

**An Internship Project Report**  
**on**  
**World Bank Global Education Analysis**

A Dissertation Submitted  
for partial fulfillment of the requirements  
for the award of the Internship Certificate of  
**Full Stack Data Science**

*by*

**Ajay Thakur**

(Roll No. 2016kuec2026)

Electronics and Communication Engineering

**Indian Institute of Information Technology Kota**  
(An Institute of National Importance)

Under the Guidance of

**Mr. Vikash Srivastava**

Co-founder & CPTO (AlmaBetter Edutech Private Limited)



**AlmaBetter Edutech Private Limited**  
Bengaluru - 560025, India

May, 2023

# Declaration

I, **Ajay Thakur** (Roll No: **2016kuec2026**), hereby declare that, this report entitled “**World Bank Global Education Analysis**” submitted to AlmaBetter Edutech Private Limited, Bengaluru towards the partial requirement for the award of the **Internship Certificate in Full Stack Data Science**, is an original work carried out by me under the supervision of **Vikash Srivastava** and has not formed the basis for the award of any degree or diploma, in this or any other institution or university. I have sincerely tried to uphold academic ethics and honesty. Whenever a piece of external information or statement or result is used then, that has been duly acknowledged and cited.

Bengaluru - 560025

**Ajay Thakur**

May 11, 2023

# *Acknowledgements*

I am honoured to have this opportunity to convey my sincere gratitude to my supervisor, Mr. Vikash Srivastava, for his precious supervision, constant motivation, and caring mentorship throughout the tenure of this research. Without his immense knowledge and unparalleled vision, this project would not have taken this shape.

**Place:** Bengaluru

**Date:** May 11, 2023

**Ajay Thakur**

**(2016kuec2026)**

# CERTIFICATE

This is to certify that the work contained in this report entitled ‘**World Bank Global Education Analysis**’, submitted by **Ajay Thakur** to AlmaBetter Edutech Private Limited, Bengaluru towards the partial requirement for the award of the **Internship Certificate** in **Full Stack Data Science** has been carried out by him under my supervision and that it has not been submitted elsewhere for the award of any degree.

**Place:** Bengaluru

**Date:** May 11, 2023

**Mr. Vikash Srivastava**

**(Supervisor)**

# *Abstract*

The World Bank's Education Strategy 2020 is the latest in a line of education-related strategies focused on supporting economic development in countries worldwide through systematic and targeted educational reform. Yet, the Bank has many critics and a history of developing educational policies that do as much to create inequality in education as to develop it. This chapter introduces the theme of the volume by focusing on the link between the World Bank's education strategy development and poverty reduction. The key emphasis of this volume is the development of the Bank's Education Strategy 2020 and how it is shaped by empirical evidence, contextualized by national and regional variations in education and the economy, and the legacy of World Bank educational involvement. This introductory chapter concludes by summarizing the ways in which each of the volume's chapters contribute to this theme, and suggests how the debates related to the Bank's education strategies and policies can move forward and contribute to educational improvement, economic development, and poverty reduction worldwide.

# Contents

<b>Declaration</b>	<b>i</b>
<b>Acknowledgements</b>	<b>ii</b>
<b>Abstract</b>	<b>iv</b>
<b>List of Figures</b>	<b>ix</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Problem statement . . . . .	1
1.2 Objective of the project . . . . .	1
<b>2 Literature Survey</b>	<b>2</b>
<b>3 The list of datasets have been provided for analysis</b>	<b>3</b>
<b>4 The list of indicators and countries have been selected for analysis</b>	<b>3</b>
4.1 The list of indicators have been selected for analysis . . . . .	3
4.1.1 The list of indicators have been selected for Adjusted Net Enrollment Rate (AER) of India in different educational levels during 2000-2030 . . . . .	3
4.1.2 The list of indicators have been selected for the population rate of India between 20-24 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)	4
4.1.3 The list of indicators have been selected for the population rate of India between 25-29 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)	4
4.1.4 The list of indicators have been selected for the population rate of India between 30-34 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)	5
4.1.5 The list of indicators have been selected for the population rate of India between 35-39 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)	5
4.1.6 The list of indicators have been selected for Capital Expenditure (CapEx) of India in different types of educational institutions during 2000-2030 . . . . .	6
4.1.7 The list of indicators have been selected for the correlation between different factors affecting economic growth of India during 2000-2030 . . . . .	7
4.2 The list of countries have been selected for analysis . . . . .	7
4.2.1 The list of countries have been selected for the population rate in low income group during 2005-2014 . . . . .	7
4.2.2 The list of countries have been selected for the population rate in lower middle income group during 2005-2014 . . . . .	7

4.2.3	The list of countries have been selected for the population rate in upper middle income group during 2005-2014 . . . . .	8
4.2.4	The list of countries have been selected for the population rate of in high income: nonOECD group during 2005-2014 . . . . .	8
4.2.5	The list of countries have been selected for the population rate in high income: OECD group during 2005-2014 . . . . .	8
4.2.6	The list of countries have been selected for the population rate in combined income group during 2005-2014 . . . . .	8
4.2.7	The country have been selected which comes under developing country or developed country (based on GDP per capita)? . . . . .	9
4.2.8	The list of countries have been selected for the GER in different educational levels in 2010 . . . . .	9
<b>5</b>	<b>The list of Python libraries used for analysis</b>	<b>9</b>
<b>6</b>	<b>The number of missing values (NaN) in different columns of the dataframe df_EdStatsCountry and df_EdStatsData</b>	<b>10</b>
6.1	The number of missing values (NaN) in different columns of the dataframe (df_EdStatsCountry)	10
6.2	The number of missing values (NaN) in different columns of the dataframe (df_EdStatsData)	11
<b>7</b>	<b>The number of countries according to their regions and income groups</b>	<b>11</b>
7.1	The number of countries according to their regions . . . . .	11
7.2	The number of countries according to their income groups . . . . .	12
<b>8</b>	<b>The population rate of different countries in their income groups during 2005-2014</b>	<b>13</b>
8.1	The population rate of certain countries in low income group during 2005-2014 . . . . .	13
8.2	The population rate of certain countries in lower middle income group during 2005-2014 . . .	15
8.3	The population rate of certain countries in upper middle income group during 2005-2014 . . .	16
8.4	The population rate of certain countries in high income: nonOECD group during 2005-2014 .	17
8.5	The population rate of certain countries in high income: OECD group during 2005-2014 . . .	18
8.6	The population rate of certain countries in combined income group during 2005-2014 . . . . .	20
<b>9</b>	<b>The GDP per capita of different countries during 2000-2030</b>	<b>21</b>
9.1	The percentage ratio of developing and developed countries during 2000-2030 (based on GDP per capita) . . . . .	21
<b>10</b>	<b>The GDP per capita of different countries in 2020</b>	<b>22</b>
10.1	GDP per capita of top 3 and bottom 3 developing countries in 2020 (including India) . . . .	22

10.2 GDP per capita of top 3 and bottom 3 developed countries in 2020 (including Australia) . . .	23
<b>11 Adjusted Net Enrolment Rate (AER) of India in different educational levels during 2000-2030</b>	<b>24</b>
11.1 The AER of India in different educational levels during 2000-2030 . . . . .	24
<b>12 The population rate of India between different age groups in different educational levels during 2000-2030 (Based on Barro-Lee dataset)</b>	<b>25</b>
12.1 The population rate of India between 20-24 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset) . . . . .	25
12.2 population rate of India between 25-29 age group in different educational levels during 2000-2030	26
12.3 The population rate of India between 30-34 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset) . . . . .	27
12.4 The population rate of India between 35-39 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset) . . . . .	28
<b>13 Capital Expenditure (CapEx) of India in different types of educational institutions during 2000-2030</b>	<b>30</b>
13.1 The CapEx of India in different types of educational institutions during 2000-2030 . . . . .	30
<b>14 The correlation between different factors affecting economic growth of India during 2000-2030</b>	<b>32</b>
14.1 The correlation between different factors affecting economic growth of India during 2000-2030	32
<b>15 Gross Enrolment Ratio (GER) of certain countries in different educational levels in 2010</b>	<b>33</b>
15.1 The GER of certain countries in different educational levels in 2010 . . . . .	33
<b>16 The mean score of students in different scales of PISA during 2000-2015</b>	<b>34</b>
16.1 The number of countries participating in the mean score of students in different scales of PISA according to their income groups during 2000-2015 . . . . .	34
16.2 The mean score of students in different scales of PISA during 2000-2015 . . . . .	35
16.2.1 The mean score of students in mathematics scale of PISA during 2000-2015 . . . . .	35
16.2.2 The mean score of students in science scale of PISA during 2000-2015 . . . . .	36
16.2.3 The mean score of students in reading scale of PISA during 2000-2015 . . . . .	37
16.3 The mean score of top 10 and bottom 10 countries in different scales of PISA in 2015 . . . . .	38
16.3.1 The mean score of top 10 and bottom 10 countries in mathematics scale of PISA in 2015	38
16.3.2 The mean score of top 10 and bottom 10 countries in science scale of PISA in 2015 . .	39
16.3.3 The mean score of top 10 and bottom 10 countries in reading scale of PISA in 2015 .	40



<b>17 The mean score of fourth grade students in different scales of TIMSS during 2000-2015</b>	<b>41</b>
17.1 The number of countries participating in the mean score of fourth grade students in different scales of TIMSS according to their income groups in 2015 . . . . .	41
17.2 The mean score of fourth grade students in different scales of TIMSS during 2000-2015 . . . .	42
17.2.1 The mean score of fourth grade students in mathematics scale of TIMSS during 2000-2015	42
17.2.2 The mean score of fourth grade students in science scale of TIMSS during 2000-2015 .	43
17.3 The mean score of top 10 and bottom 10 countries in different scales of TIMSS in 2015 . . . .	44
17.3.1 The mean score of top 10 and bottom 10 countries in mathematics scale of TIMSS in 2015 . . . . .	44
17.3.2 The mean score of top 10 and bottom 10 countries in science scale of TIMSS in 2015 .	45
<b>18 Conclusion</b>	<b>46</b>
<b>References</b>	<b>47</b>

## List of Figures

1	The number of null values in different columns of the dataframe (df_EdStatsCountry) . . . . .	10
2	The number of null values in different columns of the dataframe (df_EdStatsData) . . . . .	11
3	The number of countries in different regions . . . . .	12
4	The number of countries in different income groups . . . . .	13
5	The population rate of certain countries in low income group during 2005-2014 . . . . .	14
6	The population rate of certain countries in lower middle income group during 2005-2014 . . . . .	15
7	The population rate of certain countries in upper middle income group during 2005-2014 . . . . .	16
8	The population rate of certain countries in high income: nonOECD group during 2005-2014” . . . . .	17
9	The population rate of certain countries in high income: OECD group during 2005-2014 . . . . .	18
10	The population rate of certain countries in combined income group during 2005-2014 . . . . .	20
11	The percentage ratio of developing and developed countries . . . . .	21
12	The GDP per capita of top 3 and bottom 3 developing countries (including India) in 2020 . . . . .	22
13	The GDP per capita of top 3 and bottom 3 developed countries (including Australia) in 2020 . . . . .	23
14	The AER of India in different educational levels during 2000-2030 . . . . .	24
15	The population rate of India between 20-24 age group in different educational levels during 2000-2030 . . . . .	25
16	The population rate of India between 25-29 age group in different educational levels during 2000-2030 . . . . .	26
17	The population rate of India between 30-34 age group in different educational levels during 2000-2030 . . . . .	28
18	The population rate of India between 35-39 age group in different educational levels during 2000-2030 . . . . .	29
19	The CapEx of India in different types of educational institutions during 2000-2030 . . . . .	30
20	The correlation between different factors affecting economic growth of India during 2000-2030 . . . . .	32
21	The GER of certain countries in different educational levels in 2010 . . . . .	33
22	The number of countries participating in the mean score of students in different scales of PISA according to their income groups during 2000-2015 . . . . .	34
23	The mean score of students in mathematics scale of PISA during 2000-2015 . . . . .	35
24	The mean score of students in science scale of PISA during 2000-2015 . . . . .	36
25	The mean score of students in reading scale of PISA during 2000-2015 . . . . .	37
26	The mean score of top 10 and bottom 10 countries in mathematics scale of PISA in 2015 . . . . .	38
27	The mean score of top 10 and bottom 10 countries in science scale of PISA in 2015 . . . . .	39
28	The mean score of top 10 and bottom 10 countries in reading scale of PISA in 2015 . . . . .	40

29	The number of countries participating in the mean score of fourth grade students in different scales of TIMSS according to their income groups during 2000-2015 . . . . .	41
30	The mean score of fourth grade students in mathematics scale of TIMSS during 2000-2015 . .	42
31	The mean score of fourth grade students in science scale of TIMSS during 2000-2015 . . . . .	43
32	The mean score of top 10 and bottom 10 countries in mathematics scale of TIMSS in 2015 . .	44
33	The mean score of top 10 and bottom 10 countries in science scale of TIMSS in 2015 . . . . .	45

# 1 Introduction

The World Bank is an international financial institution that provides loans and grants to the governments of low and middle-income countries for the purpose of pursuing capital projects. The World Bank Group is the largest financier of education in the developing world. The World Bank EdStats (Education Statistics) All Indicator Query holds over 4,000 internationally comparable indicators that describe education access, progression, completion, literacy, teachers, population, and expenditures. The indicators cover the education cycle from pre-primary to vocational and tertiary education and also holds learning outcome data from international and regional learning assessments (e.g. PISA, TIMSS, PIRLS), equity data from household surveys, and projection/attainment data.

In this project, We are going to explore and analyse the data to identify variation of indicators across the globe, which countries are more alike and different.

## 1.1 Problem statement

The data provided by the World Bank EdStats (Education Statistics) are in unformatted manner. The data is corrupted, duplicate and sometimes irrelevant because it's a piled-up data coming from different countries. For doing the analysis on the data, it should be in well organised format.

Various datasets that need to be cleaned are as follows:

- EdStatsCountry
- EdStatsData
- EdStatsSeries
- EdStatsFootNote
- EdStatsCountry\_Series

## 1.2 Objective of the project

The main objective of the analysis is to obtain the meaning full information and facts from the given huge datasets as shown above, by cleaning the datasets, doing a proper analysis and visualization and plotting the useful information into different graph and charts so that the trend and relationship between the various indicators on which the analysis is done can be understand easily. This will also help the World Bank group in taking the future decision based on the past events.

## 2 Literature Survey

Education is a human right, a powerful driver of development, and one of the strongest instruments for reducing poverty and improving health, gender equality, peace, and stability. It delivers large, consistent returns in terms of income, and is the most important factor to ensure equity and inclusion. For individuals, education promotes employment, earnings, health, and poverty reduction. Globally, there is a 9% increase in hourly earnings for every extra year of schooling. For societies, it drives long-term economic growth, spurs innovation, strengthens institutions, and fosters social cohesion.. Reading through many research papers we found that World Bank Group is the largest financier of education in the developing world, working in 90 countries and committed to helping them reach SDG4: access to inclusive and equitable quality education and lifelong learning opportunities for all by 2030. The World Bank EdStats (Education Statistics) All Indicator Query holds over 4,000 internationally comparable indicators that describe education access, progression, completion, literacy, teachers, population, and expenditures. The indicators cover the education cycle from pre-primary to vocational and tertiary education and also holds learning outcome data from international and regional learning assessments (e.g. PISA, TIMSS, PIRLS), equity data from household surveys, and projection/attainment data. Our analysis on World Bank global education can help us better understand what could be the possible reason that are responsible for change in indicators on education stats for each and every country on the globe.

### 3 The list of datasets have been provided for analysis

View all the datasets (one by one)

- **EdStatsCountry:** We observe that the shape of the dataset is (241, 32). It contains list of all 241 countries that are present in the data. It has many columns such as - Country Code, Short Name, Table Name, Long Name, 2-alpha code, Special Notes, Region, Income Group, ..., Unnamed: 31.
- **EdStatsData:** We observe that the shape of the dataset is (886930, 70). It contains many columns such as - Country Name, Country Code, Indicator Name, Indicator Code, 1970, 1971, 1972, ..., 2060, after that 2065, 2070, 2075, ... (following same manner) till 2100, Unnamed: 69. Column 2010 has the most amount of data with 242442 (non-null) values, so we will prefer it as base year.
- **EdStatsSeries:** We observe that the shape of the dataset is (3665, 21). It contains many columns such as - Series Code, Topic, Indicator Name, Short definition, ..., Base Period, ..., Unnamed: 20. It contains list of all 3665 indicators.
- **EdStatsFootNote:** We observe that the shape of the dataset is (643638, 5). It contains just 5 columns - CountryCode, SeriesCode, Year, DESCRIPTION, Unnamed: 4. It contains the estimations and uncertainty bounds for each year - looks like some years are missing.
- **EdStatsCountry-Series:** We observe that the shape of the dataset is (613, 4). It contains just 4 columns - CountryCode, SeriesCode, DESCRIPTION, Unnamed: 3. It contains indicators and data sources for certain countries.

