Investigate World Development Indicators Dataset from World Bank

> **I will explore Economy, ealth and Economy indicators for The Republic of Singapore**
>
> ***Motivation:***
>
> I am inspired by the story of singapore as after independence it was the city-state of Singapore was an undeveloped country, Now singapore one of the world fastest growing economies and it has been developed in many sectors Economy, Health, and Employment

> ***I will study the progress of singapore over time in specific Sectors***

> - The Economic Development over years
> - The Health Development over years
> - Unemployment over year
> - Compare singapore development among its region countries

In [1]:

```
# import libs
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import sqlite3

%matplotlib inline
```

In [2]:

```
!ls
```

```
Gap Minded World Data Exploration Project (1).html
Investigate WDI Dataset.ipynb
__MACOSX
csv
database.sqlite
```

In [3]:

```
# connect our database
db = sqlite3.connect("database.sqlite")
cur = db.cursor()
```

In [4]:

```
# Acces our database
# present the database schema/tables by access sqlite_master

tables_query =  """
                SELECT name
                FROM sqlite_master
                WHERE type = 'table';
                """


tables = cur.execute(tables_query)

print(tables.fetchall())
```

```
[('Country',), ('CountryNotes',), ('Series',), ('Indicators',), ('SeriesNotes',), ('Footnotes',)]
```

Explore tables data

In [5]:
```
country_table_query =   """
                        SELECT *
                        FROM Country
                        LIMIT 10;
                        """

countries = pd.read_sql(country_table_query, db)

countries.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10 entries, 0 to 9
Data columns (total 31 columns):
 #   Column                                       Non-Null Count  Dtype 
---  ------                                       --------------  ----- 
 0   CountryCode                                  10 non-null     object
 1   ShortName                                    10 non-null     object
 2   TableName                                    10 non-null     object
 3   LongName                                     10 non-null     object
 4   Alpha2Code                                   10 non-null     object
 5   CurrencyUnit                                 10 non-null     object
 6   SpecialNotes                                 10 non-null     object
 7   Region                                       10 non-null     object
 8   IncomeGroup                                  10 non-null     object
 9   Wb2Code                                      10 non-null     object
 10  NationalAccountsBaseYear                     10 non-null     object
 11  NationalAccountsReferenceYear                10 non-null     object
 12  SnaPriceValuation                            10 non-null     object
 13  LendingCategory                              10 non-null     object
 14  OtherGroups                                  10 non-null     object
 15  SystemOfNationalAccounts                     10 non-null     object
 16  AlternativeConversionFactor                  10 non-null     object
 17  PppSurveyYear                                10 non-null     object
 18  BalanceOfPaymentsManualInUse                 10 non-null     object
 19  ExternalDebtReportingStatus                  10 non-null     object
 20  SystemOfTrade                                10 non-null     object
 21  GovernmentAccountingConcept                  10 non-null     object
 22  ImfDataDisseminationStandard                 10 non-null     object
 23  LatestPopulationCensus                       10 non-null     object
 24  LatestHouseholdSurvey                        10 non-null     object
 25  SourceOfMostRecentIncomeAndExpenditureData   10 non-null     object
 26  VitalRegistrationComplete                    10 non-null     object
 27  LatestAgriculturalCensus                     10 non-null     object
 28  LatestIndustrialData                         10 non-null     object
 29  LatestTradeData                              10 non-null     object
 30  LatestWaterWithdrawalData                    10 non-null     object
dtypes: object(31)
memory usage: 2.5+ KB
```

In [6]:
```
country_notes_query = """
                        SELECT *
                        FROM CountryNotes
                        LIMIT 10;
                        """

countries_notes = pd.read_sql(country_notes_query, db)

countries_notes.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10 entries, 0 to 9
Data columns (total 3 columns):
 #   Column       Non-Null Count  Dtype 
---  ------       --------------  ----- 
 0   Countrycode  10 non-null     object
 1   Seriescode   10 non-null     object
 2   Description  10 non-null     object
dtypes: object(3)
memory usage: 368.0+ bytes
```

```
In [7]: series_query = """
                        SELECT *
                        FROM Series
                        LIMIT 10;
                        """

        series = pd.read_sql(series_query, db)

        series.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10 entries, 0 to 9
Data columns (total 20 columns):
 #   Column                             Non-Null Count  Dtype 
---  ------                             --------------  ----- 
 0   SeriesCode                         10 non-null     object
 1   Topic                              10 non-null     object
 2   IndicatorName                      10 non-null     object
 3   ShortDefinition                    10 non-null     object
 4   LongDefinition                     10 non-null     object
 5   UnitOfMeasure                      10 non-null     object
 6   Periodicity                        10 non-null     object
 7   BasePeriod                         10 non-null     object
 8   OtherNotes                         10 non-null     object
 9   AggregationMethod                  10 non-null     object
 10  LimitationsAndExceptions           10 non-null     object
 11  NotesFromOriginalSource            10 non-null     object
 12  GeneralComments                    10 non-null     object
 13  Source                             10 non-null     object
 14  StatisticalConceptAndMethodology  10 non-null     object
 15  DevelopmentRelevance               10 non-null     object
 16  RelatedSourceLinks                 10 non-null     object
 17  OtherWebLinks                      10 non-null     object
 18  RelatedIndicators                  10 non-null     object
 19  LicenseType                        10 non-null     object
dtypes: object(20)
memory usage: 1.7+ KB
```

```
In [8]: indicator_query = """
                            SELECT *
                            FROM Indicators
                            LIMIT 10;
                            """

        indicators = pd.read_sql(indicator_query, db)

        indicators.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10 entries, 0 to 9
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   CountryName    10 non-null     object 
 1   CountryCode    10 non-null     object 
 2   IndicatorName  10 non-null     object 
 3   IndicatorCode  10 non-null     object 
 4   Year           10 non-null     int64  
 5   Value          10 non-null     float64
dtypes: float64(1), int64(1), object(4)
memory usage: 608.0+ bytes
```

Exploring the Country, Country Notes, Series and Indicators

- Country tables represent data about each country
- Series tables represent each indicator information
- indicators table represent indicators data for each country
- Indicators table joins Country table on Country Code and joins Series Table on indicator Code

Now i will get the data related to singapore and its region region

In [9]:

```
singapore_query = """
                    SELECT *
                    FROM Country
                    WHERE ShortName == "Singapore";
                    """

singapore_country = pd.read_sql(singapore_query, db)

singapore_country
```

Out[9]:

	CountryCode	ShortName	TableName	LongName	Alpha2Code	CurrencyUnit	SpecialNotes	Region	IncomeGroup	Wb2Code	...	GovernmentAcc
0	SGP	Singapore	Singapore	Republic of Singapore	SG	Singapore dollar	Fiscal year end: March 31; reporting period fo...	East Asia & Pacific	High income: nonOECD	SG	...	Consolidated c

