World Agricultural Outlook (2000-2019)

(Part-1 / Exploratory Data Analysis)

Objective:

1. This study was prepared using the OECD database.
2. The date range was selected between 2000-2019(For 20 years).

3. The aim of the study is to examine whether the world agriculture and livestock production is at a sufficient level according to the increasing population.

4. In addition, it is the evaluation of the hypotheses regarding the correlation between global warming and cattle breeding with data.

5. Another purpose is the comparison of states in agriculture and livestock production and consumption.

OECD Source Link: https://stats.oecd.org

Import Libraries

In [ ]:
```
import pandas as pd
import numpy as np
import array as arr

import matplotlib
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns

from scipy import stats
from scipy.stats import iqr
```

Read csv's and infos

In [ ]:
```
wa = pd.read_csv("world_agricultore.csv")
```

In [ ]:
```
wp = pd.read_csv("world_population_total_bysex.csv")
```

In [ ]:
```
cy = pd.read_csv("country_year.csv")
```

In [ ]:
```
wa.head(2)
```

Out[ ]:

	COUNTRY	Country	COMMODITY	Commodity	VARIABLE	Variable	TIME	Time	Value	Flag Codes	Flags
0	WLD	World	WT	Wheat	QP	Production, kt (for Biofuels in millions of li...	2000	2000	585705.5797	NaN	NaN
1	WLD	World	WT	Wheat	QP	Production, kt (for Biofuels in millions of li...	2001	2001	588610.4753	NaN	NaN

In [ ]:
```
wp.head(2)
```

Out[ ]:

	LocID	Location	VarID	Variant	Time	MidPeriod	PopMale	PopFemale	PopTotal	PopDensity
0	4	Afghanistan	2	Medium	1950	1950.5	4099.243	3652.874	7752.117	11.874
1	4	Afghanistan	2	Medium	1951	1951.5	4134.756	3705.395	7840.151	12.009

In [ ]:
```
cy.head(2)
```

Out[ ]:

	wa_all	wa_country	wa_org	wp_all	wp_country	wp_org	years	abbrv	meaning
0	World	Australia	World	World	Australia	World	2000.0	QP	Production
1	OECD	Canada	OECD	Organisation for Economic Co-operation and Dev...	Canada	Organisation for Economic Co-operation and Dev...	2001.0	IM	Imports

In [ ]:
```
wa.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 197739 entries, 0 to 197738
Data columns (total 11 columns):
 #   Column      Non-Null Count   Dtype  
---  ------      --------------   -----  
 0   COUNTRY     197739 non-null  object 
 1   Country     197739 non-null  object 
 2   COMMODITY   197739 non-null  object 
 3   Commodity   197739 non-null  object 
 4   VARIABLE    197739 non-null  object 
 5   Variable    197739 non-null  object 
 6   TIME        197739 non-null  int64  
 7   Time        197739 non-null  int64  
 8   Value       197739 non-null  float64
 9   Flag Codes  0 non-null       float64
 10  Flags       0 non-null       float64
dtypes: float64(3), int64(2), object(6)
memory usage: 16.6+ MB
```

In [ ]:
```
wp.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 280932 entries, 0 to 280931
Data columns (total 10 columns):
 #   Column      Non-Null Count   Dtype  
---  ------      --------------   -----  
 0   LocID       280932 non-null  int64  
 1   Location    280932 non-null  object 
 2   VarID       280932 non-null  int64  
 3   Variant     280932 non-null  object 
 4   Time        280932 non-null  int64  
 5   MidPeriod   280932 non-null  float64
 6   PopMale     250876 non-null  float64
 7   PopFemale   250876 non-null  float64
 8   PopTotal    280932 non-null  float64
 9   PopDensity  280932 non-null  float64
dtypes: float64(5), int64(3), object(2)
memory usage: 21.4+ MB
```

In [ ]:
```
cy.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 52 entries, 0 to 51
Data columns (total 9 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   wa_all      52 non-null     object 
 1   wa_country  41 non-null     object 
 2   wa_org      10 non-null     object 
 3   wp_all      52 non-null     object 
 4   wp_country  41 non-null     object 
 5   wp_org      10 non-null     object 
 6   years       20 non-null     float64
 7   abbrv       19 non-null     object 
 8   meaning     19 non-null     object 
dtypes: float64(1), object(8)
memory usage: 3.8+ KB
```

In [ ]:
```
wa.shape
```

Out[ ]:
```
(197739, 11)
```

In [ ]:
```
wp.shape
```

Out[ ]:
```
(280932, 10)
```

In [ ]:
```
cy.shape
```

Out[ ]:
```
(52, 9)
```

In [ ]:
```
wa.describe()
```

Out[ ]:

	TIME	Time	Value	Flag Codes	Flags
count	197739.000000	197739.000000	1.977390e+05	0.0	0.0
mean	2009.592554	2009.592554	1.275999e+04	NaN	NaN
std	5.770262	5.770262	9.900262e+04	NaN	NaN
min	2000.000000	2000.000000	-1.027303e+05	NaN	NaN
25%	2005.000000	2005.000000	1.400000e+00	NaN	NaN
50%	2010.000000	2010.000000	8.543534e+01	NaN	NaN
75%	2015.000000	2015.000000	1.550980e+03	NaN	NaN
max	2019.000000	2019.000000	8.781220e+06	NaN	NaN

In [ ]:
```
wp.describe()
```

Out[ ]:

	LocID	VarID	Time	MidPeriod	PopMale	PopFemale	PopTotal	PopDensity
count	280932.000000	280932.000000	280932.000000	280932.000000	2.508760e+05	2.508760e+05	2.809320e+05	280932.000000
mean	703.125062	22.411345	2051.026494	2051.526494	2.324362e+05	2.298754e+05	4.128536e+05	426.659040
std	631.959759	55.972847	33.642148	33.642148	6.938837e+05	6.829825e+05	1.308911e+06	2418.990784
min	4.000000	2.000000	1950.000000	1950.500000	6.812000e+00	6.889000e+00	1.510000e-01	0.052000
25%	300.000000	2.000000	2031.000000	2031.500000	1.847834e+03	1.860604e+03	1.240100e+03	34.205250
50%	586.000000	5.000000	2055.000000	2055.500000	1.136849e+04	1.164585e+04	1.420555e+04	91.590000
75%	903.000000	9.000000	2078.000000	2078.500000	8.526402e+04	8.648854e+04	1.171661e+05	216.985750
max	5501.000000	207.000000	2100.000000	2100.500000	1.092000e+07	1.071273e+07	2.163274e+07	56025.839000

In [ ]:
```
cy.describe()
```

Out[ ]:

	years
count	20.00000
mean	2009.50000
std	5.91608
min	2000.00000
25%	2004.75000
50%	2009.50000
75%	2014.25000
max	2019.00000

Creating Lists from cy dataset

In [ ]:
```
cy.head(1)
```

Out[ ]:

	wa_all	wa_country	wa_org	wp_all	wp_country	wp_org	years	abbrv	meaning
0	World	Australia	World	World	Australia	World	2000.0	QP	Production

In [ ]:
```
wa_all_list = list(cy.wa_all.unique())
wa_country_list = list(cy.wa_country.unique())
wa_org_list = list(cy.wa_org.unique())
wp_all_list = list(cy.wp_all.unique())
wp_country_list = list(cy.wp_country.unique())
wp_org_list = list(cy.wp_org.unique())
years_list = list(cy.years.unique())
abbr_list = list(cy.abbrv.unique())
mean_list = list(cy.meaning.unique())
```

In [ ]:
```
wa_country_list.pop(-1)
wa_org_list.pop(-1)
wp_country_list.pop(-1)
wp_org_list.pop(-1)
years_list.pop(-1)
```

```
abbr_list.pop(-1)
mean_list.pop(-1)
```

Out[ ]:
```
nan
```

In [ ]:
```
wp_org_list
```

Out[ ]:
```
['World',
 'Organisation for Economic Co-operation and Development (OECD)',
 'More developed regions',
 'ESCAP: ADB Developing member countries (DMCs)',
 'ESCAP: Least Developed Countries (LDCs)',
 'European Union (EU: 28)',
 'WHO: European Region (EURO)',
 'Africa',
 'Latin America and the Caribbean',
 'Asia']
```

Drop wa & wp Columns

In [ ]:
```
wa.head(1)
```

Out[ ]:

	COUNTRY	Country	COMMODITY	Commodity	VARIABLE	Variable	TIME	Time	Value	Flag Codes	Flags
0	WLD	World	WT	Wheat	QP	Production, kt (for Biofuels in millions of li...	2000	2000	585705.5797	NaN	NaN

In [ ]:
```
wa.drop(columns=["Flag Codes","Flags","COUNTRY","COMMODITY","TIME"], inplace=True)
```

In [ ]:
```
wa.head(1)
```

Out[ ]:

	Country	Commodity	VARIABLE	Variable	Time	Value
0	World	Wheat	QP	Production, kt (for Biofuels in millions of li...	2000	585705.5797

In [ ]:
```
wp.head(1)
```

Out[ ]:

	LocID	Location	VarID	Variant	Time	MidPeriod	PopMale	PopFemale	PopTotal	PopDensity
0	4	Afghanistan	2	Medium	1950	1950.5	4099.243	3652.874	7752.117	11.874

In [ ]:
```
wp.drop(columns=["LocID","VarID","Variant","MidPeriod","PopDensity"], inplace=True)
```

In [ ]:
```
wp.head(1)
```

Out[ ]:

	Location	Time	PopMale	PopFemale	PopTotal
0	Afghanistan	1950	4099.243	3652.874	7752.117

Rename the wa Columns

In [ ]:
```
wa.rename(columns = {'VARIABLE':'Var_abbr', 'Variable':'Var_expl'}, inplace = True)
wp.rename(columns = {'Location':'Country'}, inplace = True)
```

Insert & Reordering Population Columns to wa

In [ ]:
```
wa.head(1)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_expl	Time	Value
0	World	Wheat	QP	Production, kt (for Biofuels in millions of li...	2000	585705.5797

In [ ]:
```
wa['Var_mean'] = wa['Var_abbr']
wa['PopTotal'] = wa['Country']
wa['PopMale'] = wa['Country']
wa['PopFemale'] = wa['Country']
```

In [ ]:
```
wa.head(1)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_expl	Time	Value	Var_mean	PopTotal	PopMale	PopFemale
0	World	Wheat	QP	Production, kt (for Biofuels in millions of li...	2000	585705.5797	QP	World	World	World

In [ ]:
```
wa = wa.iloc[:, [0,1,2,6,3,4,5,7,8,9]]
```

In [ ]:
```
wa.head(1)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	World	Wheat	QP	QP	Production, kt (for Biofuels in millions of li...	2000	585705.5797	World	World	World

Reordering Columns wp

In [ ]:
```
wp.head(1)
```

Out[ ]:

	Country	Time	PopMale	PopFemale	PopTotal
0	Afghanistan	1950	4099.243	3652.874	7752.117

In [ ]:
```
wp = wp.iloc[:, [0,1,4,2,3]]
```

In [ ]:
```
wp.head(1)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
0	Afghanistan	1950	7752.117	4099.243	3652.874