**Observation:** After analysing data of all the datasets, we have decided to work with two datasets - EdStatsCountry and EdStatsData.

### 4 The list of indicators and countries have been selected for analysis

#### 4.1 The list of indicators have been selected for analysis

##### 4.1.1 The list of indicators have been selected for Adjusted Net Enrollment Rate (AER) of India in different educational levels during 2000-2030

- Adjusted net enrolment rate, lower secondary, both sexes (%) - UIS.NERA.2
- Adjusted net enrolment rate, lower secondary, female (%) - UIS.NERA.2.F
- Adjusted net enrolment rate, lower secondary, male (%) - UIS.NERA.2.M
- Adjusted net enrolment rate, primary, both sexes (%) - SE.PRM.TENR

- Adjusted net enrolment rate, primary, female (%) - SE.PRM.TENR.FE
- Adjusted net enrolment rate, primary, male (%) - SE.PRM.TENR.MA
- Adjusted net enrolment rate, upper secondary, both sexes (%) - UIS.NERA.3
- Adjusted net enrolment rate, upper secondary, female (%) - UIS.NERA.3.F
- Adjusted net enrolment rate, upper secondary, male (%) - UIS.NERA.3.M

**4.1.2 The list of indicators have been selected for the population rate of India between 20-24 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)**

- Barro-Lee: Percentage of female population age 20-24 with no education - BAR.NOED.2024.FE.ZS
- Barro-Lee: Percentage of female population age 20-24 with primary schooling. Completed Primary - BAR.PRM.CMPT.2024.FE.ZS
- Barro-Lee: Percentage of female population age 20-24 with secondary schooling. Completed Secondary - BAR.SEC.CMPT.2024.FE.ZS
- Barro-Lee: Percentage of female population age 20-24 with tertiary schooling. Completed Tertiary - BAR.TER.CMPT.2024.FE.ZS
- Barro-Lee: Percentage of population age 20-24 with no education - BAR.NOED.2024.ZS
- Barro-Lee: Percentage of population age 20-24 with primary schooling. Completed Primary - BAR.PRM.CMPT.2024.ZS
- Barro-Lee: Percentage of population age 20-24 with secondary schooling. Completed Secondary - BAR.SEC.CMPT.2024.ZS
- Barro-Lee: Percentage of population age 20-24 with tertiary schooling. Completed Tertiary - BAR.TER.CMPT.2024.ZS

**4.1.3 The list of indicators have been selected for the population rate of India between 25-29 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)**

- Barro-Lee: Percentage of female population age 25-29 with no education - BAR.NOED.2529.FE.ZS
- Barro-Lee: Percentage of female population age 25-29 with primary schooling. Completed Primary - BAR.NOED.2529.ZS
- Barro-Lee: Percentage of female population age 25-29 with secondary schooling. Completed Secondary - BAR.PRM.CMPT.2529.FE.ZS

- Barro-Lee: Percentage of female population age 25-29 with tertiary schooling. Completed Tertiary - BAR.PRM.CMPT.2529.ZS
- Barro-Lee: Percentage of population age 25-29 with no education - BAR.SEC.CMPT.2529.FE.ZS
- Barro-Lee: Percentage of population age 25-29 with primary schooling. Completed Primary - BAR.SEC.CMPT.2529.ZS
- Barro-Lee: Percentage of population age 25-29 with secondary schooling. Completed Secondary - BAR.TER.CMPT.2529.FE.ZS
- Barro-Lee: Percentage of population age 25-29 with tertiary schooling. Completed Tertiary - BAR.TER.CMPT.2529.ZS

**4.1.4 The list of indicators have been selected for the population rate of India between 30-34 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)**

- Barro-Lee: Percentage of female population age 30-34 with no education - BAR.NOED.3034.FE.ZS
- Barro-Lee: Percentage of female population age 30-34 with primary schooling. Completed Primary - BAR.PRM.CMPT.3034.FE.ZS
- Barro-Lee: Percentage of female population age 30-34 with secondary schooling. Completed Secondary - BAR.SEC.CMPT.3034.FE.ZS
- Barro-Lee: Percentage of female population age 30-34 with tertiary schooling. Completed Tertiary - BAR.TER.CMPT.3034.FE.ZS
- Barro-Lee: Percentage of population age 30-34 with no education - BAR.NOED.3034.ZS
- Barro-Lee: Percentage of population age 30-34 with primary schooling. Completed Primary - BAR.PRM.CMPT.3034.ZS
- Barro-Lee: Percentage of population age 30-34 with secondary schooling. Completed Secondary - BAR.SEC.CMPT.3034.ZS
- Barro-Lee: Percentage of population age 30-34 with tertiary schooling. Completed Tertiary - BAR.TER.CMPT.3034.ZS

**4.1.5 The list of indicators have been selected for the population rate of India between 35-39 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)**

- Barro-Lee: Percentage of female population age 35-39 with no education - BAR.NOED.3539.FE.ZS



- Barro-Lee: Percentage of female population age 35-39 with primary schooling. Completed Primary - BAR.PRM.CMPT.3539.FE.ZS
- Barro-Lee: Percentage of female population age 35-39 with secondary schooling. Completed Secondary - BAR.SEC.CMPT.3539.FE.ZS
- Barro-Lee: Percentage of female population age 35-39 with tertiary schooling. Completed Tertiary - BAR.TER.CMPT.3539.FE.ZS
- Barro-Lee: Percentage of population age 35-39 with no education - BAR.NOED.3539.ZS
- Barro-Lee: Percentage of population age 35-39 with primary schooling. Completed Primary - BAR.PRM.CMPT.3539.ZS
- Barro-Lee: Percentage of population age 35-39 with secondary schooling. Completed Secondary - BAR.SEC.CMPT.3539.ZS
- Barro-Lee: Percentage of population age 35-39 with tertiary schooling. Completed Tertiary - BAR.TER.CMPT.3539.ZS

#### **4.1.6 The list of indicators have been selected for Capital Expenditure (CapEx) of India in different types of educational institutions during 2000-2030**

- Capital expenditure as % of total expenditure in lower secondary public institutions (%) - UIS.XSPENDP.2.FDPUB.FNCAP
- Capital expenditure as % of total expenditure in primary public institutions (%) - UIS.XSPENDP.1.FDPUB.FNCAP
- Capital expenditure as % of total expenditure in public institutions (%) - UIS.XSPENDP.FDPUB.FNCAP
- Capital expenditure as % of total expenditure in secondary public institutions (%) - UIS.XSPENDP.23.FDPUB.FNCAP
- Capital expenditure as % of total expenditure in tertiary public institutions (%) - UIS.XSPENDP.56.FDPUB.FNCAP
- Capital expenditure as % of total expenditure in upper-secondary public institutions (%) - UIS.XSPENDP.3.FDPUB.FNCAP

#### **4.1.7 The list of indicators have been selected for the correlation between different factors affecting economic growth of India during 2000-2030**

- Barro-Lee: Percentage of population age 20-24 with no education - BAR.NOED.2024.ZS
- Barro-Lee: Percentage of population age 25-29 with no education - BAR.NOED.2529.ZS
- Barro-Lee: Percentage of population age 30-34 with no education - BAR.NOED.3034.ZS
- Barro-Lee: Percentage of population age 35-39 with no education - BAR.NOED.3539.ZS
- Internet users (per 100 people) - IT.NET.USER.P2
- Personal computers (per 100 people) - IT.CMP.PCMP.P2
- Population growth (annual %) - SP.POP.GROW

#### **4.2 The list of countries have been selected for analysis**

##### **4.2.1 The list of countries have been selected for the population rate in low income group during 2005-2014**

- Afghanistan
- Bangladesh
- Nepal
- Zimbabwe
- Myanmar

##### **4.2.2 The list of countries have been selected for the population rate in lower middle income group during 2005-2014**

- India
- Sri Lanka
- Pakistan
- Bhutan
- Indonesia

**4.2.3 The list of countries have been selected for the population rate in upper middle income group during 2005-2014**

- China
- Brazil
- South Africa
- Thailand
- Malaysia

**4.2.4 The list of countries have been selected for the population rate of in high income: nonOECD group during 2005-2014**

- Saudi Arabia
- Singapore
- United Arab Emirates
- Kuwait
- Oman

**4.2.5 The list of countries have been selected for the population rate in high income: OECD group during 2005-2014**

- Australia
- Canada
- Japan
- United Kingdom
- United States

**4.2.6 The list of countries have been selected for the population rate in combined income group during 2005-2014**

- India
- China
- United States

- Oman
- Nepal

#### 4.2.7 The country have been selected which comes under developing country or developed country (based on GDP per capita)?

- India

#### 4.2.8 The list of countries have been selected for the GER in different educational levels in 2010

- India - IND
- Nepal - NPL
- Pakistan - PAK
- China - CHN
- Bangladesh - BGD

## 5 The list of Python libraries used for analysis

- **Pandas:** Pandas is an open-source library that is made mainly for working with relational or labeled data both easily and intuitively. It provides various data structures and operations for manipulating numerical data and time series. It is used for data analysis, manipulation and cleaning.
- **NumPy:** NumPy is one of the most widely used open-source Python libraries, focusing on scientific computation. It features built-in mathematical functions for quick computation and supports big matrices and multidimensional data. It can be used in linear algebra, as a multi-dimensional container for generic data and as a random number generator, among other things.
- **Matplotlib:** Matplotlib is a comprehensive library for creating static, animated and interactive visualizations in Python. Matplotlib makes easy things easy and hard things possible.
- **Seaborn:** Seaborn is a library for making statistical graphics in Python. Seaborn helps you explore and understand your data. Its plotting functions operate on dataframes and arrays containing whole datasets and internally perform the necessary semantic mapping and statistical aggregation to produce informative plots.

## 6 The number of missing values (NaN) in different columns of the dataframe df\_EdStatsCountry and df\_EdStatsData

After analysing data of all the datasets, we have decided to work with two datasets - EdStatsCountry and EdStatsData.

### 6.1 The number of missing values (NaN) in different columns of the dataframe (df\_EdStatsCountry)

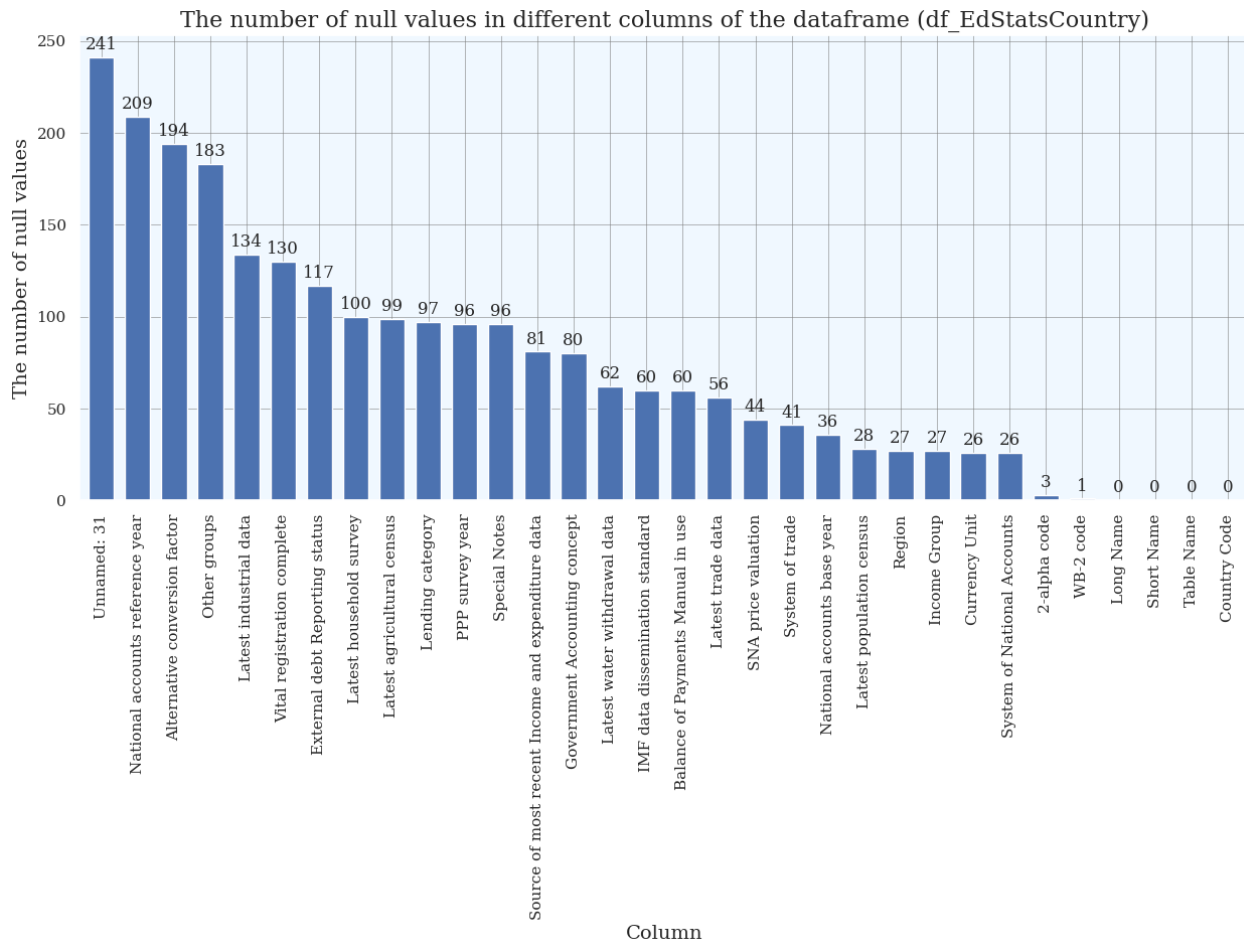


Figure 1: The number of null values in different columns of the dataframe (df\_EdStatsCountry)

**Observation:** We observe that the columns of the dataframe (df\_EdStatsCountry) which have the maximum number of missing values (NaN) are – Unnamed: 31, National accounts reference year, Alternative conversion factor, Other groups, Latest industrial data, Vital registration complete and some others also.

## 6.2 The number of missing values (NaN) in different columns of the dataframe (df\_EdStatsData)

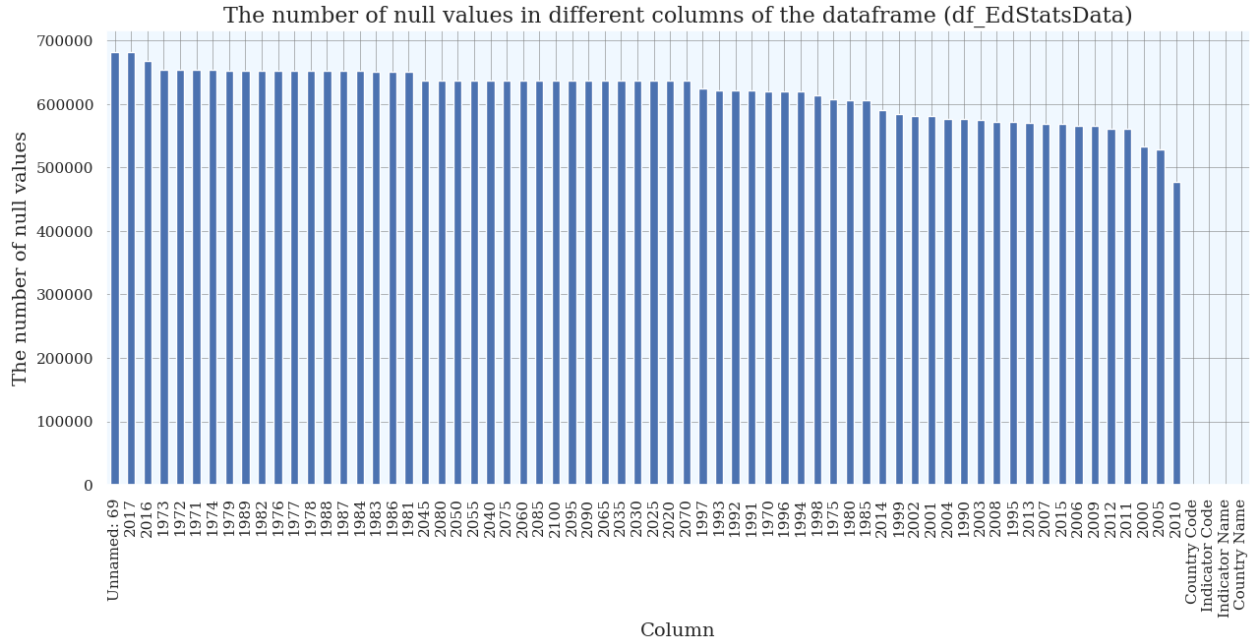


Figure 2: The number of null values in different columns of the dataframe (df\_EdStatsData)

**Observation:** We observe that the columns of the dataframe (df\_EdStatsData) which have the maximum number of missing values (NaN) are - Unnamed: 69, 2017, 2016, 1971, 1973, 1972, ..., and some other year columns also. Most of the year columns are having missing values (NaN).