1 rows × 31 columns

In [10]:

```
# Get all singapore related indicators data
singapore_indicators_query = """
                                SELECT *
                                FROM Indicators
                                WHERE CountryCode = "SGP";
                                """

singapore_indicators = pd.read_sql(singapore_indicators_query,db)

singapore_indicators.info ()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 22600 entries, 0 to 22599
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   CountryName    22600 non-null  object 
 1   CountryCode    22600 non-null  object 
 2   IndicatorName  22600 non-null  object 
 3   IndicatorCode  22600 non-null  object 
 4   Year           22600 non-null  int64  
 5   Value          22600 non-null  float64
dtypes: float64(1), int64(1), object(4)
memory usage: 1.0+ MB
```

In [11]:

```
# Get all singapore related indicators data
singapore_indicators = indicators[indicators["CountryCode"] == "SGP"]

singapore_indicators.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 0 entries
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   CountryName    0 non-null      object 
 1   CountryCode    0 non-null      object 
 2   IndicatorName  0 non-null      object 
 3   IndicatorCode  0 non-null      object 
 4   Year           0 non-null      int64  
 5   Value          0 non-null      float64
dtypes: float64(1), int64(1), object(4)
memory usage: 0.0+ bytes
```

In [12]:

```
# Get region data
region_query = """
                SELECT *
                FROM Country
                WHERE Region = "East Asia & Pacific";
                """

region_data = pd.read_sql(region_query, db)

region_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 36 entries, 0 to 35
Data columns (total 31 columns):
 #   Column                                      Non-Null Count  Dtype 
---  ------                                      --------------  ----- 
 0   CountryCode                                 36 non-null     object
 1   ShortName                                   36 non-null     object
 2   TableName                                   36 non-null     object
 3   LongName                                    36 non-null     object
 4   Alpha2Code                                  36 non-null     object
 5   CurrencyUnit                                36 non-null     object
 6   SpecialNotes                                36 non-null     object
 7   Region                                      36 non-null     object
 8   IncomeGroup                                 36 non-null     object
 9   Wb2Code                                     36 non-null     object
 10  NationalAccountsBaseYear                    36 non-null     object
 11  NationalAccountsReferenceYear               36 non-null     object
 12  SnaPriceValuation                           36 non-null     object
 13  LendingCategory                             36 non-null     object
 14  OtherGroups                                 36 non-null     object
 15  SystemOfNationalAccounts                    36 non-null     object
 16  AlternativeConversionFactor                 36 non-null     object
 17  PppSurveyYear                               36 non-null     object
 18  BalanceOfPaymentsManualInUse                36 non-null     object
 19  ExternalDebtReportingStatus                 36 non-null     object
 20  SystemOfTrade                               36 non-null     object
 21  GovernmentAccountingConcept                 36 non-null     object
 22  ImfDataDisseminationStandard                36 non-null     object
 23  LatestPopulationCensus                      36 non-null     object
 24  LatestHouseholdSurvey                       36 non-null     object
 25  SourceOfMostRecentIncomeAndExpenditureData  36 non-null     object
 26  VitalRegistrationComplete                   36 non-null     object
 27  LatestAgriculturalCensus                    36 non-null     object
 28  LatestIndustrialData                        36 non-null     object
 29  LatestTradeData                             36 non-null     object
 30  LatestWaterWithdrawalData                   36 non-null     object
dtypes: object(31)
memory usage: 8.8+ KB
```

In [13]:

```
# Get all rigion country indicators
region_indicators_query = """
                            SELECT I.CountryName, I.CountryCode, IndicatorName, IndicatorCode, Year, Value
                            FROM Indicators AS I
                            INNER JOIN Country AS C
                            ON I.CountryCode = C.CountryCode
                            WHERE Region = "East Asia & Pacific";
                            """

region_indicators = pd.read_sql(region_indicators_query, db)

region_indicators.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 703768 entries, 0 to 703767
Data columns (total 6 columns):
 #   Column         Non-Null Count   Dtype  
---  ------         --------------   -----  
 0   CountryName    703768 non-null  object 
 1   CountryCode    703768 non-null  object 
 2   IndicatorName  703768 non-null  object 
 3   IndicatorCode  703768 non-null  object 
 4   Year           703768 non-null  int64  
 5   Value          703768 non-null  float64
dtypes: float64(1), int64(1), object(4)
memory usage: 32.2+ MB
```

In [14]:

```
# Check the number of unique countries name to make sure we get all the countries in the region
region_indicators.CountryName.nunique()
```

Out[14]:

```
36
```

Now we have all Singapore Indicators Data, and East Asia & Pacific Region countries Indicators Data

Getting the Indicators [Economy, Health, Employment]

In [15]:
```
topics_query = """
                SELECT DISTINCT Topic
                FROM Series;
                """

topics = pd.read_sql(topics_query, db)

topics_list = [x for x in topics["Topic"]]

topics_list
```