Insert the Meanings of Var_abbr to Var_mean

In [ ]:
```
wa.head(2)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	World	Wheat	QP	QP	Production, kt (for Biofuels in millions of li...	2000	585705.5797	World	World	World
1	World	Wheat	QP	QP	Production, kt (for Biofuels in millions of li...	2001	588610.4753	World	World	World

In [ ]:
```
var_mean_dict = dict(zip(abbr_list, mean_list))
var_mean_dict
```

Out[ ]:
```
{'QP': 'Production',
 'IM': 'Imports',
 'QC': 'Consumption',
 'ST': 'Ending_stocks',
 'EX': 'Exports',
 'NT': 'Trade_balance',
 'AH': 'Area_harvested',
 'FE': 'Feed',
 'FO': 'Food',
 'BF': 'Biofuel_use',
 'OU': 'Other_use',
 'YLD': 'Yield',
 'XP': 'World_Price',
 'PC': 'Consumption_per_cap',
 'PP': 'Producer_price',
 'CR': 'Crush',
 'CI': 'Cow_inventory',
 'QP__BME': 'Ethanol_Bio',
 'QP__BMD': 'Biodiesel_Bio'}
```

In [ ]:
```
wa["Var_mean"].replace(var_mean_dict, inplace=True)
```

In [ ]:
```
wa.head(2)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	585705.5797	World	World	World
1	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	588610.4753	World	World	World

