	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.076200e+10
4556602	Russian Federation	RUS	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1995	3.900000e+09
4544913	Russian Federation	RUS	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1996	3.539000e+09
4544264	United Kingdom	GBR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1989	3.520000e+09
4541527	Russian Federation	RUS	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1993	3.442000e+09
4513924	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1994	2.751000e+09
4507509	Russian Federation	RUS	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1992	2.613000e+09
4502729	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1991	2.516000e+09
4486259	France	FRA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1989	2.207000e+09
4472323	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1996	1.974000e+09
4467214	France	FRA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1996	1.896000e+09
4465903	United Kingdom	GBR	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.877000e+09
4462962	Germany	DEU	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1990	1.834000e+09

Histogram of Top 20 contributors from 1989-1996

In [119]:

```
fig, ax = plt.subplots()

ax.annotate("USA",
            xy=(10e9, 5), xycoords='data',
            xytext=(8e9, 5), textcoords='data',
            arrowprops=dict(arrowstyle="->",
                            connectionstyle="arc3"),
            )

plt.hist(arms_range2['Value'], 10, normed=False, facecolor='green')

plt.xlabel(arms_range2['IndicatorName'].iloc[0])
```

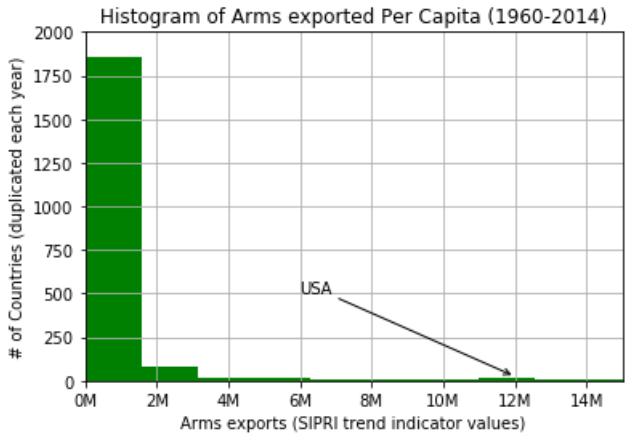
```
plt.xlabel(arms_range2['IndicatorName'].iloc[0])
plt.ylabel('# of Countries (duplicated each year)')
plt.title('Histogram of Arms exported Per Capita (1973-1981)')

plt.axis([0, 1.5e10, 0, 20])
plt.grid(True)

ax = plt.gca()
ax.xaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.xaxis.set_major_formatter(formatter)


plt.show()
```



Histogram of arms exports per capita by country

In [52]:

```
fig, ax = plt.subplots()

ax.annotate("USA",
            xy=(12e9, 25), xycoords='data',
            xytext=(6e9, 500), textcoords='data',
            arrowprops=dict(arrowstyle="->",
                            connectionstyle="arc3"),
            )

plt.hist(arms_stage['Value'], 10, normed=False, facecolor='green')

plt.xlabel(arms_stage['IndicatorName'].iloc[0])
plt.ylabel('# of Countries (duplicated each year)')
plt.title('Histogram of Arms exported Per Capita (1960-2014)')

plt.axis([0, 1.5e10, 0, 2000])
plt.grid(True)

ax = plt.gca()
ax.xaxis.get_major_formatter().set_scientific(False)

def millions(x, pos):
    'The two args are the value and tick position'
    return '{:.0f}M'.format(x*1e-9)

formatter = FuncFormatter(millions)

ax.xaxis.set_major_formatter(formatter)


plt.show()
```



In [34]:

```
print(len(arms_stage))
```

2024

So the USA, at ~12M arms is an outlier, as most countries have 0-1M arms exported from 1960-2014

Relationship between Death rate and Arms Exports in the USA

In [50]:

```
hist_indicator = 'Death rate, crude \(p'
hist_country = 'USA'

mask1 = data['IndicatorName'].str.contains(hist_indicator)
mask2 = data['CountryCode'].str.contains(hist_country)

gdp_stage = data[mask1]
usa_death = data[mask1 & mask2]
```

In [41]:

```
gdp_stage.head(2)
```

Out[41]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
13	Arab World	ARB	Death rate, crude (per 1,000 people)	SP.DYN.CDRT.IN	1960	19.754452
91	Caribbean small states	CSS	Death rate, crude (per 1,000 people)	SP.DYN.CDRT.IN	1960	9.813167

In [42]:

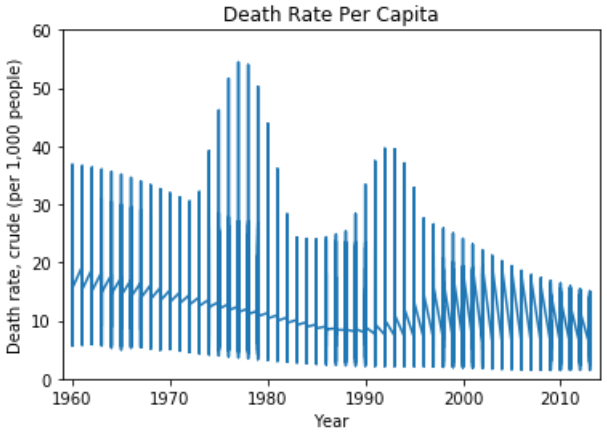
```
usa_stage.head(2)
```

Out[42]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
19360	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1960	5.961000e+09
42551	United States	USA	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1961	6.376000e+09

In [71]:

```
plt.plot(gdp_stage['Year'].values, gdp_stage['Value'].values)

plt.xlabel('Year')
plt.ylabel(gdp_stage['IndicatorName'].iloc[0])

plt.title('Death Rate Per Capita')

plt.axis([1959, 2014,0,60])

plt.show()
```



In [72]:

```
plt.plot(usa_death['Year'].values, usa_death['Value'].values)

plt.xlabel('Year')
plt.ylabel(usa_death['IndicatorName'].iloc[0])

plt.title('USA Death Rate Per Capita')

plt.axis([1959, 2014,0,60])

plt.show()
```