Out[15]:
```
['Economic Policy & Debt: Balance of payments: Capital & financial account',
 'Economic Policy & Debt: Balance of payments: Current account: Balances',
 'Economic Policy & Debt: Balance of payments: Current account: Goods, services & income',
 'Economic Policy & Debt: Balance of payments: Current account: Transfers',
 'Economic Policy & Debt: Balance of payments: Reserves & other items',
 'Economic Policy & Debt: External debt: Amortization',
 'Economic Policy & Debt: External debt: Arrears, reschedulings, etc.',
 'Economic Policy & Debt: External debt: Commitments',
 'Economic Policy & Debt: External debt: Currency composition',
 'Economic Policy & Debt: External debt: Debt outstanding',
 'Economic Policy & Debt: External debt: Debt ratios & other items',
 'Economic Policy & Debt: External debt: Debt service',
 'Economic Policy & Debt: External debt: Disbursements',
 'Economic Policy & Debt: External debt: Interest',
 'Economic Policy & Debt: External debt: Net flows',
 'Economic Policy & Debt: External debt: Net transfers',
 'Economic Policy & Debt: External debt: Terms',
 'Economic Policy & Debt: External debt: Undisbursed debt',
 'Economic Policy & Debt: National accounts: Adjusted savings & income',
 'Economic Policy & Debt: National accounts: Atlas GNI & GNI per capita',
 'Economic Policy & Debt: National accounts: Growth rates',
 'Economic Policy & Debt: National accounts: Growth rates:',
 'Economic Policy & Debt: National accounts: Local currency at constant prices: Aggregate indicators',
 'Economic Policy & Debt: National accounts: Local currency at constant prices: Expenditure on GDP',
 'Economic Policy & Debt: National accounts: Local currency at constant prices: Other items',
 'Economic Policy & Debt: National accounts: Local currency at constant prices: Value added',
 'Economic Policy & Debt: National accounts: Local currency at current prices: Aggregate indicators',
 'Economic Policy & Debt: National accounts: Local currency at current prices: Expenditure on GDP',
 'Economic Policy & Debt: National accounts: Local currency at current prices: Value added',
 'Economic Policy & Debt: National accounts: Shares of GDP & other',
 'Economic Policy & Debt: National accounts: US$ at constant 2005 prices: Aggregate indicators',
 'Economic Policy & Debt: National accounts: US$ at constant 2005 prices: Expenditure on GDP',
 'Economic Policy & Debt: National accounts: US$ at constant 2005 prices: Value added',
 'Economic Policy & Debt: National accounts: US$ at current prices: Aggregate indicators',
 'Economic Policy & Debt: National accounts: US$ at current prices: Expenditure on GDP',
 'Economic Policy & Debt: National accounts: US$ at current prices: Other items',
 'Economic Policy & Debt: National accounts: US$ at current prices: Value added',
 'Economic Policy & Debt: Official development assistance',
 'Economic Policy & Debt: Purchasing power parity',
 'Education: Efficiency',
 'Education: Inputs',
 'Education: Outcomes',
 'Education: Participation',
 'Environment: Agricultural production',
 'Environment: Biodiversity & protected areas',
 'Environment: Density & urbanization',
 'Environment: Emissions',
 'Environment: Energy production & use',
 'Environment: Freshwater',
 'Environment: Land use',
 'Environment: Natural resources contribution to GDP',
 'Financial Sector: Access',
 'Financial Sector: Assets',
 'Financial Sector: Capital markets',
 'Financial Sector: Exchange rates & prices',
 'Financial Sector: Interest rates',
 'Financial Sector: Monetary holdings (liabilities)',
 'Health: Disease prevention',
 'Health: Health services',
 'Health: Mortality',
 'Health: Nutrition',
 'Health: Population: Dynamics',
 'Health: Population: Structure',
 'Health: Reproductive health',
 'Health: Risk factors',
 'Infrastructure: Communications',
 'Infrastructure: Technology',
 'Infrastructure: Transportation',
 'Poverty: Income distribution',
 'Poverty: Poverty rates',
 'Poverty: Shared prosperity',
 'Private Sector & Trade: Business environment',
 'Private Sector & Trade: Exports',
 'Private Sector & Trade: Imports',
 'Private Sector & Trade: Private infrastructure investment',
 'Private Sector & Trade: Tariffs',
 'Private Sector & Trade: Total merchandise trade',
 'Private Sector & Trade: Trade facilitation',
 'Private Sector & Trade: Trade indexes',
 'Private Sector & Trade: Travel & tourism',
 'Public Sector: Conflict & fragility',
 'Public Sector: Defense & arms trade',
 'Public Sector: Government finance: Deficit & financing',
 'Public Sector: Government finance: Expense',
 'Public Sector: Government finance: Revenue',
 'Public Sector: Policy & institutions',
 'Social Protection & Labor: Economic activity',
 'Social Protection & Labor: Labor force structure',
 'Social Protection & Labor: Migration',
 'Social Protection & Labor: Performance',
 'Social Protection & Labor: Unemployment']
```

Indicators Choice

> I will select one indicator related to each topic and see the progress in it over time in singapore and compare singapore with its region countries to see singapore development progress.

> - Economy Indicator : GDP Per Capita
> - Health : Life Expectancy
> - Unemployment : Total Unemployment Rate

In [16]:

```
# Economy Indicators
economy_ind_query = """
                    SELECT DISTINCT I.IndicatorName
                    FROM Indicators AS I
                    INNER JOIN Series AS S
                    ON I.IndicatorName = S.IndicatorName
                    WHERE Topic LIKE "Economic Policy & Debt: National accounts: Growth rates"
                    AND CountryCode = "SGP";
                    """

economy_ind = pd.read_sql(economy_ind_query, db)

economy_ind_list = [x for x in economy_ind["IndicatorName"]]

economy_ind_list
```

Out[16]:

```
['Agriculture, value added (annual % growth)',
 'Exports of goods and services (annual % growth)',
 'Final consumption expenditure, etc. (annual % growth)',
 'GDP growth (annual %)',
 'GDP per capita growth (annual %)',
 'General government final consumption expenditure (annual % growth)',
 'Gross capital formation (annual % growth)',
 'Gross fixed capital formation (annual % growth)',
 'Household final consumption expenditure (annual % growth)',
 'Household final consumption expenditure per capita growth (annual %)',
 'Household final consumption expenditure, etc. (annual % growth)',
 'Imports of goods and services (annual % growth)',
 'Industry, value added (annual % growth)',
 'Manufacturing, value added (annual % growth)',
 'Services, etc., value added (annual % growth)']
```

In [17]:

```
# Health indicators
health_ind_query = """
                SELECT DISTINCT I.IndicatorName
                FROM Indicators AS I
                INNER JOIN Series AS S
                ON I.IndicatorName = S.IndicatorName
                WHERE Topic LIKE "%Health%"
                AND CountryCode = "SGP";
                """

health_ind = pd.read_sql(health_ind_query, db)

health_ind_list = [x for x in health_ind["IndicatorName"]]

health_ind_list
```