Drop the wp values before the year 2000

In [ ]:
```
wp = wp[wp['Time'] >= 2000]
```

In [ ]:
```
wp.head(1)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
50	Afghanistan	2000	20779.957	10689.508	10090.449

Select only the concurrent all country names from wp to wp1

In [ ]:
```
wp.Country.unique()
```

Out[ ]:
```
array(['Afghanistan', 'Africa', 'African Group', 'African Union',
       'African Union: Central Africa', 'African Union: Eastern Africa',
       'African Union: Northern Africa', 'African Union: Southern Africa',
       'African Union: Western Africa',
       'African, Caribbean and Pacific (ACP) Group of States', 'Albania',
       'Algeria', 'American Samoa', 'Andean Community', 'Andorra',
       'Angola', 'Anguilla', 'Antigua and Barbuda', 'Argentina',
       'Armenia', 'Aruba', 'Asia',
       'Asia-Pacific Economic Cooperation (APEC)', 'Asia-Pacific Group',
       'Association of Southeast Asian Nations (ASEAN)', 'Australia',
       'Australia/New Zealand', 'Austria', 'Azerbaijan', 'BRIC', 'BRICS',
       'Bahamas', 'Bahrain', 'Bangladesh', 'Barbados', 'Belarus',
       'Belgium', 'Belize', 'Belt-Road Initiative (BRI)',
       'Belt-Road Initiative: Africa', 'Belt-Road Initiative: Asia',
       'Belt-Road Initiative: Europe',
       'Belt-Road Initiative: Latin America and the Caribbean',
       'Belt-Road Initiative: Pacific', 'Benin', 'Bermuda', 'Bhutan',
       'Black Sea Economic Cooperation (BSEC)',
       'Bolivarian Alliance for the Americas (ALBA)',
       'Bolivia (Plurinational State of)',
       'Bonaire, Sint Eustatius and Saba', 'Bosnia and Herzegovina',
       'Botswana', 'Brazil', 'British Virgin Islands',
       'Brunei Darussalam', 'Bulgaria', 'Burkina Faso', 'Burundi',
       'Cabo Verde', 'Cambodia', 'Cameroon', 'Canada', 'Caribbean',
       'Caribbean Community and Common Market (CARICOM)',
       'Cayman Islands', 'Central African Republic', 'Central America',
       'Central Asia', 'Central European Free Trade Agreement (CEFTA)',
       'Central and Southern Asia', 'Chad', 'Channel Islands', 'Chile',
       'China', 'China (and dependencies)', 'China, Hong Kong SAR',
       'China, Macao SAR', 'China, Taiwan Province of China', 'Colombia',
       'Commonwealth of Independent States (CIS)',
       'Commonwealth of Nations', 'Commonwealth: Africa',
       'Commonwealth: Asia', 'Commonwealth: Caribbean and Americas',
       'Commonwealth: Europe', 'Commonwealth: Pacific', 'Comoros',
       'Congo', 'Cook Islands', 'Costa Rica',
       'Countries with Access to the Sea',
       'Countries with Access to the Sea: Africa',
       'Countries with Access to the Sea: Asia',
       'Countries with Access to the Sea: Europe',
       'Countries with Access to the Sea: Latin America and the Caribbean',
       'Countries with Access to the Sea: Northern America',
       'Countries with Access to the Sea: Oceania', 'Croatia', 'Cuba',
       'Curaçao', 'Cyprus', 'Czechia', "Côte d'Ivoire",
       "Dem. People's Republic of Korea",
```

'Democratic Republic of the Congo', 'Denmark',
'Denmark (and dependencies)', 'Djibouti', 'Dominica',
'Dominican Republic', 'ECE: North America-2', 'ECE: UNECE-52',
'ECLAC: Latin America', 'ECLAC: The Caribbean',
'ESCAP region: East and North-East Asia',
'ESCAP region: North and Central Asia', 'ESCAP region: Pacific',
'ESCAP region: South and South-West Asia',
'ESCAP region: South-East Asia',
'ESCAP: ADB Developing member countries (DMCs)',
'ESCAP: ADB Group A (Concessional assistance\xa0only)',
'ESCAP: ADB Group B\xa0(OCR blend)',
'ESCAP: ADB Group C (Regular OCR only)', 'ESCAP: ASEAN',
'ESCAP: Central Asia', 'ESCAP: ECO', 'ESCAP: HDI groups',
'ESCAP: Landlocked countries (LLDCs)',
'ESCAP: Least Developed Countries (LDCs)',
'ESCAP: Pacific island dev. econ.', 'ESCAP: SAARC',
'ESCAP: WB High income econ.', 'ESCAP: WB Low income econ.',
'ESCAP: WB Lower middle income econ.',
'ESCAP: WB Upper middle income econ.', 'ESCAP: WB income groups',
'ESCAP: high HDI', 'ESCAP: high income', 'ESCAP: income groups',
'ESCAP: low HDI', 'ESCAP: low income', 'ESCAP: lower middle HDI',
'ESCAP: lower middle income',
'ESCAP: other Asia-Pacific countries/areas',
'ESCAP: upper middle HDI', 'ESCAP: upper middle income',
'ESCWA: Arab countries', 'ESCWA: Arab least developed countries',
'ESCWA: Gulf Cooperation Council countries',
'ESCWA: Maghreb countries', 'ESCWA: Mashreq countries',
'ESCWA: member countries', 'East African Community (EAC)',
'Eastern Africa', 'Eastern Asia', 'Eastern Europe',
'Eastern European Group', 'Eastern and South-Eastern Asia',
'Economic Community of Central African States (ECCAS)',
'Economic Community of West African States (ECOWAS)',
'Economic Cooperation Organization (ECO)', 'Ecuador', 'Egypt',
'El Salvador', 'Equatorial Guinea', 'Eritrea', 'Estonia',
'Eswatini', 'Ethiopia', 'Eurasian Economic Community (Eurasec)',
'Europe', 'Europe (48)', 'Europe and Northern America',
'European Community (EC: 12)',
'European Free Trade Agreement (EFTA)', 'European Union (EU: 15)',
'European Union (EU: 28)', 'Falkland Islands (Malvinas)',
'Faroe Islands', 'Fiji', 'Finland', 'France',
'France (and dependencies)', 'French Guiana', 'French Polynesia',
'Gabon', 'Gambia', 'Georgia', 'Germany', 'Ghana', 'Gibraltar',
'Greater Arab Free Trade Area (GAFTA)', 'Greece', 'Greenland',
'Grenada', 'Group of 77 (G77)', 'Group of Eight (G8)',

'Group of Seven (G7)', 'Group of Twenty (G20) - member states',
'Guadeloupe', 'Guam', 'Guatemala', 'Guinea', 'Guinea-Bissau',
'Gulf Cooperation Council (GCC)', 'Guyana', 'Haiti',
'High-income countries', 'Holy See', 'Honduras', 'Hungary',
'Iceland', 'India', 'Indonesia', 'Iran (Islamic Republic of)',
'Iraq', 'Ireland', 'Isle of Man', 'Israel', 'Italy', 'Jamaica',
'Japan', 'Jordan', 'Kazakhstan', 'Kenya', 'Kiribati', 'Kuwait',
'Kyrgyzstan', 'LLDC: Africa', 'LLDC: Asia', 'LLDC: Europe',
'LLDC: Latin America', 'Land-locked Countries',
'Land-locked Countries (Others)',
'Land-locked Developing Countries (LLDC)',
"Lao People's Democratic Republic",
'Latin America and the Caribbean',
'Latin American Integration Association (ALADI)',
'Latin American and Caribbean Group (GRULAC)', 'Latvia',
'League of Arab States (LAS, informal name: Arab League)',
'Least developed countries', 'Least developed: Africa',
'Least developed: Asia',
'Least developed: Latin America and the Caribbean',
'Least developed: Oceania', 'Lebanon', 'Lesotho',
'Less developed regions',
'Less developed regions, excluding China',
'Less developed regions, excluding least developed countries',
'Less developed: Africa', 'Less developed: Asia',
'Less developed: Latin America and the Caribbean',
'Less developed: Oceania', 'Liberia', 'Libya', 'Liechtenstein',
'Lithuania', 'Low-income countries',
'Lower-middle-income countries', 'Luxembourg', 'Madagascar',
'Malawi', 'Malaysia', 'Maldives', 'Mali', 'Malta',
'Marshall Islands', 'Martinique', 'Mauritania', 'Mauritius',
'Mayotte', 'Melanesia', 'Mexico', 'Micronesia',
'Micronesia (Fed. States of)', 'Middle Africa',
'Middle-income countries', 'Monaco', 'Mongolia', 'Montenegro',
'Montserrat', 'More developed regions', 'More developed: Asia',
'More developed: Europe', 'More developed: Northern America',
'More developed: Oceania', 'Morocco', 'Mozambique', 'Myanmar',
'Namibia', 'Nauru', 'Nepal', 'Netherlands',
'Netherlands (and dependencies)', 'New Caledonia',
'New EU member states (joined since 2004)', 'New Zealand',
'New Zealand (and dependencies)', 'Nicaragua', 'Niger', 'Nigeria',
'Niue', 'No income group available',
'Non-Self-Governing Territories',
'North American Free Trade Agreement (NAFTA)',
'North Atlantic Treaty Organization (NATO)', 'North Macedonia',

'Northern Africa', 'Northern Africa and Western Asia',
'Northern America', 'Northern Europe', 'Northern Mariana Islands',
'Norway', 'Oceania',
'Oceania (excluding Australia and New Zealand)', 'Oman',
'Organisation for Economic Co-operation and Development (OECD)',
'Organization for Security and Co-operation in Europe (OSCE)',
'Organization of American States (OAS)',
'Organization of Petroleum Exporting countries (OPEC)',
'Organization of the Islamic Conference (OIC)', 'Pakistan',
'Palau', 'Panama', 'Papua New Guinea', 'Paraguay', 'Peru',
'Philippines', 'Poland', 'Polynesia', 'Portugal', 'Puerto Rico',
'Qatar', 'Republic of Korea', 'Republic of Moldova', 'Romania',
'Russian Federation', 'Rwanda', 'Réunion',
'SIDS Atlantic, and Indian Ocean, Mediterranean and South China Sea (AIMS)',
'SIDS Caribbean', 'SIDS Pacific', 'Saint Barthélemy',
'Saint Helena', 'Saint Kitts and Nevis', 'Saint Lucia',
'Saint Martin (French part)', 'Saint Pierre and Miquelon',
'Saint Vincent and the Grenadines', 'Samoa', 'San Marino',
'Sao Tome and Principe', 'Saudi Arabia', 'Senegal', 'Serbia',
'Seychelles', 'Shanghai Cooperation Organization (SCO)',
'Sierra Leone', 'Singapore', 'Sint Maarten (Dutch part)',
'Slovakia', 'Slovenia', 'Small Island Developing States (SIDS)',
'Solomon Islands', 'Somalia', 'South Africa', 'South America',
'South Asian Association for Regional Cooperation (SAARC)',
'South Sudan', 'South-Eastern Asia', 'Southern Africa',
'Southern African Development Community (SADC)', 'Southern Asia',
'Southern Common Market (MERCOSUR)', 'Southern Europe', 'Spain',
'Sri Lanka', 'State of Palestine', 'Sub-Saharan Africa', 'Sudan',
'Suriname', 'Sweden', 'Switzerland', 'Syrian Arab Republic',
'Tajikistan', 'Thailand', 'Timor-Leste', 'Togo', 'Tokelau',
'Tonga', 'Trinidad and Tobago', 'Tunisia', 'Turkey',
'Turkmenistan', 'Turks and Caicos Islands', 'Tuvalu',
'UN-ECE: member countries', 'UNFPA Regions',
'UNFPA: Arab States (AS)', 'UNFPA: Asia and the Pacific (AP)',
'UNFPA: East and Southern Africa (ESA)',
'UNFPA: Eastern Europe and Central Asia (EECA)',
'UNFPA: Latin America and the Caribbean (LAC)',
'UNFPA: West and Central Africa (WCA)', 'UNICEF PROGRAMME REGIONS',
'UNICEF Programme Regions: East Asia and Pacific (EAPRO)',
'UNICEF Programme Regions: Eastern Caribbean',
'UNICEF Programme Regions: Eastern and Southern Africa (ESARO)',
'UNICEF Programme Regions: Europe and Central Asia (CEECIS)',
'UNICEF Programme Regions: Latin America',
'UNICEF Programme Regions: Latin America and Caribbean (LACRO)',