We will fill these missing values by using `bfill()` and `ffill()` function.

## 7 The number of countries according to their regions and income groups

### 7.1 The number of countries according to their regions

**Observations:** The number of countries according to their regions

- We observe that Europe & Central Asia region has maximum countries and North America region has minimum countries.
- We observe that Sub-Saharan Africa region has 48 countries, Latin America & Caribbean region has 41 countries, East Asia & Pacific region has 36 countries, Middle East & North Africa region has 21 countries and South Asia region has 8 countries.

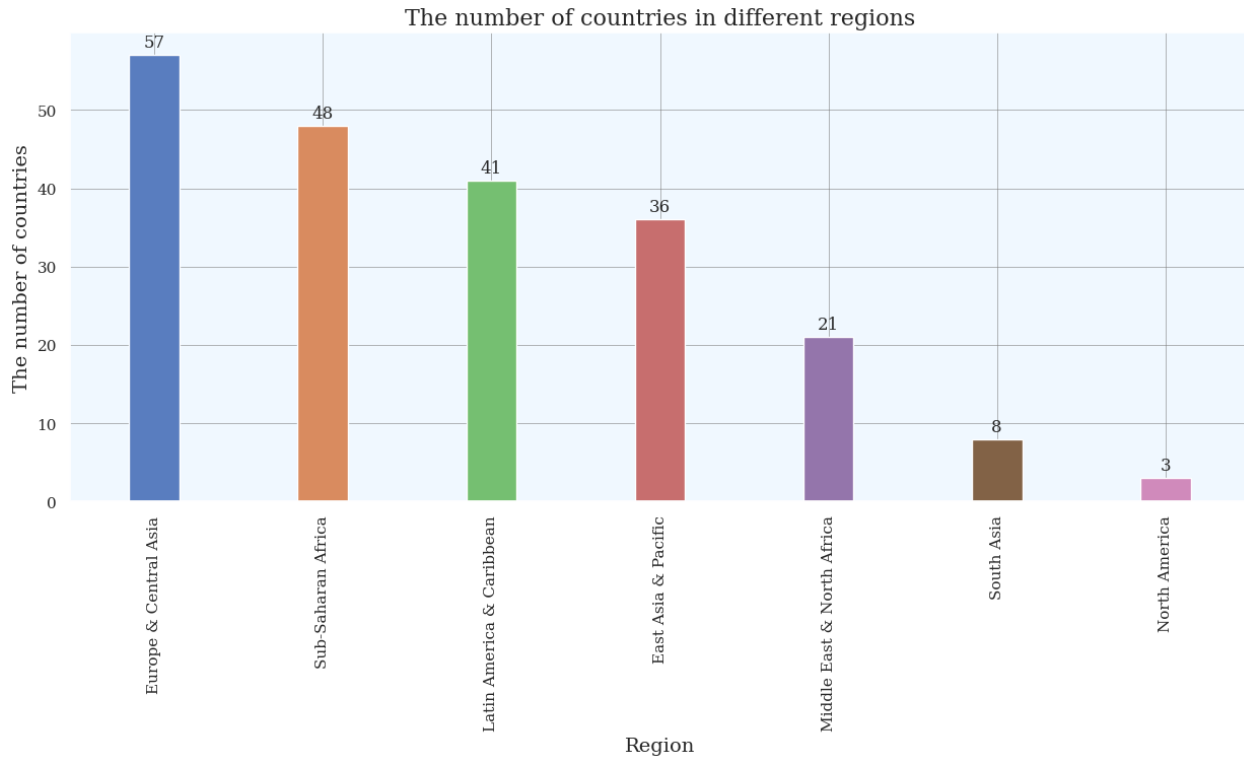


Figure 3: The number of countries in different regions

## 7.2 The number of countries according to their income groups

**Observations:** The number of countries according to their income groups

- We observe that upper middle income group has maximum countries and high income: OECD group has minimum countries.
- We observe that lower middle income group has 50 countries, high income: nonOECD group has 44 countries and low income group has 34 countries.

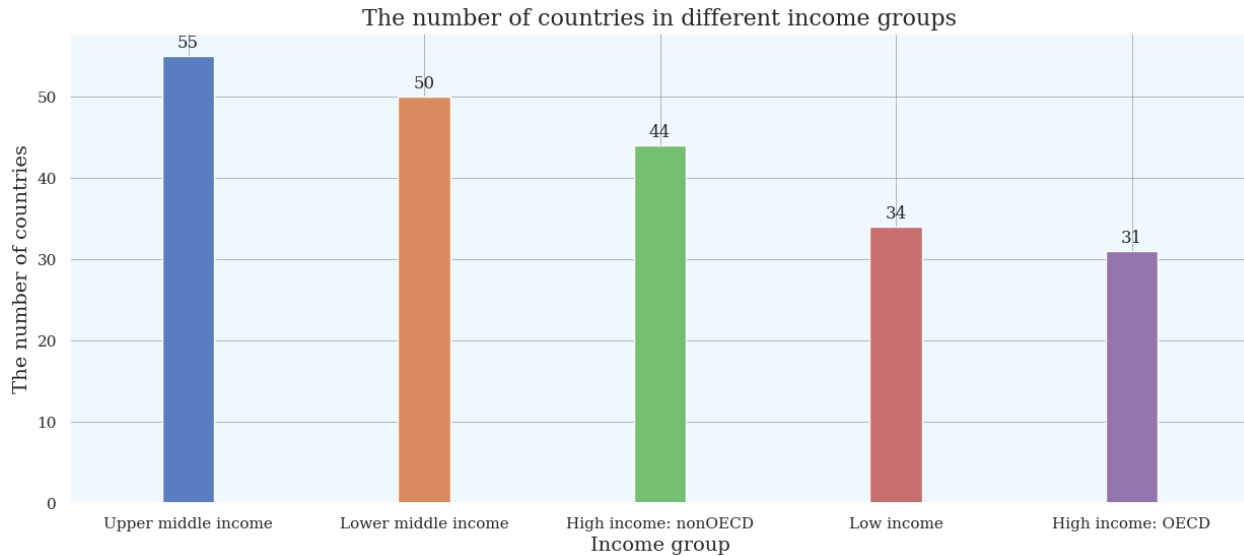


Figure 4: The number of countries in different income groups

## 8 The population rate of different countries in their income groups during 2005-2014

**Population Rate** - It is the rate of change of population size, for a given country, territory or geographic area during a specified period. It expresses the ratio between the annual increase in the population size and the total population for that year, usually multiplied by 100. The annual increase in the population size is defined as a sum of differences: the difference between births less deaths and the difference between immigrants less emigrants, in a given country, territory or geographic area at a given year.

Population majorly affects the education and literacy. Rapid growth of population increases the rate of illiteracy and poverty. It also increases the disparity between rich and poor countries in their socio- economic as well as general life.

### 8.1 The population rate of certain countries in low income group during 2005-2014

**Observations:** The population rate of certain countries in low income group during 2005-2014

- **Afghanistan:** We observe a decline during 2005-2008 and incline during 2008-2012. It becomes constant during 2012-2013 and falls during 2013-2014.
- **Bangladesh:** We observe a decline during 2005-2008 and become constant during 2008-2010. It inclines during 2010-2011 and becomes stable during 2011-2014.
- **Myanmar:** We observe a decline during 2005-2006 and become constant during 2006-2007. It falls



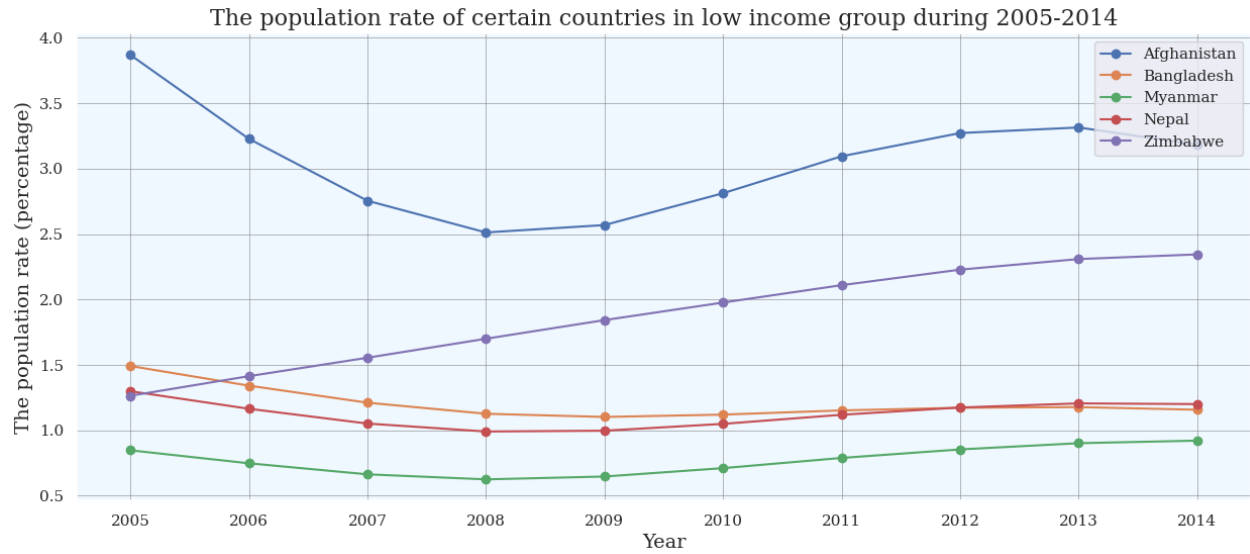


Figure 5: The population rate of certain countries in low income group during 2005-2014

during 2007-2008 and becomes stable during 2008-2009. It inclines during 2009-2012 and again becomes constant during 2012-2014.

- **Nepal:** We observe a decline during 2005-2008 and become constant during 2008-2010. It inclines during 2010-2012 and becomes stable during 2012-2014.
- **Zimbabwe:** We observe an incline during 2005-2013 and become constant during 2013-2014.

## 8.2 The population rate of certain countries in lower middle income group during 2005-2014

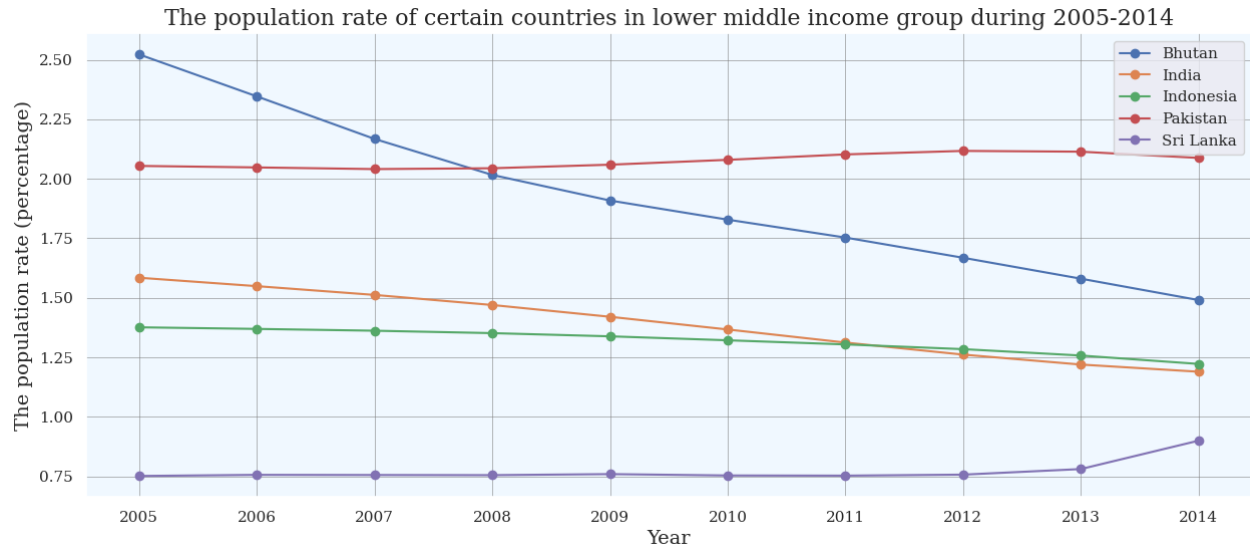


Figure 6: The population rate of certain countries in lower middle income group during 2005-2014

**Observations:** The population rate of certain countries in lower middle income group during 2005-2014

- **Bhutan:** We observe a decline during 2005-2010 and become constant during 2010-2011. It falls during 2011-2014.
- **India:** We observe a decline during 2005-2006 and become constant during 2006-2008. It falls during 2008-2009 and becomes stable during 2009-2010. It goes down during 2010-2011 and again becomes constant during 2011-2012. It decreases during 2012-2013 and again becomes stable during 2013-2014.
- **Indonesia:** We observe a constant trend during 2005-2008 and decline during 2008-2009. It becomes stable during 2009-2013 and falls during 2013-2014.
- **Pakistan:** We observe a decline during 2005-2006 and become constant during 2006-2008. It inclines during 2008-2009 and becomes stable during 2009-2014.
- **Sri Lanka:** We observe a constant trend during 2005-2013 and incline during 2013-2014.

### 8.3 The population rate of certain countries in upper middle income group during 2005-2014

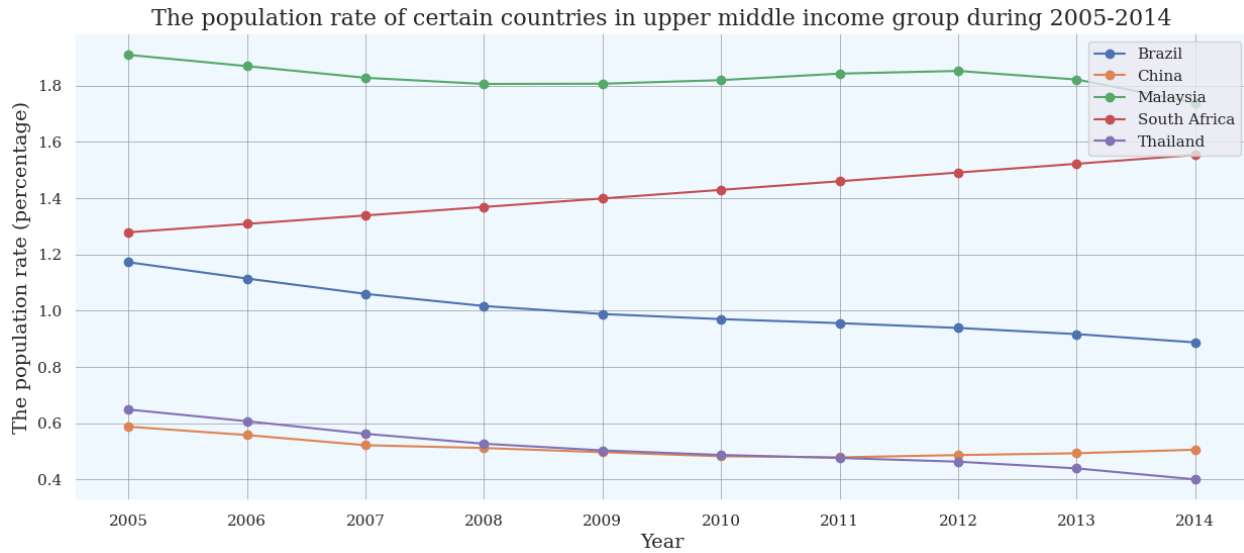


Figure 7: The population rate of certain countries in upper middle income group during 2005-2014

**Observations:** The population rate of certain countries in upper middle income group during 2005-2014

- **Brazil:** We observe a decline during 2005-2006 and becomes constant during 2006-2007. It falls during 2007-2008 and becomes stable during 2008-2011. It goes down during 2011-2012 and again becomes constant during 2012-2014.
- **China:** We observe a constant trend during 2005-2006 and decline during 2006-2007. It becomes stable during 2007-2014.
- **Malaysia:** We observe a constant trend during 2005-2006 and decline during 2006-2007. It becomes stable during 2007-2011 and inclines during 2011-2012. It falls during 2012-2014.
- **South Africa:** We observe a constant trend during 2005-2007 and incline during 2007-2008. It becomes stable during 2008-2010 and climbs up during 2010-2011. Once again it becomes stable during 2011-2013 and goes up during 2013-2014.
- **Thailand:** We observe a constant trend during 2005-2007 and decline during 2007-2008. It becomes stable during 2008-2012 and falls during 2012-2013. Once again it becomes constant during 2013-2014.