Out[17]:

```
['Adolescent fertility rate (births per 1,000 women ages 15-19)',
 'Age dependency ratio (% of working-age population)',
 'Age dependency ratio, old (% of working-age population)',
 'Age dependency ratio, young (% of working-age population)',
 'Birth rate, crude (per 1,000 people)',
 'Births attended by skilled health staff (% of total)',
 'Cause of death, by communicable diseases and maternal, prenatal and nutrition conditions (% of total)',
 'Cause of death, by injury (% of total)',
 'Cause of death, by non-communicable diseases (% of total)',
 'Completeness of death registration with cause-of-death information (%)',
 'Completeness of infant death reporting (% of reported infant deaths to estimated infant deaths)',
 'Completeness of total death reporting (% of reported total deaths to estimated total deaths)',
 'Contraceptive prevalence (% of women ages 15-49)',
 'Death rate, crude (per 1,000 people)',
 'Diabetes prevalence (% of population ages 20 to 79)',
 'External resources for health (% of total expenditure on health)',
 'Fertility rate, total (births per woman)',
 'Health expenditure per capita (current US$)',
 'Health expenditure per capita, PPP (constant 2011 international $)',
 'Health expenditure, private (% of GDP)',
 'Health expenditure, public (% of GDP)',
 'Health expenditure, public (% of government expenditure)',
 'Health expenditure, public (% of total health expenditure)',
 'Health expenditure, total (% of GDP)',
 'Hospital beds (per 1,000 people)',
 'Immunization, DPT (% of children ages 12-23 months)',
 'Immunization, measles (% of children ages 12-23 months)',
 'Improved sanitation facilities (% of population with access)',
 'Improved sanitation facilities, urban (% of urban population with access)',
 'Improved water source (% of population with access)',
 'Improved water source, urban (% of urban population with access)',
 'Incidence of tuberculosis (per 100,000 people)',
 'Life expectancy at birth, female (years)',
 'Life expectancy at birth, male (years)',
 'Life expectancy at birth, total (years)',
 'Lifetime risk of maternal death (%)',
 'Lifetime risk of maternal death (1 in: rate varies by country)',
 'Low-birthweight babies (% of births)',
 'Maternal mortality ratio (modeled estimate, per 100,000 live births)',
 'Maternal mortality ratio (national estimate, per 100,000 live births)',
 'Mortality rate, adult, female (per 1,000 female adults)',
 'Mortality rate, adult, male (per 1,000 male adults)',
 'Mortality rate, infant (per 1,000 live births)',
 'Mortality rate, infant, female (per 1,000 live births)',
 'Mortality rate, infant, male (per 1,000 live births)',
 'Mortality rate, neonatal (per 1,000 live births)',
 'Mortality rate, under-5, female (per 1,000 live births)',
 'Mortality rate, under-5, male (per 1,000 live births)',
 'Number of infant deaths',
 'Number of maternal deaths',
 'Number of neonatal deaths',
 'Number of under-five deaths',
 'Nurses and midwives (per 1,000 people)',
 'Out-of-pocket health expenditure (% of private expenditure on health)',
 'Out-of-pocket health expenditure (% of total expenditure on health)',
 'Physicians (per 1,000 people)',
 'Population ages 65 and above (% of total)',
 'Population growth (annual %)',
 'Population, female (% of total)',
 'Population, total',
 'Prevalence of anemia among children (% of children under 5)',
 'Prevalence of anemia among non-pregnant women (% of women ages 15-49)',
 'Prevalence of anemia among pregnant women (%)',
 'Prevalence of overweight, weight for height (% of children under 5)',
 'Prevalence of overweight, weight for height, female (% of children under 5)',
 'Prevalence of overweight, weight for height, male (% of children under 5)',
 'Prevalence of severe wasting, weight for height (% of children under 5)',
 'Prevalence of severe wasting, weight for height, female (% of children under 5)',
 'Prevalence of severe wasting, weight for height, male (% of children under 5)',
 'Prevalence of stunting, height for age (% of children under 5)',
 'Prevalence of stunting, height for age, female (% of children under 5)',
 'Prevalence of stunting, height for age, male (% of children under 5)',
 'Prevalence of underweight, weight for age (% of children under 5)',
 'Prevalence of underweight, weight for age, female (% of children under 5)',
 'Prevalence of underweight, weight for age, male (% of children under 5)',
 'Prevalence of wasting, weight for height (% of children under 5)',
 'Prevalence of wasting, weight for height, female (% of children under 5)',
 'Prevalence of wasting, weight for height, male (% of children under 5)',
 'Smoking prevalence, females (% of adults)',
 'Smoking prevalence, males (% of adults)',
 'Survival to age 65, female (% of cohort)',
 'Survival to age 65, male (% of cohort)',
 'Tuberculosis case detection rate (%, all forms)',
 'Tuberculosis treatment success rate (% of new cases)']
```

In [18]:

```
# Unemployment Indicators
unemployment_ind_query = """
                        SELECT DISTINCT I.IndicatorName
                        FROM Indicators AS I
                        INNER JOIN Series AS S
                        ON I.IndicatorName = S.IndicatorName
                        WHERE Topic LIKE "%Unemployment"
                        AND CountryCode = "SGP";
                        """

unemployment_ind = pd.read_sql(unemployment_ind_query, db)

unemployment_ind_list = [x for x in unemployment_ind["IndicatorName"]]

unemployment_ind_list
```

Out[18]:

```
['Long-term unemployment (% of total unemployment)',
 'Unemployment with primary education (% of total unemployment)',
 'Unemployment with primary education, female (% of female unemployment)',
 'Unemployment with primary education, male (% of male unemployment)',
 'Unemployment with secondary education (% of total unemployment)',
 'Unemployment with secondary education, female (% of female unemployment)',
 'Unemployment with secondary education, male (% of male unemployment)',
 'Unemployment with tertiary education (% of total unemployment)',
 'Unemployment with tertiary education, female (% of female unemployment)',
 'Unemployment with tertiary education, male (% of male unemployment)',
 'Unemployment, female (% of female labor force) (national estimate)',
 'Unemployment, male (% of male labor force) (national estimate)',
 'Unemployment, total (% of total labor force) (national estimate)',
 'Unemployment, youth female (% of female labor force ages 15-24) (modeled ILO estimate)',
 'Unemployment, youth female (% of female labor force ages 15-24) (national estimate)',
 'Unemployment, youth male (% of male labor force ages 15-24) (modeled ILO estimate)',
 'Unemployment, youth male (% of male labor force ages 15-24) (national estimate)',
 'Unemployment, youth total (% of total labor force ages 15-24) (modeled ILO estimate)',
 'Unemployment, youth total (% of total labor force ages 15-24) (national estimate)']
```

Get each indivdual indicator data for the region

I will get all the region data for analysis and make mask to filter through analysis

In [19]:

```
# GDP per Gapita Growth Annualy Indicator
gdp_query = """
            SELECT I.CountryName, I.CountryCode, I.IndicatorName, Year, Value
            FROM Indicators AS I
            INNER JOIN Country AS C
            ON C.CountryCode = I.CountryCode
            WHERE Region = "East Asia & Pacific"
            AND IndicatorName = "GDP per capita growth (annual %)"
            """

gdp = pd.read_sql(gdp_query, db)

gdp.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1272 entries, 0 to 1271
Data columns (total 5 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   CountryName    1272 non-null   object 
 1   CountryCode    1272 non-null   object 
 2   IndicatorName  1272 non-null   object 
 3   Year           1272 non-null   int64  
 4   Value          1272 non-null   float64
dtypes: float64(1), int64(1), object(3)
memory usage: 49.8+ KB
```

In [20]:

```
# Health : Life Expectancy Indicator
health_query = """
            SELECT I.CountryName, I.CountryCode, I.IndicatorName, Year, Value
            FROM Indicators AS I
            INNER JOIN Country AS C
            ON C.CountryCode = I.CountryCode
            WHERE Region = "East Asia & Pacific"
            AND IndicatorName = "Life expectancy at birth, total (years)"
            """

health = pd.read_sql(health_query, db)

health.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1681 entries, 0 to 1680
Data columns (total 5 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   CountryName    1681 non-null   object 
 1   CountryCode    1681 non-null   object 
 2   IndicatorName  1681 non-null   object 
 3   Year           1681 non-null   int64  
 4   Value          1681 non-null   float64
dtypes: float64(1), int64(1), object(3)
memory usage: 65.8+ KB
```