```
'UNICEF Programme Regions: Middle East and North Africa (MENARO)',
'UNICEF Programme Regions: South Asia (ROSA)',
'UNICEF Programme Regions: West and Central Africa (WCARO)',
'UNICEF REGIONS', 'UNICEF Regions: East Asia and Pacific',
'UNICEF Regions: Eastern Europe and Central Asia',
'UNICEF Regions: Eastern and Southern Africa',
'UNICEF Regions: Europe and Central Asia',
'UNICEF Regions: Latin America and Caribbean',
'UNICEF Regions: Middle East and North Africa',
'UNICEF Regions: North America', 'UNICEF Regions: South Asia',
'UNICEF Regions: Sub-Saharan Africa',
'UNICEF Regions: West and Central Africa',
'UNICEF Regions: Western Europe',
'UNITED NATIONS Regional Groups of Member States', 'Uganda',
'Ukraine', 'United Arab Emirates', 'United Kingdom',
'United Kingdom (and dependencies)',
'United Nations Economic Commission for Africa (UN-ECA)',
'United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC)',
'United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP) Regions',
'United Nations Member States', 'United Republic of Tanzania',
'United States Virgin Islands', 'United States of America',
'United States of America (and dependencies)',
'Upper-middle-income countries', 'Uruguay', 'Uzbekistan',
'Vanuatu', 'Venezuela (Bolivarian Republic of)', 'Viet Nam',
'WB region: East Asia and Pacific (excluding high income)',
'WB region: Europe and Central Asia (excluding high income)',
'WB region: Latin America and Caribbean (excluding high income)',
'WB region: Middle East and North Africa (excluding high income)',
'WB region: South Asia (excluding high income)',
'WB region: Sub-Saharan Africa (excluding high income)',
'WHO Regions', 'WHO: African region (AFRO)',
'WHO: Americas (AMRO)', 'WHO: Eastern Mediterranean Region (EMRO)',
'WHO: European Region (EURO)',
'WHO: South-East Asia region (SEARO)',
'WHO: Western Pacific region (WPRO)', 'Wallis and Futuna Islands',
'West African Economic and Monetary Union (UEMOA)',
'Western Africa', 'Western Asia', 'Western Europe',
'Western European and Others Group (WEOG)', 'Western Sahara',
'World', 'World Bank Regional Groups (developing only)', 'Yemen',
'Zambia', 'Zimbabwe'], dtype=object)
```

In [ ]:
```
wp_all_list
```

Out[ ]:
```
['World',
 'Organisation for Economic Co-operation and Development (OECD)',
 'More developed regions',
 'ESCAP: ADB Developing member countries (DMCs)',
 'ESCAP: Least Developed Countries (LDCs)',
 'Australia',
 'Canada',
 'Chile',
 'European Union (EU: 28)',
 'Israel',
 'Japan',
 "Dem. People's Republic of Korea",
 'Mexico',
 'New Zealand',
 'Turkey',
 'United States of America',
 'WHO: European Region (EURO)',
 'Kazakhstan',
 'Russian Federation',
 'Ukraine',
 'Africa',
 'Algeria',
 'Egypt',
 'Ethiopia',
 'Ghana',
 'Mozambique',
 'Nigeria',
 'Sub-Saharan Africa',
 'South Africa',
 'Sudan',
 'United Republic of Tanzania',
 'Zambia',
 'Latin America and the Caribbean',
 'Argentina',
 'Brazil',
 'Colombia',
 'Haiti',
 'Peru',
 'Paraguay',
 'Uruguay',
 'Asia',
 'Bangladesh',
 'China',
 'India',
```

```
'Indonesia',
'Iran (Islamic Republic of)',
'Malaysia',
'Pakistan',
'Philippines',
'Saudi Arabia',
'Thailand',
'Viet Nam']
```

In [ ]:
```
wp.head(1)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
50	Afghanistan	2000	20779.957	10689.508	10090.449