## 8.4 The population rate of certain countries in high income: nonOECD group during 2005-2014

**High Income: nonOECD Group** - The income group, which belong to the countries that have high income but not a member of the Organisation of Economic Co-operation and Development according to the World Bank, such a group is called High Income: nonOECD Group.

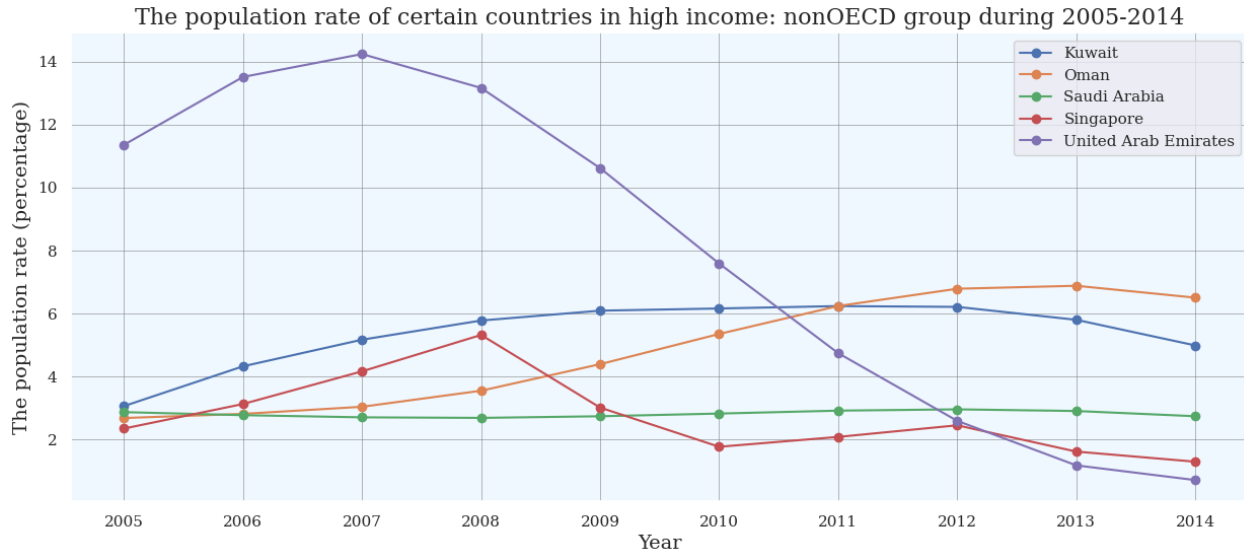


Figure 8: The population rate of certain countries in high income: nonOECD group during 2005-2014”

**Observations:** The population rate of certain countries in high income: nonOECD group during 2005-2014

- **Kuwait:** We observe an incline during 2005-2010 and become constant during 2010-2012. It declines during 2012-2014.
- **Oman:** We observe an incline during 2005-2013 and decline during 2013-2014.
- **Saudi Arabia:** We observe a decline during 2005-2007 and become constant during 2007-2009. It inclines during 2009-2012 and falls during 2012-2014.
- **Singapore:** We observe an incline during 2005-2008 and decline during 2008-2010. It goes up during 2010-2012 and falls during 2012-2014.
- **United Arab Emirates:** We observe an incline during 2005-2007 and decline during 2007-2014.

## 8.5 The population rate of certain countries in high income: OECD group during 2005-2014

**High Income: OECD Group** - The income group, which belong to the countries that are both high income and members of the Organisation of Economic Co-operation and Development according to the World Bank, such a group is called High Income: OECD Group.

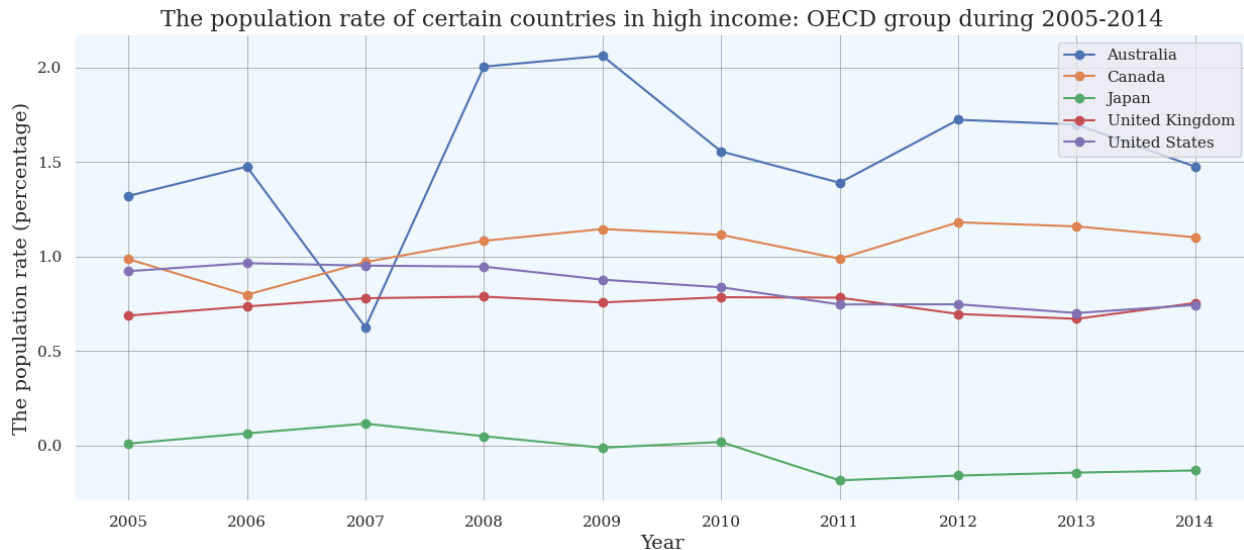


Figure 9: The population rate of certain countries in high income: OECD group during 2005-2014

**Observations:** The population rate of certain countries in high income: OECD group during 2005-2014

- **Australia:** We observe an incline during 2005-2006 and decline during 2006-2007. It climbs up during 2007-2009 and falls during 2009-2011. It increases during 2011-2012 and becomes constant during 2012-2013. It goes down during 2013-2014.
- **Canada:** We observe a decline during 2005-2006 and incline during 2006-2008. It becomes constant during 2008-2010 and falls during 2010-2011. It goes up during 2011-2012 and becomes stable during 2012-2013. It goes down during 2013-2014.
- **Japan:** We observe an incline during 2005-2006 and become constant during 2006-2007. It declines during 2007-2011 and becomes stable during 2011-2012. It goes up during 2012-2013 and again becomes constant during 2013-2014.
- **United Kingdom:** We observe a constant trend during 2005-2006 and incline during 2006-2007. It becomes stable during 2007-2011 and declines during 2011-2012. Once again it becomes constant during 2012-2013 and goes up during 2013-2014.

- **United States:** We observe an incline during 2005-2006 and becomes constant during 2006-2007. It declines during 2007-2008 and becomes stable during 2008-2009. It falls during 2009-2011 and again becomes constant during 2011-2014.

## 8.6 The population rate of certain countries in combined income group during 2005-2014

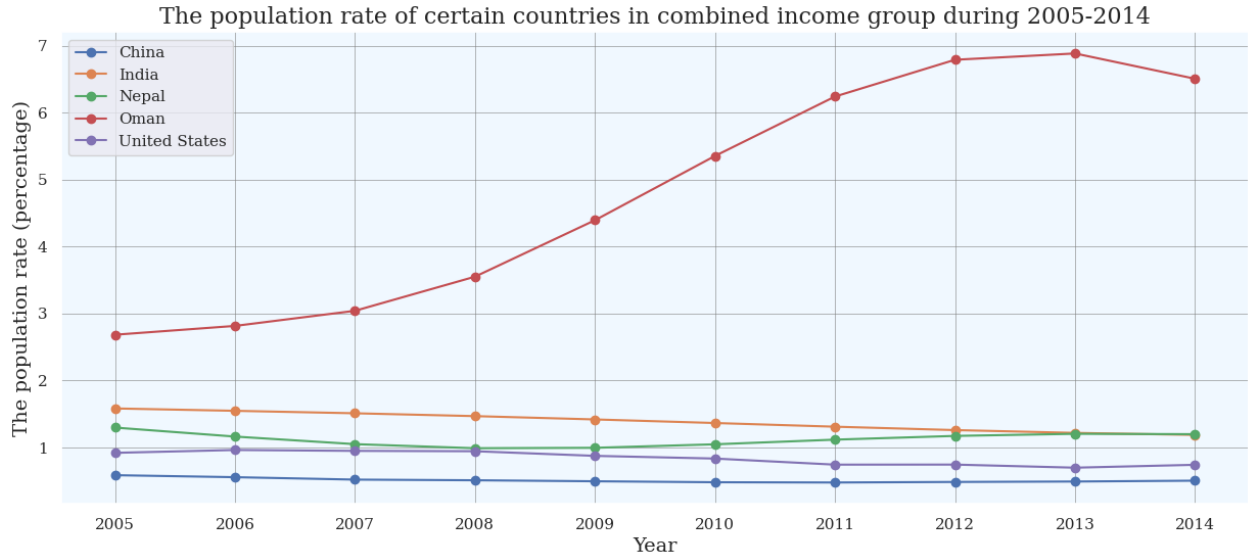


Figure 10: The population rate of certain countries in combined income group during 2005-2014

**Observations:** The population rate of certain countries in combined income group during 2005-2014

- **China:** We observe a constant trend during 2005-2006 and decline during 2006-2007. It becomes stable during 2007-2014.
- **India:** We observe a decline during 2005-2006 and become constant during 2006-2008. It falls during 2008-2009 and becomes stable during 2009-2010. It goes down during 2010-2012 and again becomes constant during 2012-2014.
- **Nepal:** We observe a decline during 2005-2008 and become constant during 2008-2010. It inclines during 2010-2012 and becomes stable during 2012-2014.
- **Oman:** We observe an incline during 2005-2013 and decline during 2013-2014.
- **United States:** We observe an incline during 2005-2006 and become constant during 2006-2007. It declines during 2007-2008 and becomes stable during 2008-2009. It falls during 2009-2011 and again becomes constant during 2011-2014.

## 9 The GDP per capita of different countries during 2000-2030

### 9.1 The percentage ratio of developing and developed countries during 2000-2030 (based on GDP per capita)

The percentage ratio of developing and developed countries

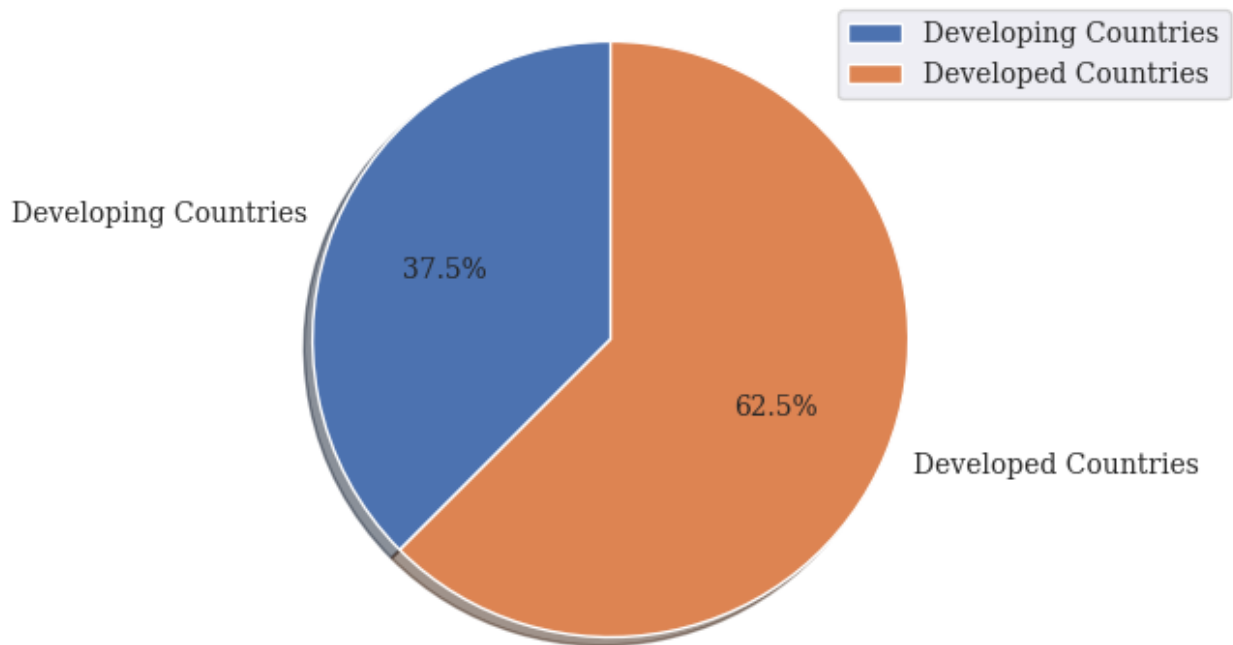


Figure 11: The percentage ratio of developing and developed countries

**Observations:** The percentage ratio of developing and developed countries during 2000-2030 (based on GDP per capita)

- The percentage ratio of developing countries is 37.5%
- The percentage ratio of developed countries is 62.5%
- The percentage ratio of developing countries is less than the percentage ratio of developed countries.



## 10 The GDP per capita of different countries in 2020

### 10.1 GDP per capita of top 3 and bottom 3 developing countries in 2020 (including India)

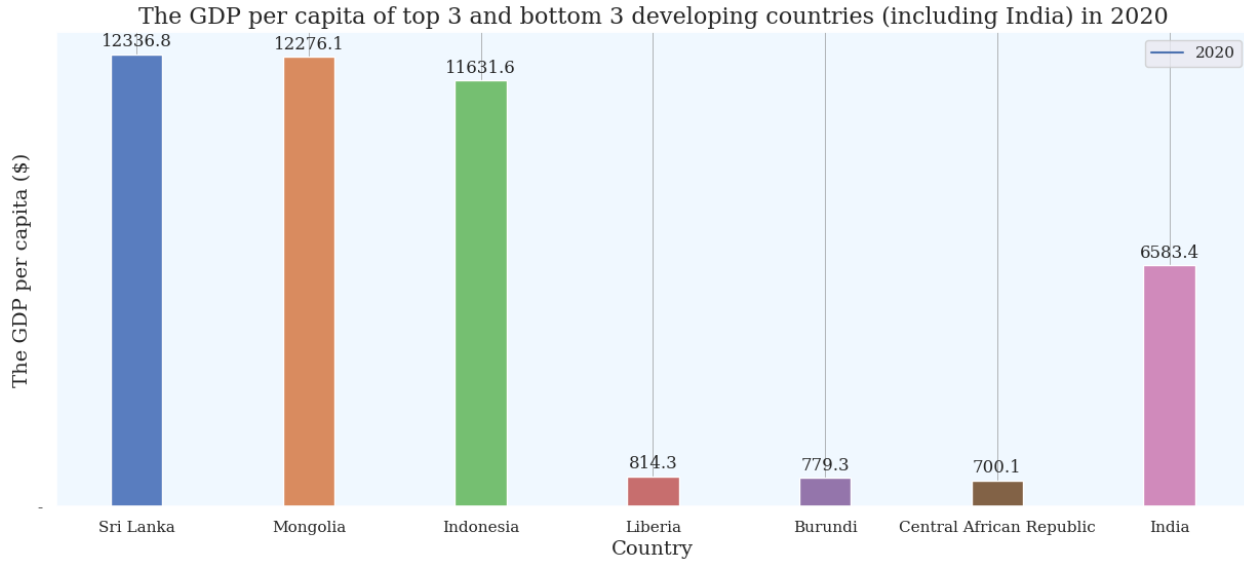


Figure 12: The GDP per capita of top 3 and bottom 3 developing countries (including India) in 2020

**Observations:** The GDP per capita of top 3 and bottom 3 developing countries (including India) in 2020

#### GDP per capita of top 3 developing countries

- We observe that Sri Lanka has the highest GDP per capita and Indonesia has the lowest GDP per capita in top 3 developing countries in 2020.
- We observe that out of top 3 developing countries, all 3 are Asian countries.

#### GDP per capita of bottom 3 developing countries

- We observe that Liberia has the highest GDP per capita and Central African Republic has the lowest GDP per capita in bottom 3 developing countries (including India) in 2020.
- We observe that out of bottom 3 developing countries (including India), all 3 are African countries and India is the only Asian country.