In [21]:

```
# Unemployment Rates Indicator
unemployment_query = """
            SELECT I.CountryName, I.CountryCode, I.IndicatorName, Year, Value
            FROM Indicators AS I
            INNER JOIN Country AS C
            ON C.CountryCode = I.CountryCode
            WHERE Region = "East Asia & Pacific"
            AND IndicatorName = "Unemployment, total (% of total labor force) (national estimate)"
            """

unemployment = pd.read_sql(unemployment_query, db)

unemployment.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 531 entries, 0 to 530
Data columns (total 5 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   CountryName    531 non-null    object 
 1   CountryCode    531 non-null    object 
 2   IndicatorName  531 non-null    object 
 3   Year           531 non-null    int64  
 4   Value          531 non-null    float64
dtypes: float64(1), int64(1), object(3)
memory usage: 20.9+ KB
```

Data Wrangling

Now I have my Dfs for the selected three indicators for all the region country, Next i will clean my data, analize Singapore progress over year and compare its progress to its region neughbours

In [22]:

```
# GDP wrangling
gdp.head()
```

Out[22]:

	CountryName	CountryCode	IndicatorName	Year	Value
0	Australia	AUS	GDP per capita growth (annual %)	1961	0.457076
1	Australia	AUS	GDP per capita growth (annual %)	1962	-1.115531
2	Australia	AUS	GDP per capita growth (annual %)	1963	4.194893
3	Australia	AUS	GDP per capita growth (annual %)	1964	4.897367
4	Australia	AUS	GDP per capita growth (annual %)	1965	3.923330

In [23]:

```
gdp.dtypes
```

Out[23]:

```
CountryName       object
CountryCode       object
IndicatorName     object
Year               int64
Value            float64
dtype: object
```

In [24]:
```
gdp.shape
```

Out[24]:
```
(1272, 5)
```

In [25]:
```
gdp.describe()
```

Out[25]:

	Year	Value
count	1272.000000	1272.000000
mean	1991.669025	2.832019
std	14.403745	5.414118
min	1961.000000	-45.222114
25%	1981.000000	0.225935
50%	1993.000000	3.023345
75%	2004.000000	5.696792
max	2014.000000	43.226695

In [26]:
```
# Life Expectancy Wrangling
health.head()
```

Out[26]:

	CountryName	CountryCode	IndicatorName	Year	Value
0	Australia	AUS	Life expectancy at birth, total (years)	1960	70.817073
1	Australia	AUS	Life expectancy at birth, total (years)	1961	70.973171
2	Australia	AUS	Life expectancy at birth, total (years)	1962	70.942439
3	Australia	AUS	Life expectancy at birth, total (years)	1963	70.911707
4	Australia	AUS	Life expectancy at birth, total (years)	1964	70.880976

In [27]:
```
health.dtypes
```

Out[27]:
```
CountryName       object
CountryCode       object
IndicatorName     object
Year               int64
Value            float64
dtype: object
```

In [28]:
```
health.describe()
```

Out[28]:

	Year	Value
count	1681.000000	1681.000000
mean	1986.541939	65.006619
std	15.575991	9.983934
min	1960.000000	19.265512
25%	1973.000000	59.381220
50%	1987.000000	66.330098
75%	2000.000000	71.822366
max	2013.000000	83.831707

In [29]:
```
# Unemployemnt wrangling
unemployment.head()
```

Out[29]:

	CountryName	CountryCode	IndicatorName	Year	Value
0	American Samoa	ASM	Unemployment, total (% of total labor force) (...	1980	12.4
1	American Samoa	ASM	Unemployment, total (% of total labor force) (...	1981	10.6
2	American Samoa	ASM	Unemployment, total (% of total labor force) (...	1982	12.8
3	American Samoa	ASM	Unemployment, total (% of total labor force) (...	1983	13.0
4	American Samoa	ASM	Unemployment, total (% of total labor force) (...	1984	13.1

In [30]:
```
unemployment.dtypes
```

Out[30]:
```
CountryName       object
CountryCode       object
IndicatorName     object
Year               int64
Value            float64
dtype: object
```

In [31]:
```
unemployment.describe()
```

Out[31]:

	Year	Value
count	531.000000	531.000000
mean	1998.222222	5.275330
std	9.887841	3.650972
min	1980.000000	0.100000
25%	1990.000000	2.900000
50%	1999.000000	4.300000
75%	2007.000000	6.950000
max	2014.000000	31.900000

Notes

- In the health and GDP Dfs it has very neay start and end year range with only 1 year difference (1960/1961 --> 2013/2014_
- In unemployment Dfs it has data starts from 1980 only which mean

Explotery Data Analysis For Singapore

I will analyize singapore indicators data the goal is to answer the following Question:

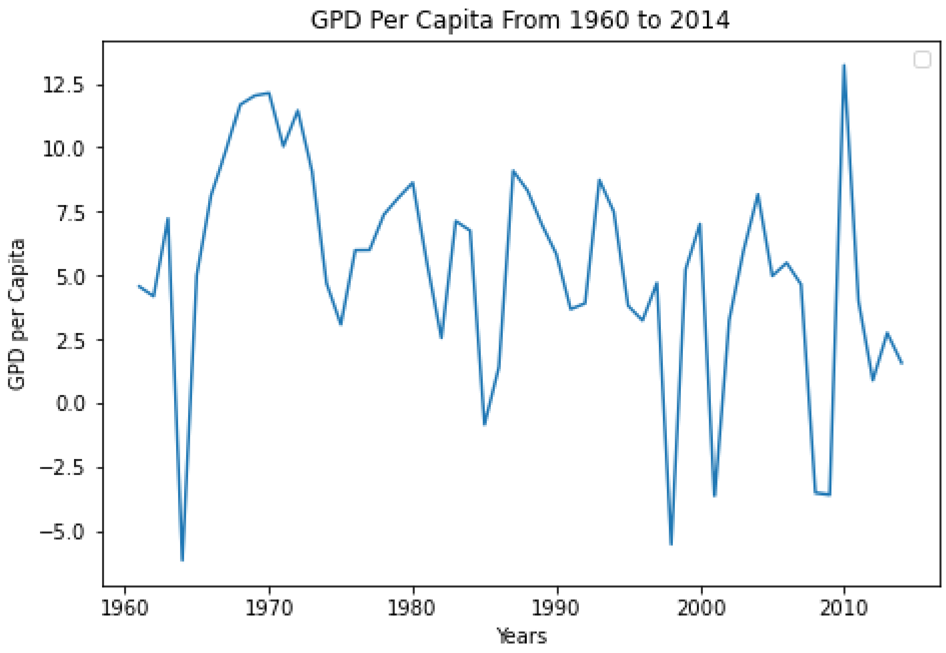
Q: How singapore development progess over the years ?

In [32]:
```
# First i will get singapore data only
singapore_gdp = gdp[gdp["CountryCode"] == "SGP"]
singapore_health = health[health["CountryCode"] == "SGP"]
singapore_unemployment = unemployment[unemployment["CountryCode"] == "SGP"]
```

1- How Economy Devloped over the years in Singapore ?