In [ ]:
```
mask = wp.Country.isin(wp_all_list)
```

In [ ]:
```
wp[mask].sample(5)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
4064	Algeria	2073	81233.149	41195.832	40037.317
10146	Argentina	2095	70513.723	35171.298	35339.025
150971	Malaysia	2087	43213.277	21861.634	21351.643
1763	Africa	2080	3191519.253	1583950.542	1606837.668
266223	Uruguay	2033	3590.632	1745.582	1845.050

In [ ]:
```
wp1 = wp.loc[mask, ["Country","Time","PopTotal","PopMale","PopFemale"]]
```

In [ ]:
```
wp1.sample(5)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
1712	Africa	2080	4033621.275	2011713.894	2022791.487
262971	United Republic of Tanzania	2063	171131.322	85325.688	85805.634
192627	Pakistan	2022	230261.942	118484.825	111777.117
121710	Israel	2075	14857.364	7533.735	7323.629
176202	New Zealand	2065	4993.897	2455.752	2538.145

In [ ]:
```
wp1[wp1.Country=="African, Caribbean and Pacific (ACP) Group of States"]
```

Out[ ]:

Country	Time	PopTotal	PopMale	PopFemale

In [ ]:
```
wp.shape
```

Out[ ]:
```
(257082, 5)
```

In [ ]:
```
wp1.shape
```

Out[ ]:
```
(40537, 5)
```

In [ ]:
```
wp1.Country.nunique()
```

Out[ ]:
```
52
```

Change the concurrent all country names as wa at wp1

In [ ]:
```
wp1.sample(5)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
9604	Argentina	2077	45784.514	22541.131	23243.383
277650	World	2031	8486146.451	4273819.314	4212327.137
116028	India	2021	1395012.077	724825.503	670186.574
121488	Israel	2096	13319.365	6717.870	6601.495
263198	United Republic of Tanzania	2047	84409.818	42054.517	42355.301

In [ ]:
```
len(wp_all_list)
```

Out[ ]:
```
52
```

In [ ]:
```
len(wa_all_list)
```

Out[ ]:
```
52
```

In [ ]:
```
wp_all_dict = dict(zip(wp_all_list, wa_all_list))
wp_all_dict
```

Out[ ]:

```
{'World': 'World',
 'Organisation for Economic Co-operation and Development (OECD)': 'OECD',
 'More developed regions': 'Developed',
 'ESCAP: ADB Developing member countries (DMCs)': 'Developing',
 'ESCAP: Least Developed Countries (LDCs)': 'Least Developed Countries',
 'Australia': 'Australia',
 'Canada': 'Canada',
 'Chile': 'Chile',
 'European Union (EU: 28)': 'European Union-27',
 'Israel': 'Israel',
 'Japan': 'Japan',
 "Dem. People's Republic of Korea": 'Korea',
 'Mexico': 'Mexico',
 'New Zealand': 'New Zealand',
 'Turkey': 'Turkey',
 'United States of America': 'United States',
 'WHO: European Region (EURO)': 'EUROPE',
 'Kazakhstan': 'Kazakhstan',
 'Russian Federation': 'Russia',
 'Ukraine': 'Ukraine',
 'Africa': 'AFRICA',
 'Algeria': 'Algeria',
 'Egypt': 'Egypt',
 'Ethiopia': 'Ethiopia',
 'Ghana': 'Ghana',
 'Mozambique': 'Mozambique',
 'Nigeria': 'Nigeria',
 'Sub-Saharan Africa': 'Sub Saharan Africa',
 'South Africa': 'Republic of South Africa',
 'Sudan': 'Sudan',
 'United Republic of Tanzania': 'Tanzania',
 'Zambia': 'Zambia',
 'Latin America and the Caribbean': 'LATIN AMERICA AND CARIBBEAN',
 'Argentina': 'Argentina',
 'Brazil': 'Brazil',
 'Colombia': 'Colombia',
 'Haiti': 'Haiti',
 'Peru': 'Peru',
 'Paraguay': 'Paraguay',
 'Uruguay': 'Uruguay',
 'Asia': 'ASIA',
 'Bangladesh': 'Bangladesh',
 'China': 'China',
 'India': 'India',
```

```
'Indonesia': 'Indonesia',
'Iran (Islamic Republic of)': 'Iran',
'Malaysia': 'Malaysia',
'Pakistan': 'Pakistan',
'Philippines': 'Philippines',
'Saudi Arabia': 'Saudi Arabia',
'Thailand': 'Thailand',
'Viet Nam': 'VietNam'}
```

In [ ]:
```
wp1[wp1.Country=="Organisation for Economic Co-operation and Development (OECD)"].head(2)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
191607	Organisation for Economic Co-operation and Dev...	2000	1155286.565	566714.934	588571.631
191608	Organisation for Economic Co-operation and Dev...	2001	1163475.156	570810.829	592664.327

In [ ]:
```
wp1["Country"].replace(wp_all_dict, inplace=True)
```

In [ ]:
```
wp1[wp1.Country=="Organisation for Economic Co-operation and Development (OECD)"].head(2)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale

Drop the "OECD countries" & "Non-OECD" values from wa

In [ ]:
```
wa[wa["Country"]=="OECD countries"].head(5)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
1556	OECD countries	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	269144.4766	OECD countries	OECD countries	OECD countries
1557	OECD countries	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	249739.4752	OECD countries	OECD countries	OECD countries
1558	OECD countries	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2002	229837.7329	OECD countries	OECD countries	OECD countries
1559	OECD countries	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2003	249871.4523	OECD countries	OECD countries	OECD countries
1560	OECD countries	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2004	281502.1956	OECD countries	OECD countries	OECD countries

In [ ]:
```
wa.drop(list(wa[wa["Country"]=="OECD countries"].index.values), inplace=True)
```

In [ ]:
```
wa[wa["Country"]=="OECD countries"]
```

Out[ ]:

Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale

In [ ]:
```
wa[wa["Country"]=="Non-OECD"].head(5)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
528	Non-OECD	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	316561.1031	Non-OECD	Non-OECD	Non-OECD
529	Non-OECD	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	338871.0001	Non-OECD	Non-OECD	Non-OECD
530	Non-OECD	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2002	343659.8801	Non-OECD	Non-OECD	Non-OECD
531	Non-OECD	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2003	310399.0781	Non-OECD	Non-OECD	Non-OECD
532	Non-OECD	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2004	349839.3341	Non-OECD	Non-OECD	Non-OECD

In [ ]:
```
wa.drop(list(wa[wa["Country"]=="Non-OECD"].index.values), inplace=True)
```

In [ ]:
```
wa[wa["Country"]=="Non-OECD"]
```

Out[ ]:

Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale

Drop duplicated values if present

In [ ]:
```
wa.duplicated(keep="last").value_counts()
```

Out[ ]:
```
False    190770
dtype: int64
```

In [ ]:
```
wa.drop_duplicates(keep="last", inplace=True)
```

In [ ]:
```
wa.duplicated(keep="last").value_counts()
```

Out[ ]:
```
False    190770
dtype: int64
```

In [ ]:
```
wa.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 190770 entries, 0 to 197738
Data columns (total 10 columns):
 #   Column     Non-Null Count   Dtype  
---  ------     --------------   -----  
 0   Country    190770 non-null  object 
 1   Commodity  190770 non-null  object 
 2   Var_abbr   190770 non-null  object 
 3   Var_mean   190770 non-null  object 
 4   Var_expl   190770 non-null  object 
 5   Time       190770 non-null  int64  
 6   Value      190770 non-null  float64
 7   PopTotal   190770 non-null  object 
 8   PopMale    190770 non-null  object 
 9   PopFemale  190770 non-null  object 
dtypes: float64(1), int64(1), object(8)
memory usage: 16.0+ MB
```

Drop null values if present

In [ ]:
```
wa.isnull().value_counts().sum()
```

Out[ ]:
```
190770
```

Convert the types of population & year to int

In [ ]:
```
wa.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 190770 entries, 0 to 197738
Data columns (total 10 columns):
 #   Column     Non-Null Count   Dtype  
---  ------     --------------   -----  
 0   Country    190770 non-null  object 
 1   Commodity  190770 non-null  object 
 2   Var_abbr   190770 non-null  object 
 3   Var_mean   190770 non-null  object 
 4   Var_expl   190770 non-null  object 
 5   Time       190770 non-null  int64  
 6   Value      190770 non-null  float64
 7   PopTotal   190770 non-null  object 
 8   PopMale    190770 non-null  object 
 9   PopFemale  190770 non-null  object 
dtypes: float64(1), int64(1), object(8)
memory usage: 16.0+ MB
```

In [ ]:
```
wa['PopTotal'] = pd.to_numeric(wa['PopTotal'],errors='coerce')
wa['PopMale'] = pd.to_numeric(wa['PopMale'],errors='coerce')
wa['PopFemale'] = pd.to_numeric(wa['PopFemale'],errors='coerce')
```

In [ ]:
```
cy['years'] = cy['years'].fillna(0).astype(np.int64)
```

In [ ]:
```
wa.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 190770 entries, 0 to 197738
Data columns (total 10 columns):
 #   Column     Non-Null Count   Dtype  
---  ------     --------------   -----  
 0   Country    190770 non-null  object 
 1   Commodity  190770 non-null  object 
 2   Var_abbr   190770 non-null  object 
 3   Var_mean   190770 non-null  object 
 4   Var_expl   190770 non-null  object 
 5   Time       190770 non-null  int64  
 6   Value      190770 non-null  float64
 7   PopTotal   0 non-null       float64
 8   PopMale    0 non-null       float64
 9   PopFemale  0 non-null       float64
dtypes: float64(4), int64(1), object(5)
memory usage: 16.0+ MB
```

In [ ]:
```
cy.dtypes
```

Out[ ]:
```
wa_all        object
wa_country    object
wa_org        object
wp_all        object
wp_country    object
wp_org        object
years          int64
abbrv         object
meaning       object
dtype: object
```

Assigning population values from wp1 to wa population columns

In [ ]:
```
wp1[wp1["Country"]=="World"].head(2)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
277295	World	2000	6143493.806	3093433.858	3050059.948
277296	World	2001	6222626.531	3133601.761	3089024.770

In [ ]:
```
wa[wa["Country"]=="World"].head(2)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	585705.5797	NaN	NaN	NaN
1	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	588610.4753	NaN	NaN	NaN

In [ ]:
```
wp1.Country.nunique()
```

Out[ ]:
```
52
```

In [ ]:
```
wa.Country.nunique()
```

Out[ ]:
```
52
```

In [ ]:
```
wp1_cntry_list = list(wp1.Country.unique())
```

In [ ]:
```
def PopTotal_func (cntlist, yearlist):
    for a in cntlist:
        for b in yearlist:
            q = list(wp1[(wp1["Country"]==a) & (wp1["Time"]==b)].index.values)[0]
            p = wp1.loc[q, "PopTotal"]
            wa.loc[(wa["Country"]==a) & (wa["Time"]==b), "PopTotal"] = p
```

In [ ]:
```
PopTotal_func(wp1_cntry_list,years_list)
```

In [ ]:
```
wa[(wa.Country=="World") & (wa.Time==2006)].head(1)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
6	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2006	600783.4302	6623517.917	NaN	NaN

In [ ]:
```
wp1[(wp1.Country=="World") & (wp1.Time==2006)].head(1)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
277301	World	2006	6623517.917	3338132.929	3285384.988

In [ ]:
```
def PopMale_func (cntlist, yearlist):
    for a in cntlist:
```

```
        for b in yearlist:
            q = list(wp1[(wp1["Country"]==a) & (wp1["Time"]==b)].index.values)[0]
            p = wp1.loc[q, "PopMale"]
            wa.loc[(wa["Country"]==a) & (wa["Time"]==b), "PopMale"] = p
```

In [ ]:
```
PopMale_func(wp1_cntry_list,years_list)
```

In [ ]:
```
wa[(wa.Country=="World") & (wa.Time==2006)].head(1)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
6	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2006	600783.4302	6623517.917	3338132.929	NaN

In [ ]:
```
wp1[(wp1.Country=="World") & (wp1.Time==2006)].head(1)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
277301	World	2006	6623517.917	3338132.929	3285384.988

In [ ]:
```
def PopFemale_func (cntlist, yearlist):
    for a in cntlist:
        for b in yearlist:
            q = list(wp1[(wp1["Country"]==a) & (wp1["Time"]==b)].index.values)[0]
            p = wp1.loc[q, "PopFemale"]
            wa.loc[(wa["Country"]==a) & (wa["Time"]==b), "PopFemale"] = p
```

In [ ]:
```
PopFemale_func(wp1_cntry_list,years_list)
```

In [ ]:
```
wa[(wa.Country=="World") & (wa.Time==2006)].head(1)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
6	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2006	600783.4302	6623517.917	3338132.929	3285384.988

In [ ]:
```
wp1[(wp1.Country=="World") & (wp1.Time==2006)].head(1)
```

Out[ ]:

	Country	Time	PopTotal	PopMale	PopFemale
277301	World	2006	6623517.917	3338132.929	3285384.988

Creating Organizations Dataset from wa

In [ ]:
```
wa[wa["Country"]==("OECD countries", "Non-OECD")].head(3)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale

In [ ]:
```
wa_org_list
```

Out[ ]:
```
['World',
 'OECD',
 'Developed',
 'Developing',
 'Least Developed Countries',
 'European Union-27',
 'EUROPE',
 'AFRICA',
 'LATIN AMERICA AND CARIBBEAN',
 'ASIA']
```

In [ ]:
```
Data_World = wa[wa["Country"]=="World"]
Data_OECD = wa[wa["Country"]=="OECD"]
Data_Developed = wa[wa["Country"]=="Developed"]
Data_Developing = wa[wa["Country"]=="Developing"]
Data_LDC = wa[wa["Country"]=="Least Developed Countries"]
Data_EU27 = wa[wa["Country"]=="European Union-27"]
Data_EU = wa[wa["Country"]=="EUROPE"]
Data_Africa = wa[wa["Country"]=="AFRICA"]
Data_Lat_Amer = wa[wa["Country"]=="LATIN AMERICA AND CARIBBEAN"]
Data_Asia = wa[wa["Country"]=="ASIA"]
```

In [ ]:
```
Data_World.head(5)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	585705.5797	6143493.806	3093433.858	3050059.948
1	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	588610.4753	6222626.531	3133601.761	3089024.770
2	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2002	573497.6130	6301773.172	3173900.449	3127872.723
3	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2003	560270.5304	6381185.141	3214422.031	3166763.110
4	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2004	631341.5297	6461159.391	3255262.626	3205896.765

Creating Country_Only Dataset from wa as wa1

In [ ]:
```
wa = wa.set_index("Country")
```

In [ ]:
```
wa.columns
```

Out[ ]:
```
Index(['Commodity', 'Var_abbr', 'Var_mean', 'Var_expl', 'Time', 'Value',
       'PopTotal', 'PopMale', 'PopFemale'],
      dtype='object')
```

In [ ]:
```
wa1 = wa.copy()
```

In [ ]:
```
wa_org_list
```

Out[ ]:
```
['World',
 'OECD',
 'Developed',
 'Developing',
 'Least Developed Countries',
 'European Union-27',
 'EUROPE',
 'AFRICA',
 'LATIN AMERICA AND CARIBBEAN',
 'ASIA']
```

In [ ]:
```
wa1.drop(index=wa_org_list, inplace=True)
```

In [ ]:
```
wa1.sample(5)
```

Out[ ]:

Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
Israel	Rice	AH	Area_harvested	Area harvested, 000 ha	2002	1.000000	6169.311	3040.643	3128.668
Ukraine	Butter (pw)	IM	Imports	Imports, kt (for Biofuels in millions of litres)	2000	0.848000	48838.058	22733.656	26104.402
China	Oilseeds	QC	Consumption	Consumption, kt (for Biofuels in millions of l...	2013	118009.791200	1391883.335	715082.615	676800.720
Canada	Wheat	PP	Producer_price	Producer price, local currency/t (for Biofuels...	2018	173.916064	37074.558	18392.121	18682.437
VietNam	Fish	EX	Exports	Exports, kt (for Biofuels in millions of litres)	2019	2212.551883	96462.108	48151.352	48310.756

In [ ]:
```
wa1.reset_index(inplace=True)
```

In [ ]:
```
wa1.head(3)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	Australia	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	22108.0	18991.434	9473.544	9517.890
1	Australia	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	24298.0	19194.676	9577.028	9617.648
2	Australia	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2002	10132.0	19401.366	9680.332	9721.034

In [ ]:
```
wa.reset_index(inplace=True)
```

In [ ]:
```
wa.head(3)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	585705.5797	6143493.806	3093433.858	3050059.948
1	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	588610.4753	6222626.531	3133601.761	3089024.770
2	World	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2002	573497.6130	6301773.172	3173900.449	3127872.723

In [ ]:
```
wa1[wa1["Country"]=="Australia"].head(3)
```

Out[ ]:

	Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale
0	Australia	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2000	22108.0	18991.434	9473.544	9517.890
1	Australia	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2001	24298.0	19194.676	9577.028	9617.648
2	Australia	Wheat	QP	Production	Production, kt (for Biofuels in millions of li...	2002	10132.0	19401.366	9680.332	9721.034

In [ ]:
```
wa1[wa1["Country"]==("World", "OECD", "Developed")].head(3)
```

Out[ ]:

Country	Commodity	Var_abbr	Var_mean	Var_expl	Time	Value	PopTotal	PopMale	PopFemale

Download the last versions of wa & wa1 & wp & wp1 & cy

In [ ]:
```
wa.to_csv("wa_for_visualization.csv")
wa1.to_csv("wa1_for_visualization.csv")
wp.to_csv("wp_for_visualization.csv")
wp1.to_csv("wp1_for_visualization.csv")
cy.to_csv("cy_for_visualization.csv")
```

In [ ]:
```

```