## 10.2 GDP per capita of top 3 and bottom 3 developed countries in 2020 (including Australia)

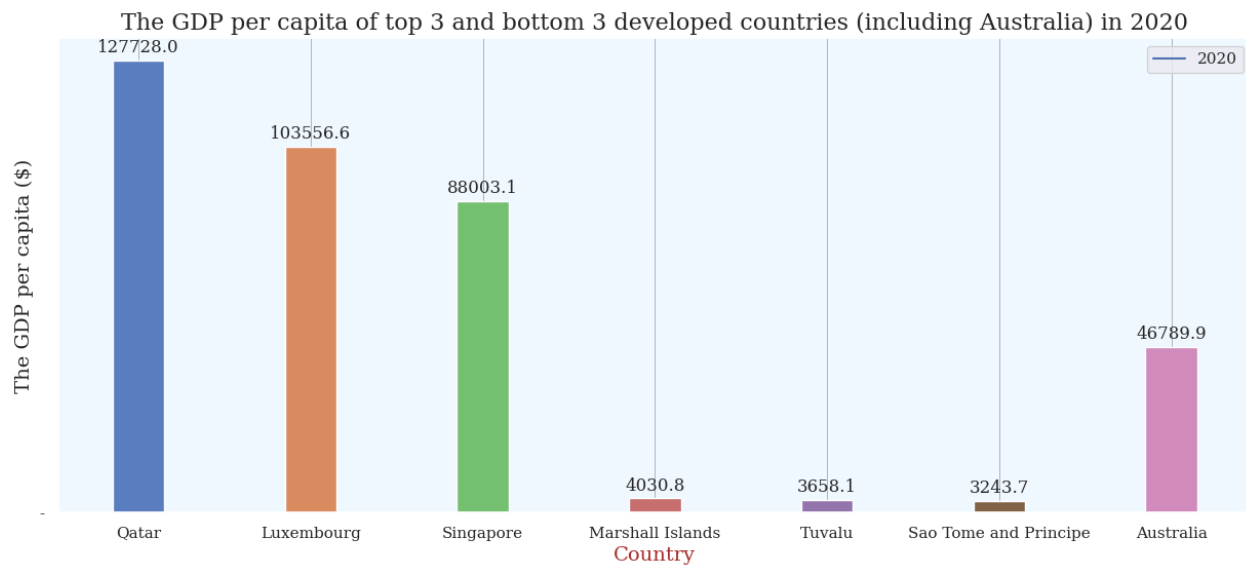


Figure 13: The GDP per capita of top 3 and bottom 3 developed countries (including Australia) in 2020

**Observations:** The GDP per capita of top 3 and bottom 3 developed countries (including Australia) in 2020

### GDP per capita of top 3 developed countries

- We observe that Qatar has the highest GDP per capita and Singapore has the lowest GDP per capita in top 3 developed countries in 2020.
- We observe that out of top 3 countries, Qatar is Middle Eastern country, Luxembourg is European country and Singapore is the only Asian country.

### GDP per capita of bottom 3 developed countries

- We observe that Marshall Islands has the highest GDP per capita and Sao Tome and Principe has the lowest GDP per capita in bottom 3 developed countries (including Australia) in 2020.
- We observe that out of bottom 3 countries (including Australia), 3 are Asian countries and Sao Tome and Principe is the only African country.

## 11 Adjusted Net Enrolment Rate (AER) of India in different educational levels during 2000-2030

**Adjusted Net Enrolment Rate (AER)** - Adjusted net enrolment rate in primary education is calculated by dividing the number of children in the official primary school age who are enrolled in primary or secondary education by the population of the same age group and multiplying by 100.

### 11.1 The AER of India in different educational levels during 2000-2030

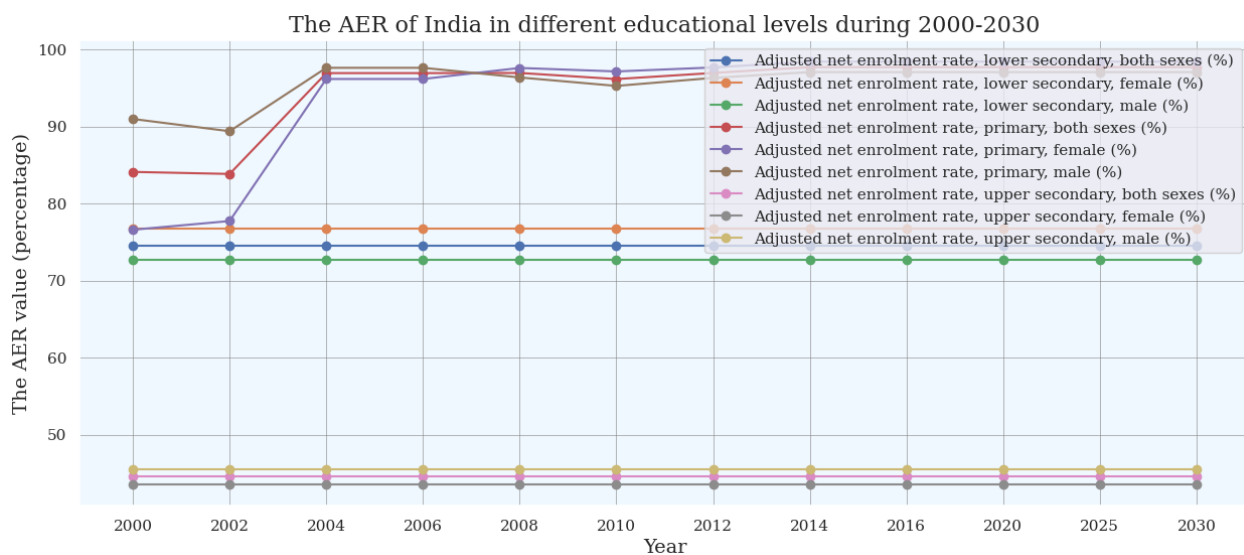


Figure 14: The AER of India in different educational levels during 2000-2030

**Observations:** The AER of India in different educational levels during 2000-2030

- **Lower secondary educational level (both sexes):** We observe a constant trend during 2000-2030.
- **Lower secondary educational level (female):** We observe a constant trend during 2000-2030.
- **Lower secondary educational level (male):** We observe a constant trend during 2000-2030.
- **Primary educational level (both sexes):** We observe a decline during 2000-2002 and incline during 2002-2004. It becomes constant during 2004-2008 and falls during 2008-2010. It goes up during 2010-2014 and becomes stable during 2014-2030.
- **Primary educational level (female):** We observe an incline during 2000-2004 and become constant during 2004-2006. It increases during 2006-2008 and declines during 2008-2010. It goes up during 2010-2014 and becomes stable during 2014-2030.

- **Primary educational level (male):** We observe an decline during 2000-2002 and incline during 2002-2004. It becomes constant during 2004-2006 and falls during 2006-2010. It goes up during 2010-2014 and becomes stable during 2014-2030.
- **Upper secondary educational level (both sexes):** We observe a constant trend during 2000-2030.
- **Upper secondary educational level (female):** We observe a constant trend during 2000-2030.
- **Upper secondary educational level (male):** We observe a constant trend during 2000-2030.

## 12 The population rate of India between different age groups in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

### 12.1 The population rate of India between 20-24 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

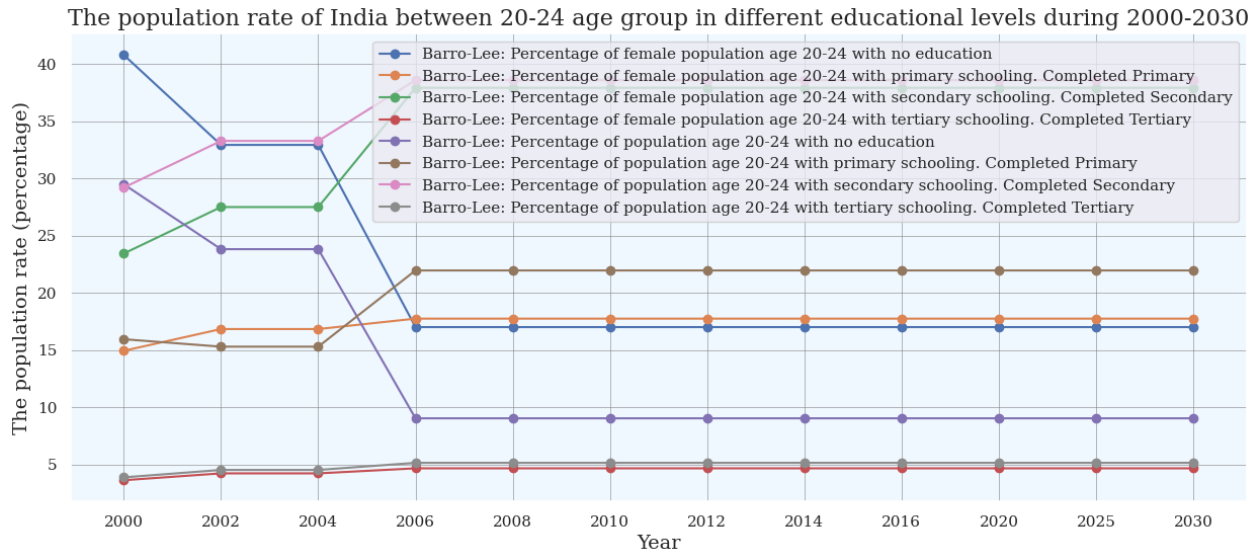


Figure 15: The population rate of India between 20-24 age group in different educational levels during 2000-2030

**Observations:** The population rate of India between 20-24 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

- **No educational level (female):** We observe a decline during 2000-2002 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.

- **Primary educational level (female):** We observe a incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Secondary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **No educational level (both sexes):** We observe a decline during 2000-2002 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Primary educational level (both sexes):** We observe a decline during 2000-2002 and become constant during 2002-2004. It inclines during 2004-2006 and becomes stable during 2006-2030.
- **Secondary educational level (both sexes):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (both sexes):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.

## 12.2 population rate of India between 25-29 age group in different educational levels during 2000-2030

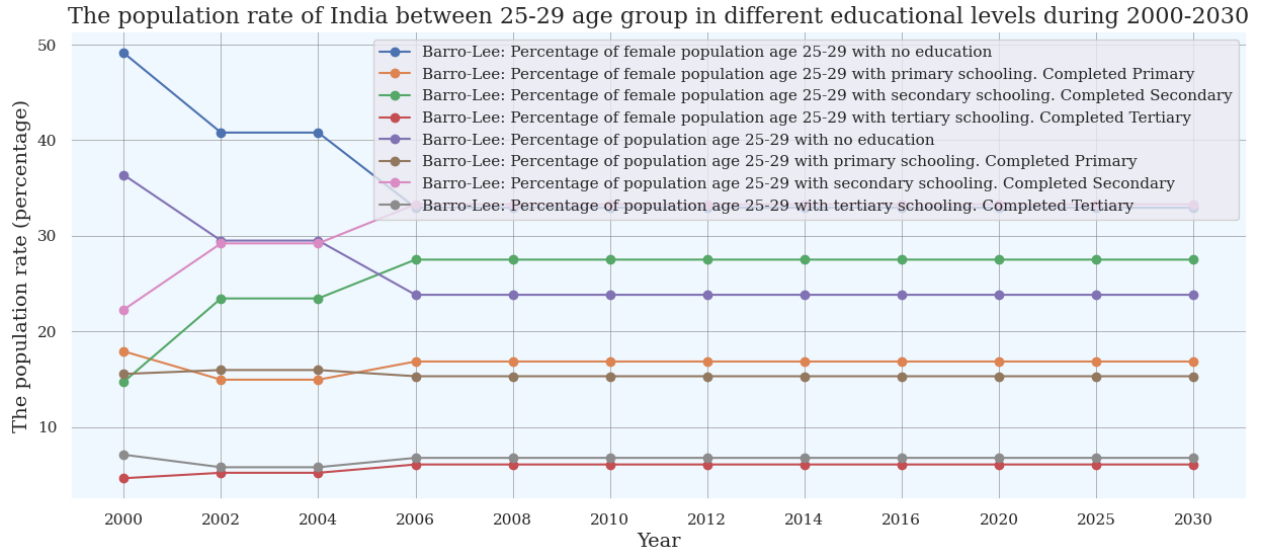


Figure 16: The population rate of India between 25-29 age group in different educational levels during 2000-2030

**Observations:** The population rate of India between 25-29 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

- **No educational level (female):** We observe a decline during 2000-2002 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Primary educational level (female):** We observe a decline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Secondary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **No educational level (both sexes):** We observe a decline during 2000-202 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Primary educational level (both sexes):** We observe an incline during 2000-2002 and becomes constant during 2002-2004. It declines during 2004-2006 and becomes stable during 2006-2030.
- **Secondary educational level (both sexes):** We observe an incline during 2000-2002 and becomes constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (both sexes):** We observe a decline during 2000-2002 and become constant during 2002-2004. It inclines during 2004-2006 and becomes stable during 2006-2030.

### 12.3 The population rate of India between 30-34 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

**Observations:** The population rate of India between 30-34 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

- **No educational level (female):** We observe a decline during 2000-2002 and become constant during 2004-2006. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Primary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It declines during 2004-2006 and becomes stable during 2006-2030.
- **Secondary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.

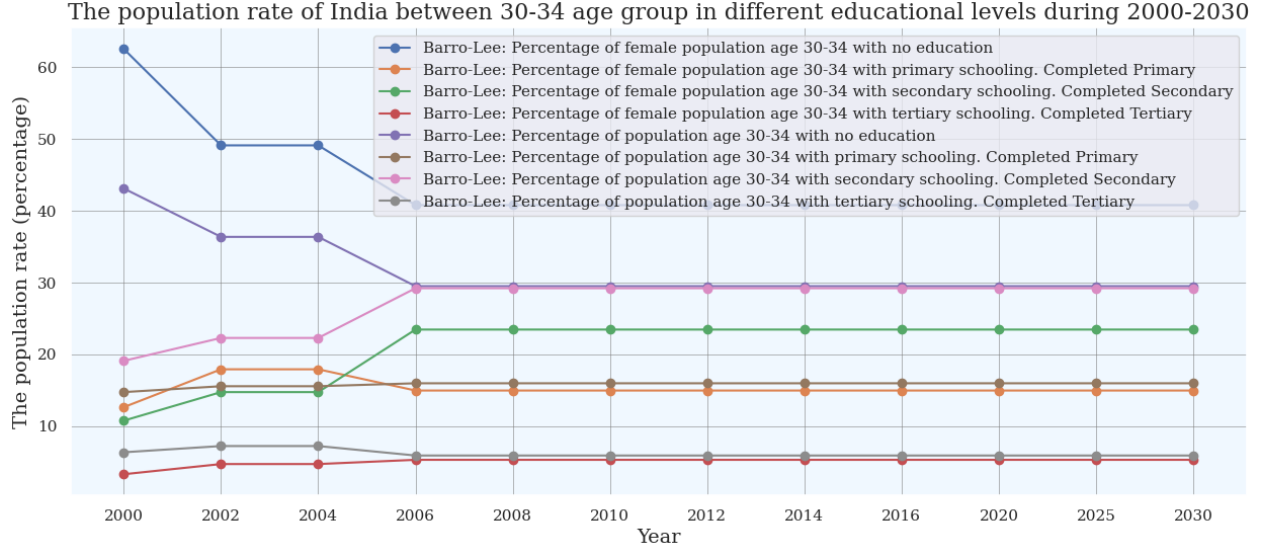


Figure 17: The population rate of India between 30-34 age group in different educational levels during 2000-2030

- **No educational level (both sexes):** We observe a decline during 2000-2002 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Primary educational level (both sexes):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Secondary educational level (both sexes):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (both sexes):** We observe an incline during 2000-2002 and become constant during 2002-2004. It declines during 2004-2006 and becomes stable during 2006-2030.

## 12.4 The population rate of India between 35-39 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

**Observations:** The population rate of India between 35-39 age group in different educational levels during 2000-2030 (Based on Barro-Lee dataset)

- **No educational level (female):** We observe a decline during 2000-2002 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Primary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.

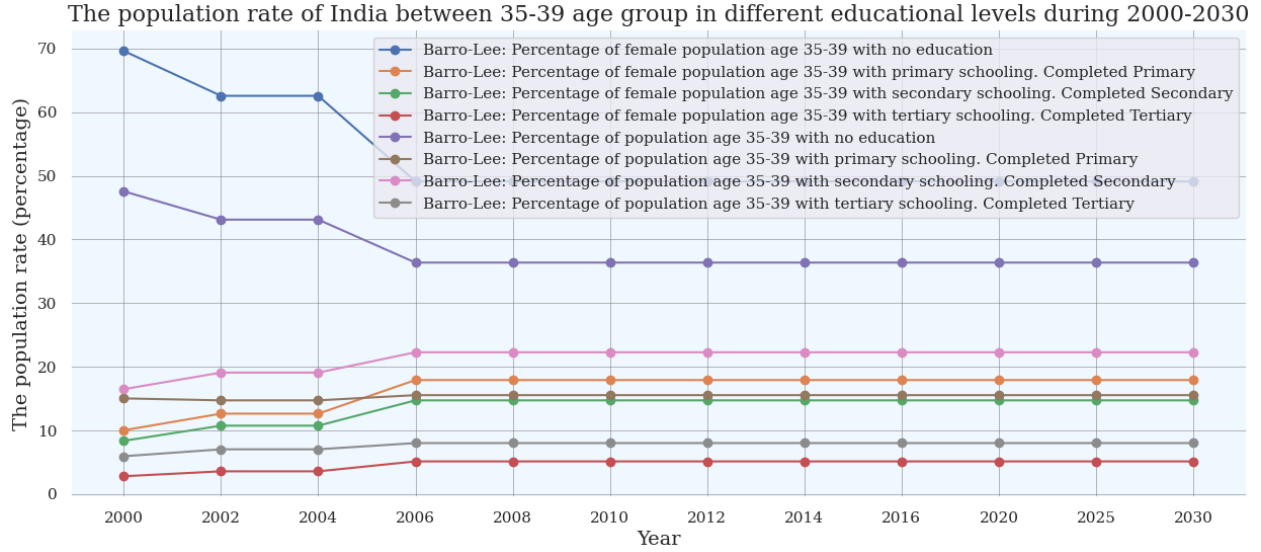


Figure 18: The population rate of India between 35-39 age group in different educational levels during 2000-2030

- **Secondary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (female):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **No educational level (both sexes):** We observe a decline during 2000-2002 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Primary educational level (both sexes):** We observe a decline during 2000-2002 and become constant during 2002-2004. It inclines during 2004-2006 and becomes stable during 2006-2030.
- **Secondary educational level (both sexes):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.
- **Tertiary educational level (both sexes):** We observe an incline during 2000-2002 and become constant during 2002-2004. It goes up during 2004-2006 and becomes stable during 2006-2030.



## 13 Capital Expenditure (CapEx) of India in different types of educational institutions during 2000-2030

**Capital Expenditure (CapEx)** - Expenditure for education goods or assets that yield benefits for a period of more than one year. It includes expenditure for construction, renovation and major repairs of buildings and the purchase of heavy equipment or vehicles. It represents the value of assets acquired or created – i.e. the amount of capital formation – during the year in which the expenditure occurs.

### 13.1 The CapEx of India in different types of educational institutions during 2000-2030

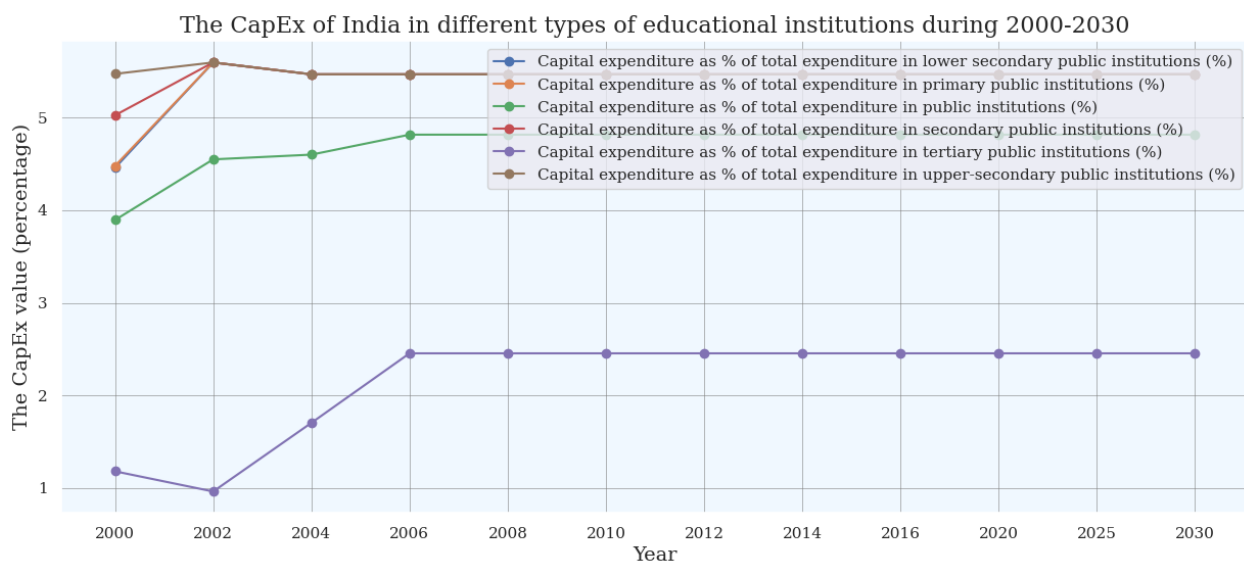


Figure 19: The CapEx of India in different types of educational institutions during 2000-2030

**Observations:** The CapEx of India in different types of educational institutions during 2000-2030

- **Lower secondary public educational institutions:** We observe an incline during 2000-2002 and decline during 2002-2004. It becomes constant during 2004-2030.
- **Primary public educational institutions:** We observe an incline during 2000-2002 and decline during 2002-2004. It becomes constant during 2004-2030.
- **Public educational institutions:** We observe an incline during 2000-2006 and become constant during 2006-2030.
- **Secondary public educational institutions:** We observe an incline during 2000-2002 and decline during 2002-2004. It becomes constant during 2004-2030.

- **Tertiary public educational institutions:** We observe a decline during 2000-2002 and incline during 2002-2006. It becomes constant during 2006-2030.
- **Upper-secondary public educational institutions:** We observe an incline during 2000-2002 and decline during 2002-2004. It becomes constant during 2004-2030.

## 14 The correlation between different factors affecting economic growth of India during 2000-2030

### 14.1 The correlation between different factors affecting economic growth of India during 2000-2030

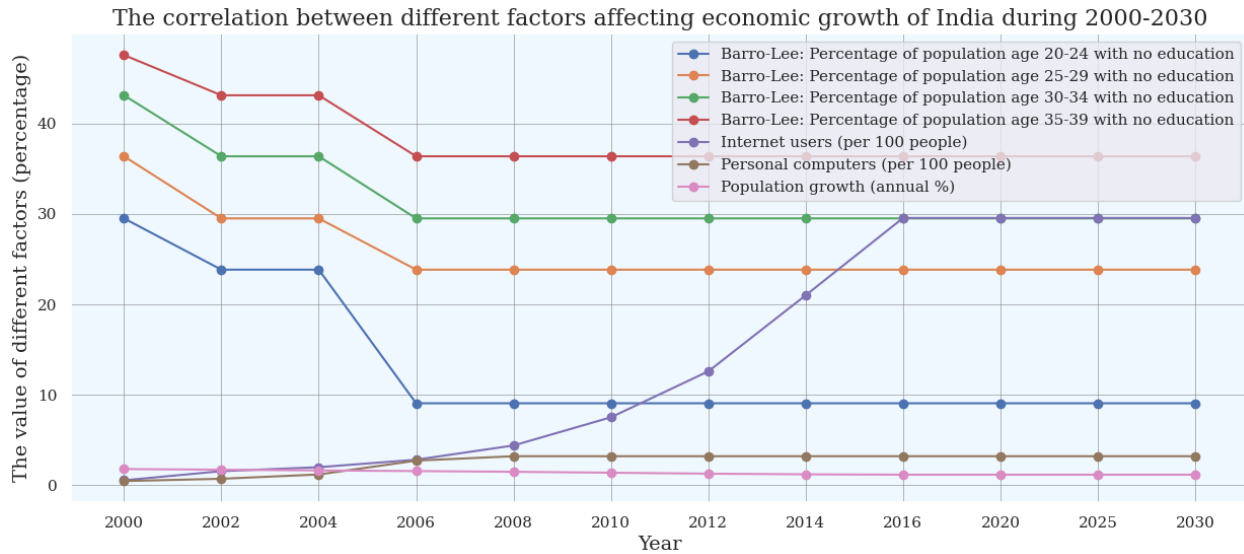


Figure 20: The correlation between different factors affecting economic growth of India during 2000-2030

**Observations:** The correlation between different factors affecting economic growth of India during 2000-2030

- **Population rate between 20-24 age group in no educational level:** We observe a decline during 2000-2002 and become constant during 2002-2004. It falls during 2004-2006 and becomes stable during 2006-2030.
- **Population rate between 25-29 age group in no educational level:** We observe a decline during 2000-2002 and become constant during 2002-2004. It declines during 2004-2006 and becomes stable during 2006-2030.
- **Population rate between 30-34 age group in no educational level:** We observe a decline during 2000-2002 and become constant during 2002-2004. It declines during 2004-2006 and becomes stable during 2006-2030.
- **Population rate between 35-39 age group in no educational level:** We observe a decline during 2000-2002 and become constant during 2002-2004. It declines during 2004-2006 and becomes stable during 2006-2030.

- **Internet users (per 100 people):** We observe an incline during 2000-2016 and become constant during 2016-2030.
- **Personal computers (per 100 people):** We observe an incline during 2000-2008 and become constant during 2008-2030.
- **Population rate:** We observe a decline during 2000-2006 and become constant during 2006-2008. It falls during 2008-2016 and becomes constant during 2016-2030.

## 15 Gross Enrolment Ratio (GER) of certain countries in different educational levels in 2010

**Gross Enrolment Ratio (GER)** - Gross enrolment ratio (GER) is a statistical measure used in the education sector, and formerly by the UN in its Education Index, to determine the number of students enrolled in school at several different grade levels (like elementary, middle school and high school), and use it to show the ratio of the number of students who live in that country to those who qualify for the particular grade level.

### 15.1 The GER of certain countries in different educational levels in 2010

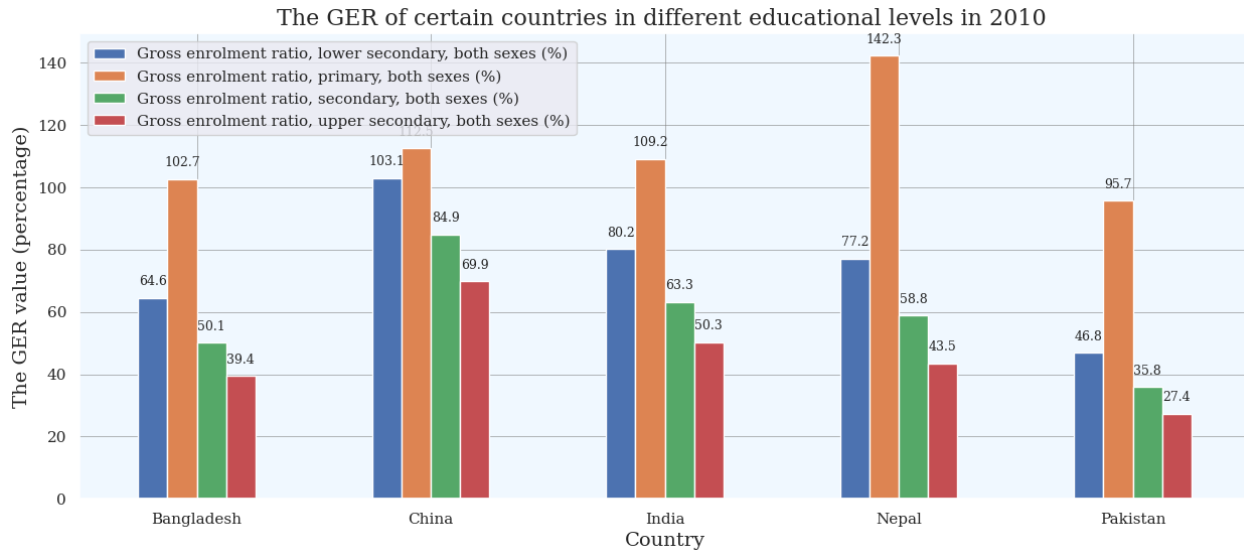


Figure 21: The GER of certain countries in different educational levels in 2010

**Observations:** The GER of certain countries in different educational levels in 2010

- **Lower secondary educational level (both sexes):** We observe an increase from Bangladesh to China and decrease from China to Pakistan.

- **Primary educational level (both sexes):** We observe an increase from Bangladesh to China and decrease from China to India. Again it increases from India to Nepal and reduces from Nepal to Pakistan.
- **Secondary educational level (both sexes):** We observe an increase from Bangladesh to China and decrease from China to Pakistan.
- **Upper secondary educational level (both sexes):** We observe an increase from Bangladesh to China and decrease from China to Pakistan.

## 16 The mean score of students in different scales of PISA during 2000-2015

**PISA** - The Program for International Student Assessment (PISA) is an international assessment that measures 15-year-old students' reading, mathematics, and science literacy every 3 years. First conducted in 2000, the major domain of study rotates between reading, mathematics, and science in each cycle.

### 16.1 The number of countries participating in the mean score of students in different scales of PISA according to their income groups during 2000-2015

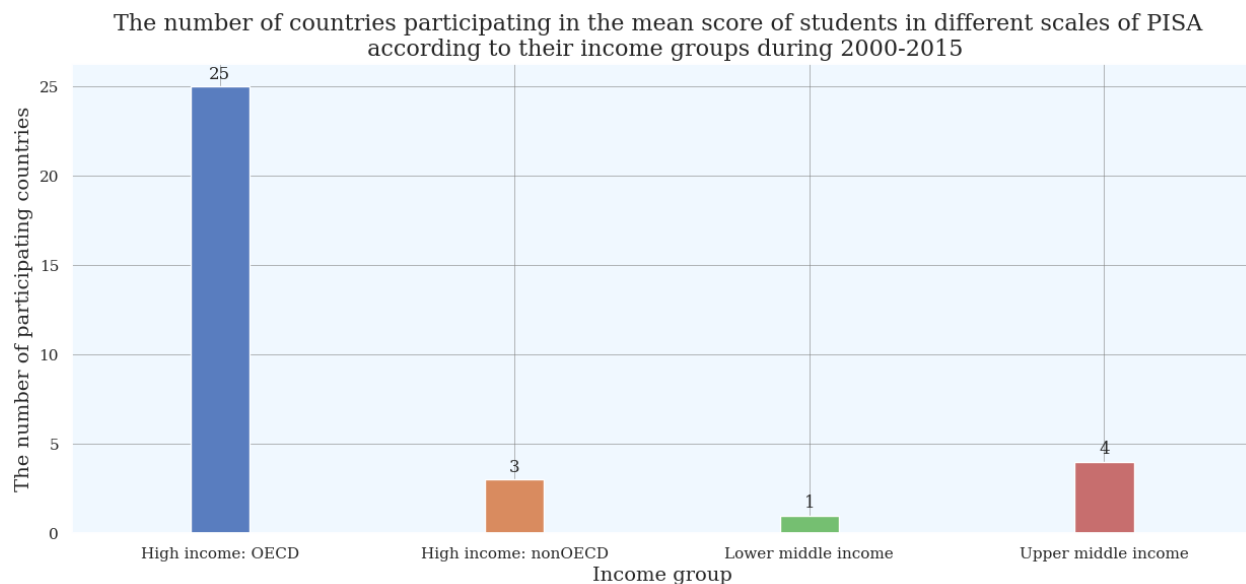


Figure 22: The number of countries participating in the mean score of students in different scales of PISA according to their income groups during 2000-2015

**Observations:** The number of countries participating in the mean score of students in different scales of PISA according to their income groups during 2000-2015

- We observe that high income: OECD group has maximum participating countries and lower middle income group has minimum participating countries in the mean score of students in different scales of PISA during 2000-2015.
- We observe that upper middle income group has 4 participating countries and high income: nonOECD group has 3 participating countries in the mean score of students in different scales of PISA during 2000-2015.

## 16.2 The mean score of students in different scales of PISA during 2000-2015

### 16.2.1 The mean score of students in mathematics scale of PISA during 2000-2015

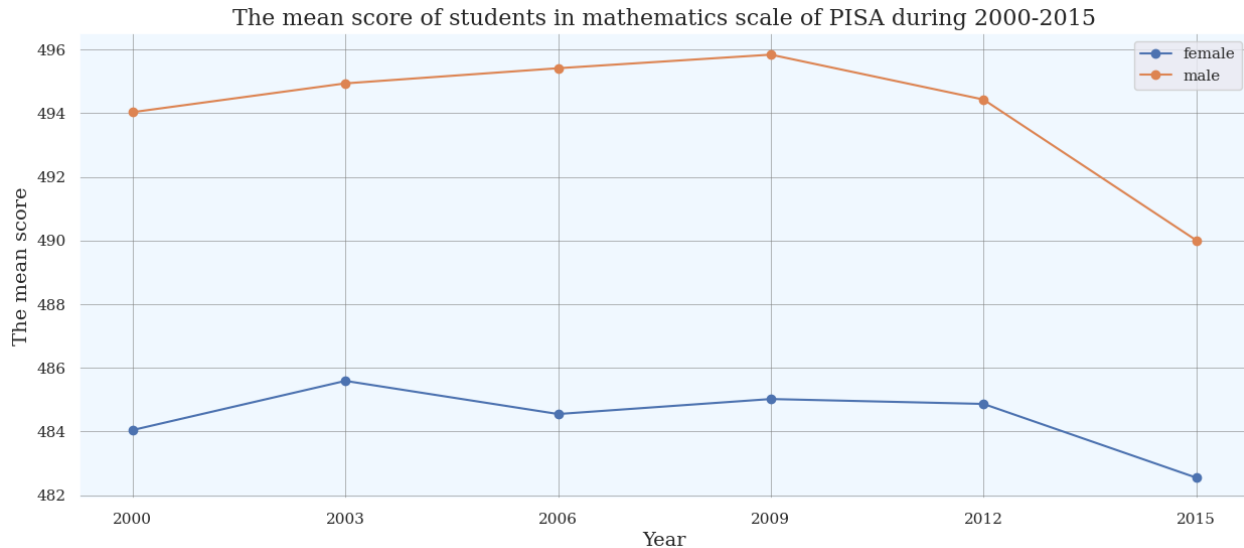


Figure 23: The mean score of students in mathematics scale of PISA during 2000-2015

**Observations:** The mean score of students in mathematics scale of PISA during 2000-2015

- **Students (female):** We observe an incline during 2000-2003 and decline during 2003-2006. It goes up during 2006-2009 and falls during 2009-2015.
- **Students (male):** We observe an incline during 2000-2009 and decline during 2009-2015.

### 16.2.2 The mean score of students in science scale of PISA during 2000-2015

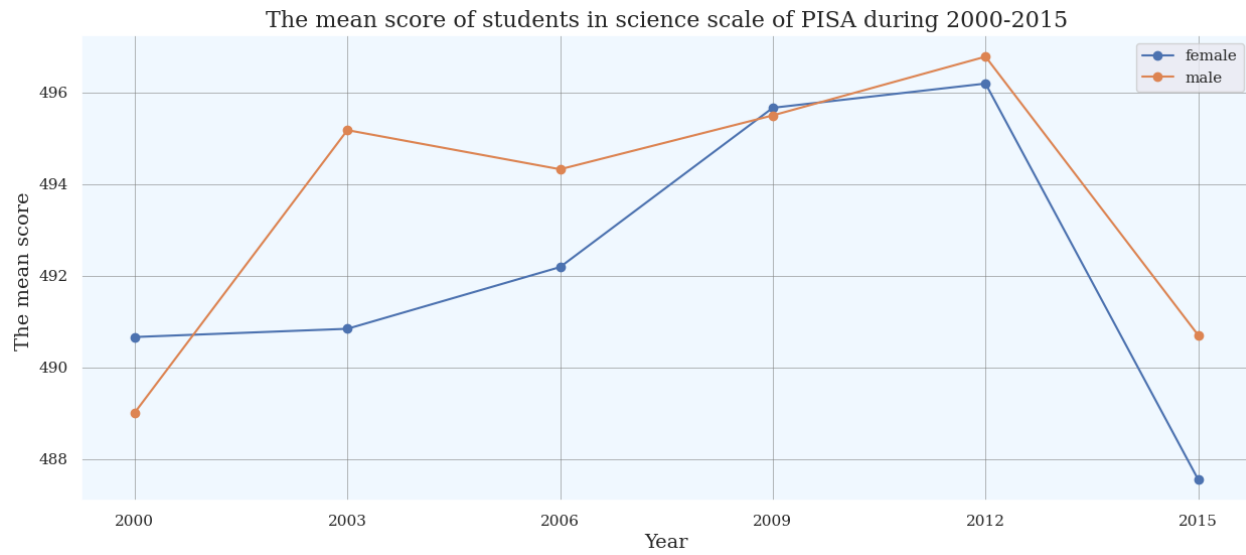


Figure 24: The mean score of students in science scale of PISA during 2000-2015

**Observations:** The mean score of students in science scale of PISA during 2000-2015

- **Students (female):** We observe an incline during 2000-2012 and decline during 2012-2015.
- **Students (male):** We observe an incline during 2000-2003 and decline during 2003-2006. It goes up during 2006-2012 and falls during 2012-2015.

### 16.2.3 The mean score of students in reading scale of PISA during 2000-2015

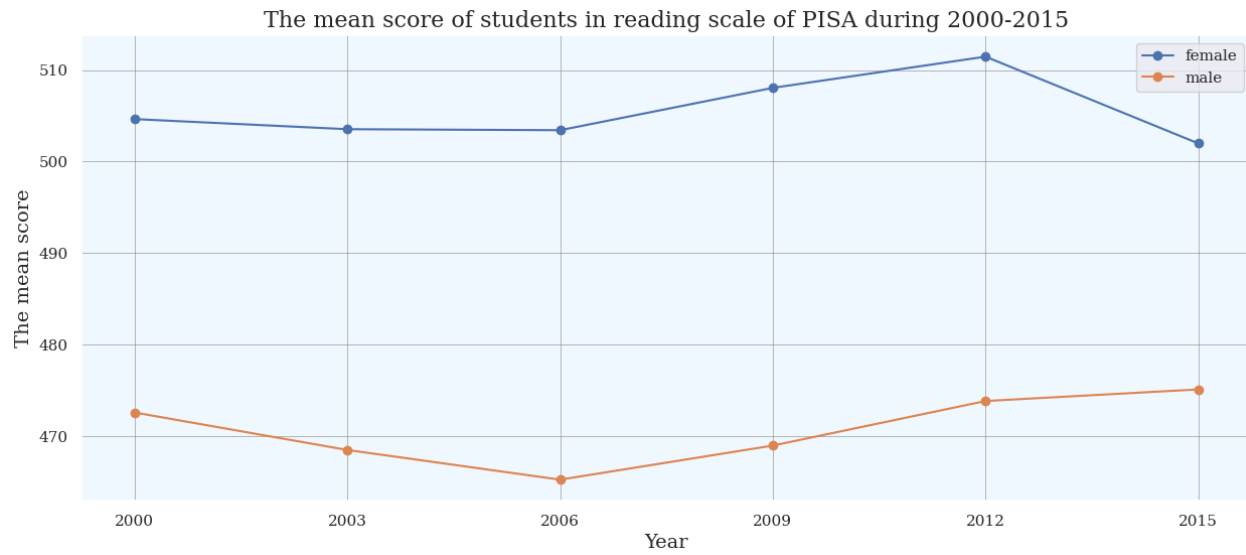


Figure 25: The mean score of students in reading scale of PISA during 2000-2015

**Observations:** The mean score of students in reading scale of PISA during 2000-2015

- **Students (female):** We observe a decline during 2000-2006 and incline during 2006-2012. It falls during 2012-2015.
- **Students (male):** We observe a decline during 2000-2006 and incline during 2006-2015.



## 16.3 The mean score of top 10 and bottom 10 countries in different scales of PISA in 2015

### 16.3.1 The mean score of top 10 and bottom 10 countries in mathematics scale of PISA in 2015

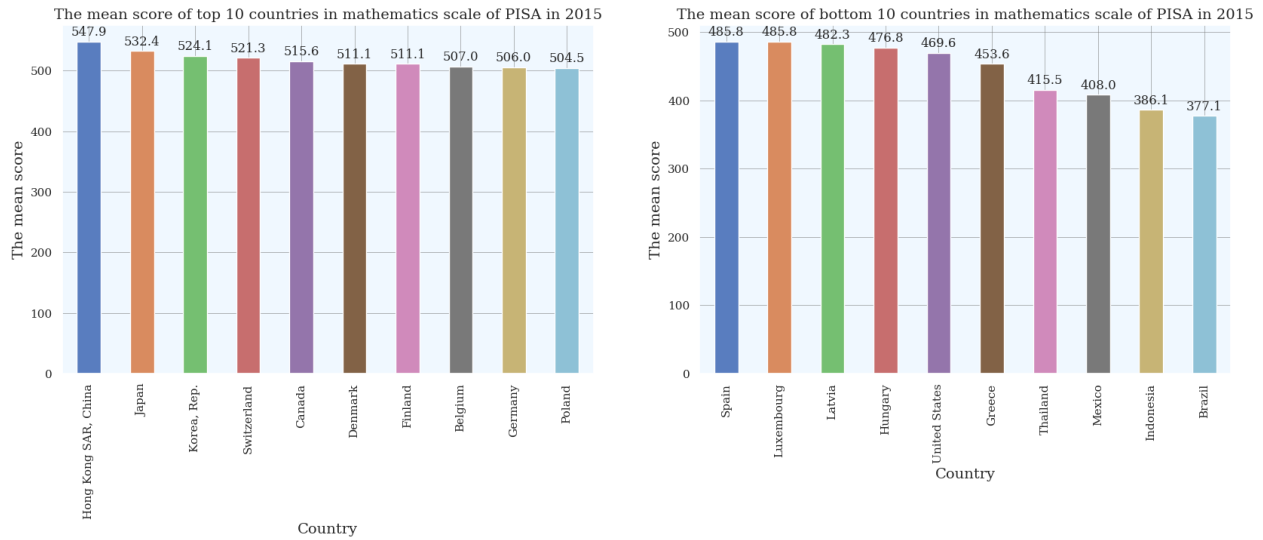


Figure 26: The mean score of top 10 and bottom 10 countries in mathematics scale of PISA in 2015

**Observations:** The mean score of top 10 and bottom 10 countries in mathematics scale of PISA in 2015

**The mean score of top 10 countries in mathematics scale of PISA in 2015**

- We observe that Hong Kong SAR, China has the highest mean score and Poland has the lowest mean score among all the top 10 countries in the mathematics scale of PISA in 2015.
- We observe that out of top 10 countries, 6 are European countries, 3 are Asian countries and Canada is the only North American country.

#### The mean score of bottom 10 countries in mathematics scale of PISA in 2015

- We observe that Spain has the highest mean score and Brazil has the lowest mean score among all the bottom 10 countries in the mathematics scale of PISA in 2015.
- We observe that out of bottom 10 countries, 5 are European countries, 2 are Asian countries, 2 are Latin American countries and United States is the only North American country.

### 16.3.2 The mean score of top 10 and bottom 10 countries in science scale of PISA in 2015

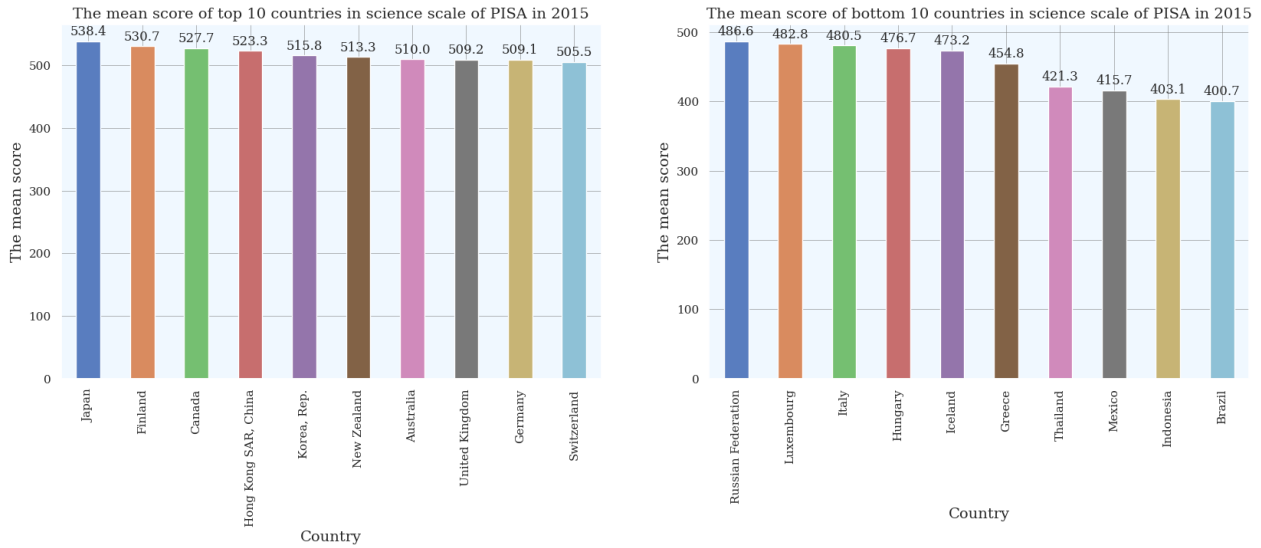


Figure 27: The mean score of top 10 and bottom 10 countries in science scale of PISA in 2015

**Observations:** The mean score of top 10 and bottom 10 countries in science scale of PISA in 2015

#### The mean score of top 10 countries in science scale of PISA in 2015

- We observe that Japan has the highest mean score and Switzerland has the lowest mean score among all the top 10 countries in the science scale of PISA in 2015.
- We observe that out of top 10 countries, 5 are Asian countries, 3 are European countries and 2 are North American countries.

#### The mean score of bottom 10 countries in science scale of PISA in 2015

- We observe that Russian Federation has the highest mean score and Brazil has the lowest mean score among all the bottom 10 countries in the science scale of PISA in 2015.
- We observe that out of bottom 10 countries, 6 are European countries, 2 are Asian countries and 2 are Latin American countries.

### 16.3.3 The mean score of top 10 and bottom 10 countries in reading scale of PISA in 2015

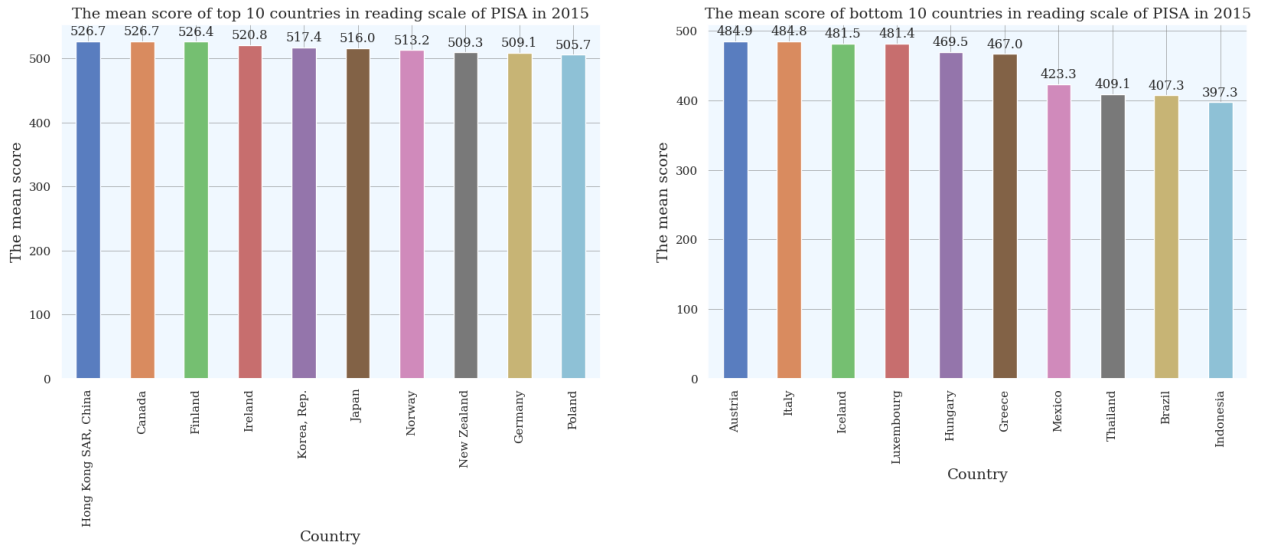


Figure 28: The mean score of top 10 and bottom 10 countries in reading scale of PISA in 2015

**Observations:** The mean score of top 10 and bottom 10 countries in reading scale of PISA in 2015

#### The mean score of top 10 countries in reading scale of PISA in 2015

- We observe that Hong Kong SAR, China has the highest mean score and Poland has the lowest mean score among all the top 10 countries in the reading scale of PISA in 2015.
- We observe that out of top 10 countries, 5 are European countries, 4 are Asian countries and Canada is the only North American country.

#### The mean score of bottom 10 countries in reading scale of PISA in 2015

- We observe that Austria has the highest mean score and Indonesia has the lowest mean score among all the bottom 10 countries in the reading scale of PISA in 2015.
- We observe that out of bottom 10 countries, 6 are European countries, 2 are Asian countries and 2 are Latin American countries.

## 17 The mean score of fourth grade students in different scales of TIMSS during 2000-2015

**TIMSS** - The Trends in International Mathematics and Science Study (TIMSS) is an assessment of the mathematics and science knowledge of fourth (or fifth) and eighth (or ninth) grade learners in various countries around the world.

### 17.1 The number of countries participating in the mean score of fourth grade students in different scales of TIMSS according to their income groups in 2015

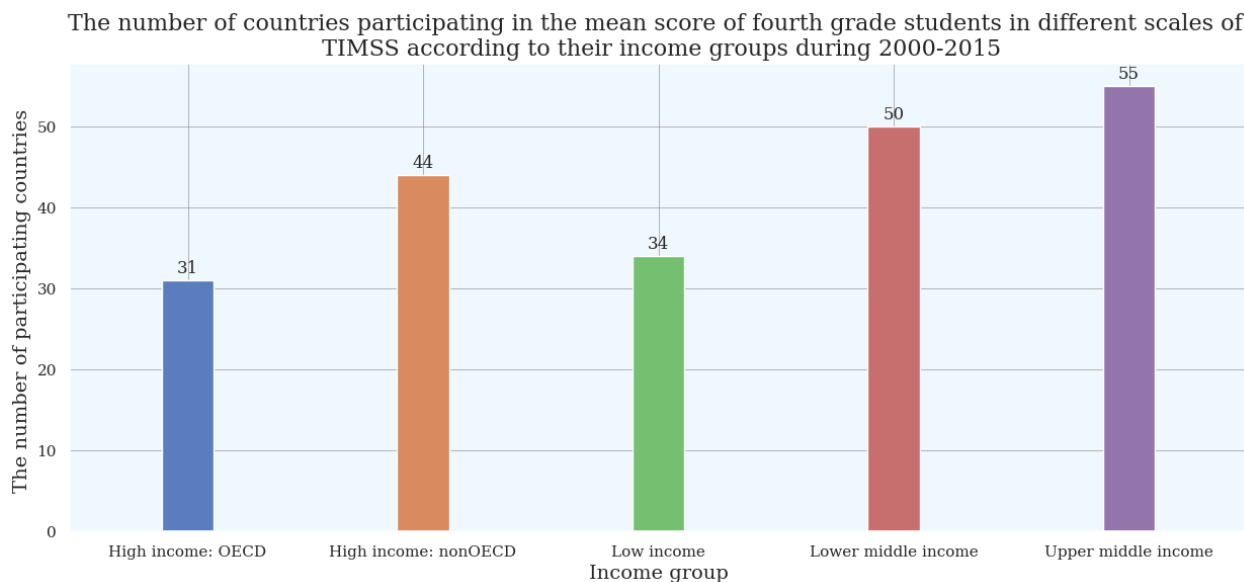


Figure 29: The number of countries participating in the mean score of fourth grade students in different scales of TIMSS according to their income groups during 2000-2015

**Observations:** The number of countries participating in the mean score of fourth grade students in different scales of TIMSS according to their income groups during 2000-2015

- We observe that upper middle income group has maximum participating countries and high income: OECD group has minimum participating countries in the mean score of fourth grade students in different scales of TIMSS during 2000-2015.
- We observe that lower middle income group has 50 participating countries, high income: nonOECD group has 44 participating countries and low income group has 34 participating countries in the mean score of fourth grade students in different scales of TIMSS during 2000-2015.

## 17.2 The mean score of fourth grade students in different scales of TIMSS during 2000-2015

### 17.2.1 The mean score of fourth grade students in mathematics scale of TIMSS during 2000-2015

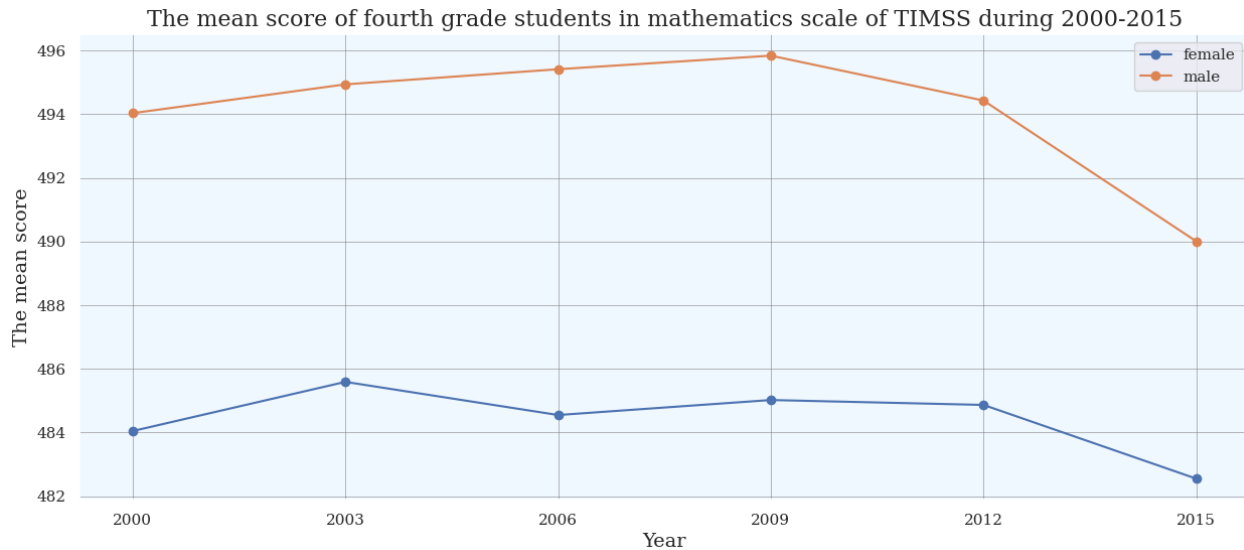


Figure 30: The mean score of fourth grade students in mathematics scale of TIMSS during 2000-2015

**Observations:** The mean score of fourth grade students in mathematics scale of TIMSS during 2000-2015

- **Students (female):** We observe an incline during 2000-2003 and decline during 2003-2006. It goes up during 2006-2009 and falls during 2009-2015.
- **Students (male):** We observe an incline during 2000-2009 and decline during 2009-2015.

### 17.2.2 The mean score of fourth grade students in science scale of TIMSS during 2000-2015

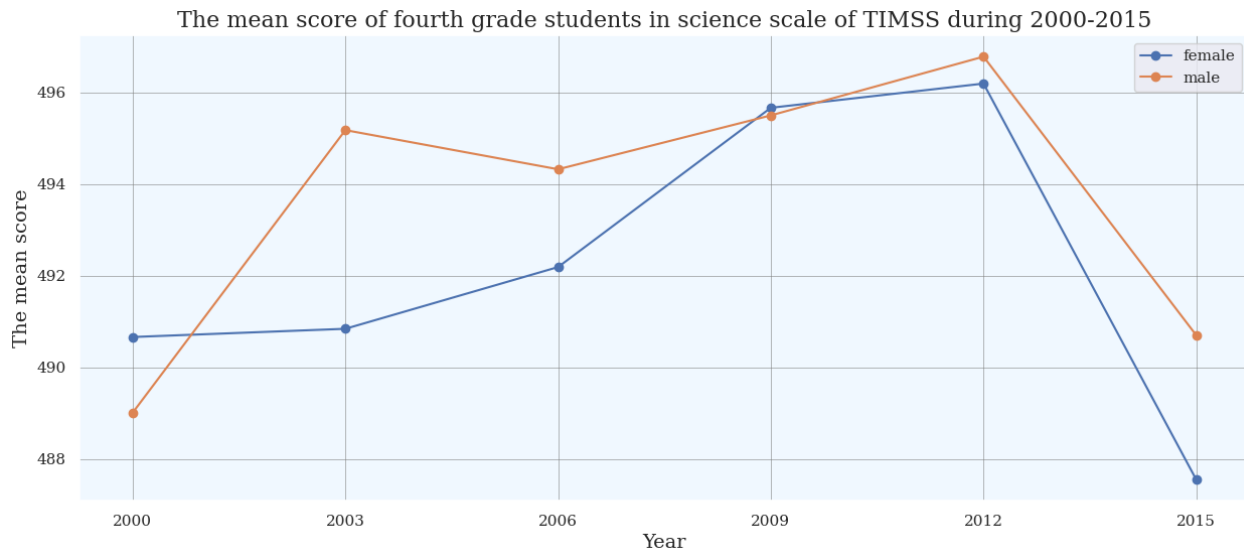


Figure 31: The mean score of fourth grade students in science scale of TIMSS during 2000-2015

**Observations:** The mean score of fourth grade students in science scale of TIMSS during 2000-2015

- **Students (female):** We observe an incline during 2000-2012 and decline during 2012-2015.
- **Students (male):** We observe an incline during 2000-2003 and decline during 2003-2006. It goes up during 2006-2012 and falls during 2012-2015.

## 17.3 The mean score of top 10 and bottom 10 countries in different scales of TIMSS in 2015

### 17.3.1 The mean score of top 10 and bottom 10 countries in mathematics scale of TIMSS in 2015

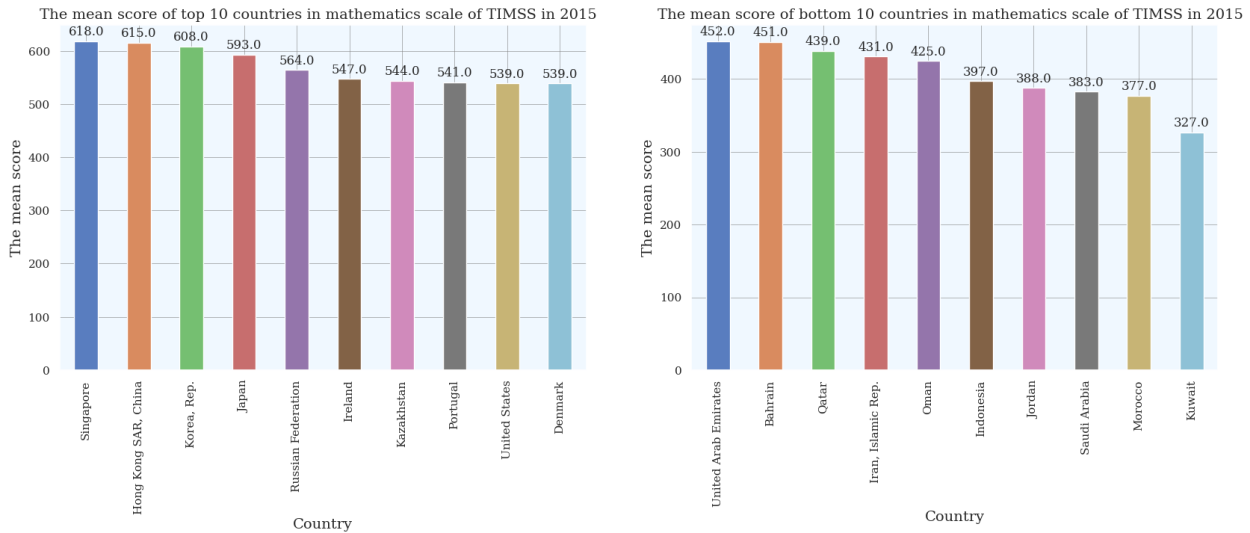


Figure 32: The mean score of top 10 and bottom 10 countries in mathematics scale of TIMSS in 2015

**Observations:** The mean score of top 10 and bottom 10 countries in mathematics scale of TIMSS in 2015 **The mean score of top 10 countries in mathematics scale of TIMSS in 2015**

- We observe that Singapore has the highest mean score and Denmark has the lowest mean score among all the top 10 countries in the mathematics scale of TIMSS in 2015.
- We observe that out of top 10 countries, 5 are Asian countries, 4 are European countries and United states is the only North American country.

**The mean score of bottom 10 countries in mathematics scale of TIMSS in 2015**

- We observe that United Arab Emirates has the highest mean score and Kuwait has the lowest mean score among all the bottom 10 countries in the mathematics scale of TIMSS in 2015.
- We observe that out of bottom 10 countries, 7 are Middle Eastern countries, 2 are Arab States countries and Indonesia is the only Asian country.

### 17.3.2 The mean score of top 10 and bottom 10 countries in science scale of TIMSS in 2015

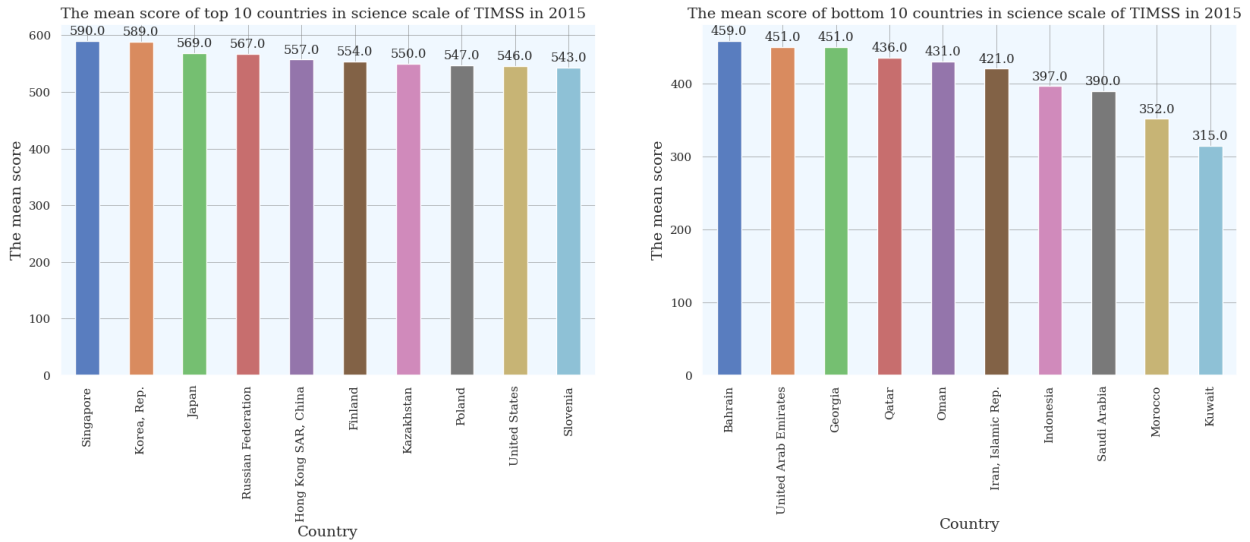


Figure 33: The mean score of top 10 and bottom 10 countries in science scale of TIMSS in 2015

**Observations:** The mean score of top 10 and bottom 10 countries in science scale of TIMSS in 2015

**The mean score of top 10 countries in science scale of TIMSS in 2015**

- We observe that Singapore has the highest mean score and Slovenia has the lowest mean score among all the top 10 countries in the science scale of TIMSS in 2015.
- We observe that out of top 10 countries, 5 are Asian countries, 4 are European countries and United States is the only North American country.

**The mean score of bottom 10 countries in science scale of TIMSS in 2015**

- We observe that Bahrain has the highest mean score and Kuwait has the lowest mean score among all the bottom 10 countries in the science scale of TIMSS in 2015.
- We observe that out of bottom 10 countries, 6 are Middle Eastern countries, 2 are Arab States countries, Georgia is European country and Indonesia is the only Asian country.



## 18 Conclusion

Following are the key findings of our analysis:

- This study shows that most of the countries, whether developing and developed, are part of the World Bank, that's why the "Region" with a high number of countries has high involvement.
- The population growth analysis, based on income, indicates that the country's government of law, middle wages should implement some laws to control the population growth.
- GDP bar shows that developed countries have GDP exceeding 120000 and developing countries have GDP exceeding 12000. This indicates a very vast difference in terms of economy of the country.
- Educational analysis of the youth shows that literacy rate is increasing over the years but still females are lagging behind, compared to the total population literacy. Government and individuals should pay attention to education.
- Literacy rate and technological advancement, influence the GDP of the country, should be increased.
- PISA and TIMSS analysis shows that it's quite different for males and females in the mathematics scale and reading scale.

## References

1. Verger, A. & Bonal, X. The 2020 education strategy or the limitations of the World Bank to promote "learning for all". *Educação & Sociedade* **32**, 911–932. doi:[10.1590/S0101-73302011000400002](https://doi.org/10.1590/S0101-73302011000400002) (Dec. 2011).
2. David, S. A. The impacts of the World Bank on educational policy making: General Tendencies in India. *Research and Reflections on Education* **3** (Jan. 2005).
3. Salmi, J. & Bassett, R. in, 590–596 (Dec. 2010). ISBN: 9780080448947. doi:[10.1016/B978-0-08-044894-7.00846-0](https://doi.org/10.1016/B978-0-08-044894-7.00846-0).
4. Zapp, M. The authority of science and the legitimacy of international organisations: OECD, UNESCO and World Bank in global education governance (Compare: A Journal of Comparative and International Education). *Compare*. doi:[10.1080/03057925.2019.1702503](https://doi.org/10.1080/03057925.2019.1702503) (Jan. 2020).
5. Klees, S. World Bank education policy: New rhetoric, old ideology. *International Journal of Educational Development* **22**, 451–474. doi:[10.1016/S0738-0593\(02\)00006-8](https://doi.org/10.1016/S0738-0593(02)00006-8) (Sept. 2002).
6. Vally, S. & Spreen, C. A. in, 173–187 (Jan. 2012). ISBN: 978-94-6091-903-9. doi:[10.1007/978-94-6091-903-9\\_12](https://doi.org/10.1007/978-94-6091-903-9_12).