In [133]:
```
# Use line plot to measure the GDP
plt.plot(singapore_gdp["Year"].values, singapore_gdp["Value"].values)

plt.title('GPD Per Capita From 1960 to 2014')
plt.rcParams["figure.figsize"] = (7.5,5)

plt.ylabel('GPD per Capita')
plt.xlabel('Years')

plt.show()
```

```
No handles with labels found to put in legend.
```



There is no steady progress line and in the latest years it has been declined in GDP per Capita

In [34]:
```
#plot the value at 1960 and the value at 2014
values = singapore_gdp.iloc[[0, -1]]
```

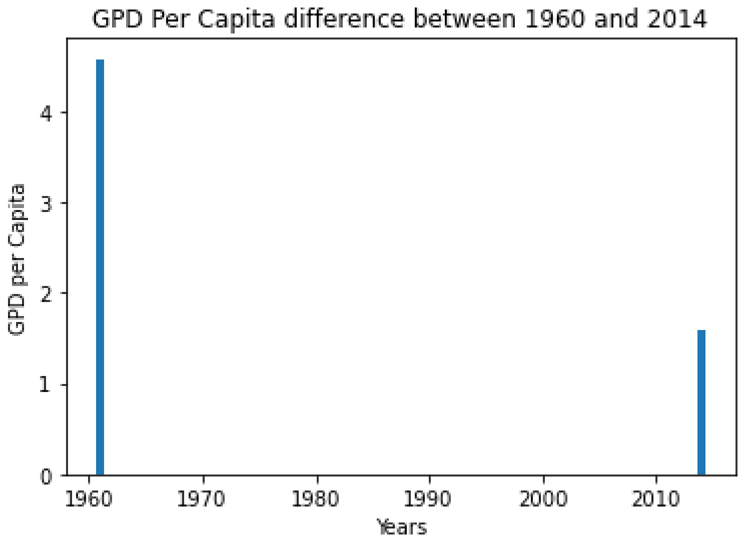
In [35]:
```
values.head()
```

Out[35]:

	CountryName	CountryCode	IndicatorName	Year	Value
1003	Singapore	SGP	GDP per capita growth (annual %)	1961	4.580466
1056	Singapore	SGP	GDP per capita growth (annual %)	2014	1.591855

In [40]:
```
# bar plot
plt.bar(values.Year, values.Value)

plt.title('GPD Per Capita difference between 1960 and 2014')

plt.ylabel('GPD per Capita')
plt.xlabel('Years')
```

Out[40]:
```
Text(0.5, 0, 'Years')
```



Here also i see that the value of GDP t the start of our analysis period is higher than the last one

In [128]:
```
# I will compare the value at 2014 to the mean value of GDP
x = [1, "mean", "2014"]
y = [singapore_gdp["Value"].mean(), singapore_gdp[singapore_gdp["Year"] == 2014]["Value"].values[0]]
df = pd.DataFrame(data = y, columns = ["Value"], index = ["2014", "Mean"])
```

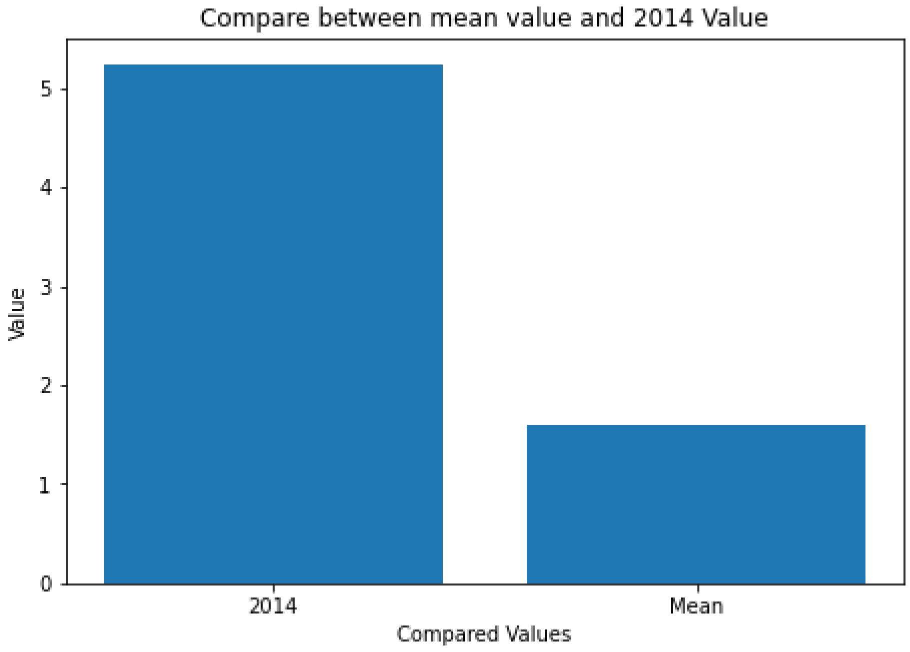
In [129]:
```
df.head()
```

Out[129]:

	Value
2014	5.239174
Mean	1.591855

In [135]:
```
# plot the two values
x = ["Meab Value", "2014 Value"]
plt.bar(df.index, df["Value"].values);

plt.title("Compare between mean value and 2014 Value")
plt.xlabel("Compared Values")
plt.ylabel("Value")
```

Out[135]:
```
Text(0, 0.5, 'Value')
```



I notice compare to the mean the value at 2014 after the decline it still good comparing to the mean value, the value at 1960 was before independence

Q2: How singapore Compare on the GDP at 2014 between Region countries ?

In [45]:
```
gdp_compare = gdp[gdp["Year"] == 2014]
```

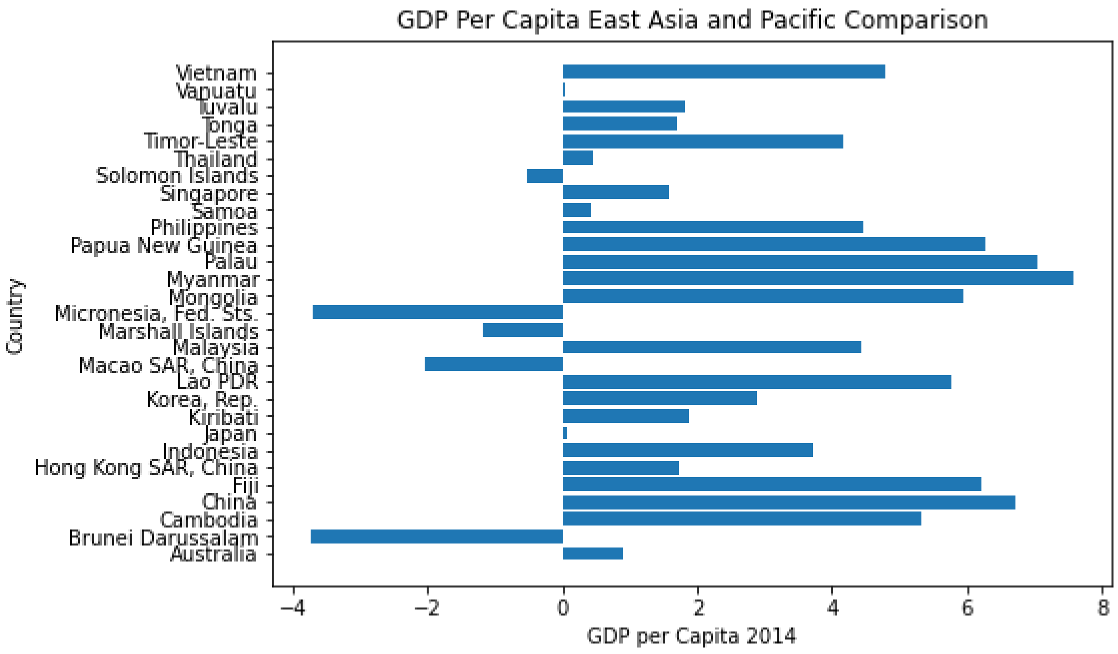
In [46]:
```
gdp_compare.head()
```

Out[46]:

	CountryName	CountryCode	IndicatorName	Year	Value
53	Australia	AUS	GDP per capita growth (annual %)	2014	0.907780
93	Brunei Darussalam	BRN	GDP per capita growth (annual %)	2014	-3.719286
114	Cambodia	KHM	GDP per capita growth (annual %)	2014	5.328192
168	China	CHN	GDP per capita growth (annual %)	2014	6.726721
222	Fiji	FJI	GDP per capita growth (annual %)	2014	6.225178

In [71]:
```
# define a function to create the horizontal bar plot
def h_bar_plot(df, title, xlabel, ylabel):
    plt.barh(df.CountryName.values, df.Value.values)

    plt.title('{}'.format(title))

    plt.ylabel('{}'.format(ylabel))
    plt.xlabel('{}'.format(xlabel))

    return plt.show()
```

In [136]:
```
h_bar_plot(gdp_compare, "GDP Per Capita East Asia and Pacific Comparison", "GDP per Capita 2014", "Country")
plt.rcParams["figure.figsize"] = (7,5)
```

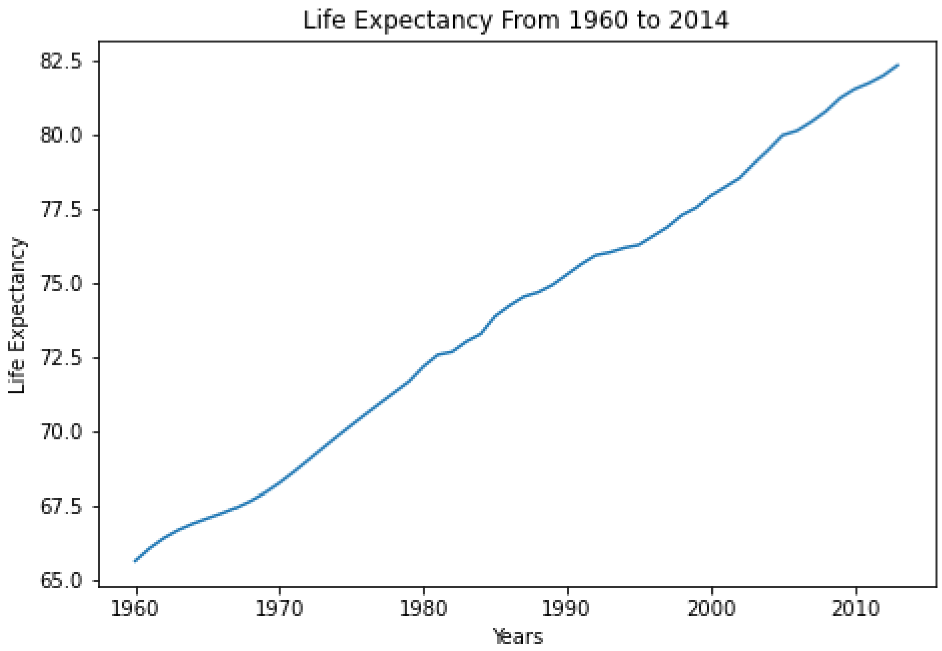


singapore in the 8th Place

2- How health Devloped over the years in Singapore ?

In [103]:

```
# Use line plot to analyize the Life Expectancy
plt.plot(singapore_health["Year"].values, singapore_health["Value"].values)

plt.title('Life Expectancy From 1960 to 2014')
plt.rcParams["figure.figsize"] = (7.5,5)

plt.ylabel('Life Expectancy')
plt.xlabel('Years')

plt.show()
```



The health of the population has steady increase trend line which means it has developed through the last 60 years

In [98]:

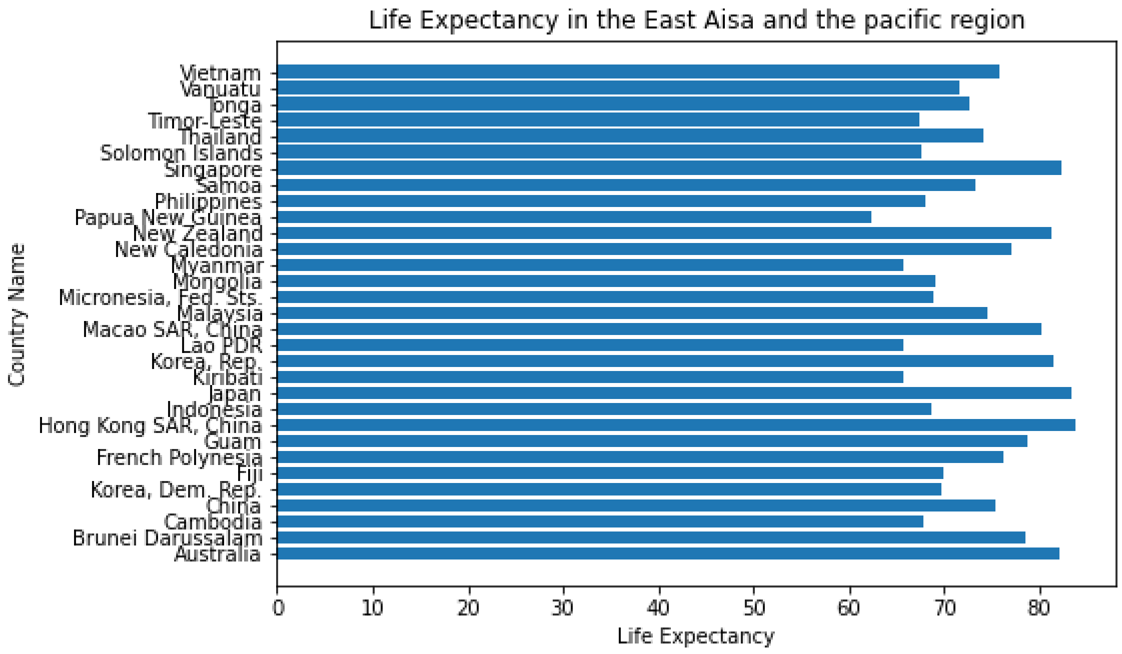
```
# Compare it with the Region Countries at 2013
health_compare = health[health["Year"] == 2013]

health_compare.head()
```

Out[98]:

	CountryName	CountryCode	IndicatorName	Year	Value
53	Australia	AUS	Life expectancy at birth, total (years)	2013	82.197561
107	Brunei Darussalam	BRN	Life expectancy at birth, total (years)	2013	78.546659
161	Cambodia	KHM	Life expectancy at birth, total (years)	2013	67.772049
215	China	CHN	Life expectancy at birth, total (years)	2013	75.353024
269	Korea, Dem. Rep.	PRK	Life expectancy at birth, total (years)	2013	69.791951

In [99]:

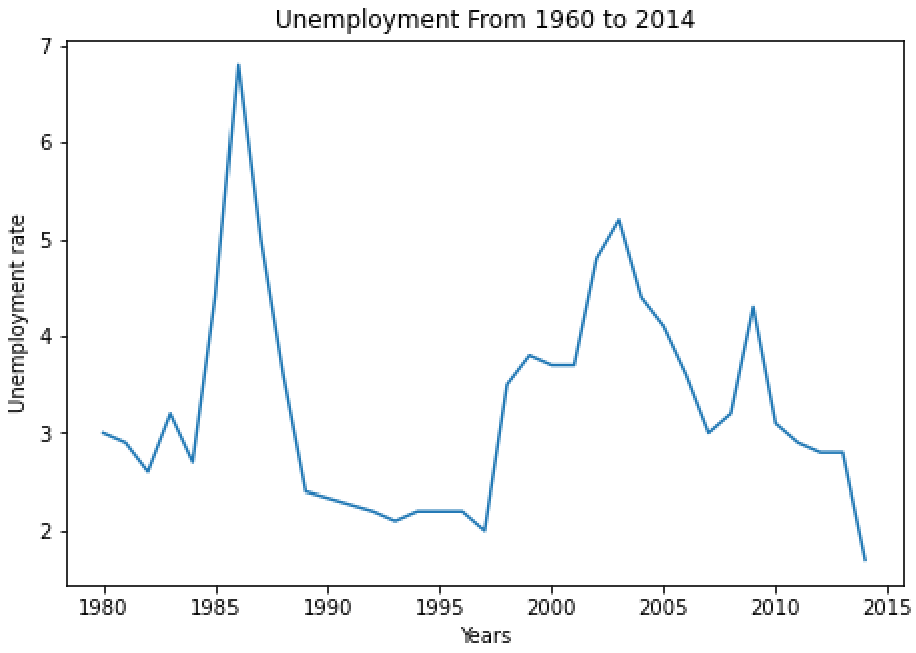
```
h_bar_plot(health_compare, "Life Expectancy in the East Aisa and the pacific region", "Life Expectancy", "Country Name")
plt.rcParams["figure.figsize"] = (7.5,5)
```



Singapore has the 6th place between region countries

3- How Unemployment Developed over the years in singapore ?

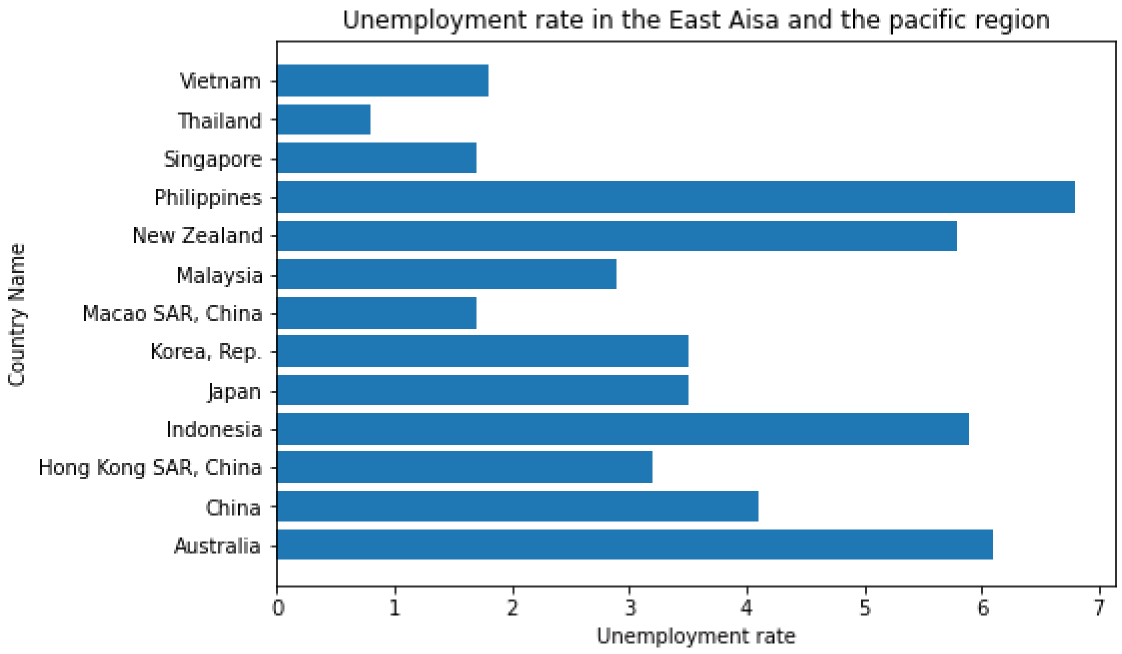
In [100]:
```
# Use line plot to measure the GDP
plt.plot(singapore_unemployment["Year"].values, singapore_unemployment["Value"].values)

plt.title('Unemployment From 1960 to 2014')

plt.ylabel('Unemployment rate')
plt.xlabel('Years')

plt.show()
```



Unemployment Rate has a huge decline in the 80s and 90s, it seems that was a problem faced singapore in 2000s but it seems that the government controlled the situations and now the has very low unemployment rate

In [101]:
```
unemployment_compare = unemployment[unemployment["Year"] == 2014]
```

In [138]:
```
# compare unemployment rate between region countries
h_bar_plot(unemployment_compare, "Unemployment rate in the East Aisa and the pacific region", "Unemployment rate", "Coun
plt.rcParams["figure.figsize"] = (7.5,5)
```



Singapore has the 3th place between region countries, It has one of the most low unemployment rates in the region

Conclusions

Result

I started my analysis to explore the development process of singapore and compare it between its region countries and as i see it is one of the most developed countries in the last few decades and has a good position between its region countries

Economy progress i measured it using GDP the deveopment was not steady as i expected but comparing the last year progress to the mean value it is progressing

In the health sector steady increasing trend line

in the unemployment huge development as it now has one of the region lowest unemployment rate

Limitations

- No data about historical events in the countries which may have huge impact on its progress
- The difference between recorded data years range

In [ ]: