

“Education for Knowledge, Science and Culture”

-Shikhanmaharshi Dr. Bapuji Salunkhe



**VIVEKANAND COLLEGE, KOLHAPUR (Autonomous)**

**DEPARTMENT OF STATISTICS**

**A PROJECT REPORT  
on  
“STATISTICAL ANALYSIS OF FACTORS INFLUENCING  
LIFE EXPECTANCY”**

*Submitted by*

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Ms. Jadhav Vaishnavi Vishwas  
Ms. Patil Pooja Sampat  
Ms. Thorat Samiksha Mahadev**

*in partial fulfillment for the award of*

*the degree of*

**BACHELOR OF SCIENCE**

*in*

**STATISTICS**

**2022-23**

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(स्वायत्त) कोल्हापूर

**VIVEKANAND COLLEGE, KOLHAPUR(Autonomous)**  
**DEPARTMENT OF STATISTICS**

## Certificate

This is to Certify that,

Sr. No.	Name	Roll No.
1	Ms. Gade Vaibhavi Rajendra	8336
2	Ms. Jadhav Vaishnavi Vishwas	8339
3	Ms. Patil Pooja Sampat	8348
4	Ms. Thorat Samiksha Mahadev	8315

Have satisfactorily completed the project work on “**STATISTICAL ANALYSIS OF FACTORS INFLUENCING LIFE EXPECTANCY**” as a part of skill enhancement course for **B. Sc. III**, prescribed by the Department of Statistics, *Vivekanand College, Kolhapur (Autonomous)* in the academic year **2022-23**.

This project has been completed under our guidance and supervision. To the best of our knowledge and belief, the matter presented in this project report is original and has not been submitted elsewhere for any other purpose.

**Project Guide**

(Ms. Makandar A. M.)

**Examiner**

**Head**

(Ms. Pawar V. V.)

**HEAD**

**DEPARTMENT OF STATISTICS**  
**VIVEKANAND COLLEGE, KOLHAPUR**  
**(AUTONOMOUS)**

# **ACKNOWLEDGEMENT**

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We extremely thankful to **Ms. V. V. Pawar, Head and Associated Professor,** Department of Statistics, Vivekanand College, Kolhapur (Autonomous) for her valuable guidance and encouragement throughout this project work give to us during the study.

We also thankful to **Project Guide Miss. Makandar A.M.** & all teaching as well as non-teaching staff members of Department of Statistics, Vivekanand College, Kolhapur (Autonomous) for the direct and indirect support.

Also, we sincerely thankful to our parents for helping us in all aspects to complete the project work. Finally, we would like to appreciate to our friends, colleagues for their direct and indirect contribution.

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# **ABSTRACT**

Although there have been lot of studies undertaken in the past on factors affecting life expectancy considering demographic variables, income composition and mortality rates. It was found that effect of immunization and human development index was not taken into account in the past. Important immunization like Hepatitis B, Polio and Diphtheria will also be considered. In a nutshell, this study will focus on immunization factors, mortality factors, economic factors, social factors and other health related factors as well. Since the observations this dataset are based on different countries, it will be easier for a country to determine the predicting factor which is contributing to lower value of life expectancy. This will help in suggesting a country which area should be given importance in order to efficiently improve the life expectancy of its population.

The project relies on accuracy of data. The Global Health Observatory (GHO) data repository under World Health Organization (WHO) keeps track of the health status as well as many other related factors for all countries The data-sets are made available to public for the purpose of health data analysis. The data-set related to life expectancy, health factors for 193 countries has been collected from the same WHO data repository website and its corresponding economic data was collected from United Nation website. Among all categories of health-related factors only those critical factors were chosen which are more representative. It has been observed that there has been a huge development in health sector resulting in improvement of human mortality rates especially in the developing nations. As the data-sets were from WHO, we found no evident errors. The result indicated that most of the missing data was for population, Hepatitis B and GDP. The missing data were from less known countries like Vanuatu, Tonga, Togo, Cabo Verde etc. Finding all data for these countries was difficult and hence, it was decided that we exclude these countries from the final model data-set. The final dataset consists of 6 columns and 173 rows.

## **OBJECTIVES**

- To study life expectancy in developed countries and developing countries.
- To study education has a significant impact on a life expectancy.
- To study the life expectancy for countries with higher income composition of resource for human development.
- To study the most frequent range for life expectancy.

## **DATA COLLECTION**

The data-set related to life expectancy, health factors for 193 countries has been collected from the same WHO data repository website and its corresponding economic data was collected from United Nation website. Therefore, in this project we have considered data from year 2015 for **193** countries for further analysis. As the data-sets were from WHO, we found no evident errors.

# METHODOLOGY

## To compare the life expectancy in developed and developing countries:

### Hypothesis:

$H_{01}$ : Life expectancy in developed countries is same as that of developing countries.

v/s

$H_{11}$ : Life expectancy in developed countries is different from developing countries.

### Observation table:

COUNTRIES	NO. OF OBSERVATION	MEAN	VARIANCE
Developed	29	80.8069	12.58892
Developing	144	69.88125	52.63361
Total	173	-	-

For testing the above hypothesis, we carried out Z test for two sample for means.

### Calculation:

Calculated value of test statistic is

$$Z_{cal}=12.2182$$

$$Z_{tab}=1.96$$

Here,

$Z_{cal} > Z_{tab}$  Therefore, null hypothesis is rejected at 5% l.o.s.

### Conclusion:

We can conclude that life expectancy in developed countries is more than that of developing countries.



## **To compare two proportions of infant deaths and under-five deaths:**

### **Hypothesis:**

$H_0$ : There is no significant difference between two proportions.

v/s

$H_1$ : There is significant difference between two proportions.

### **Calculation:**

$$P = 0.527947$$

$$Q = 0.472053$$

$$n_1 = 3894$$

$$n_2 = 5159$$

$$Z_{\text{tab}} = 1.96$$

$$Z_{\text{cal}} = 37.7445$$

Here,

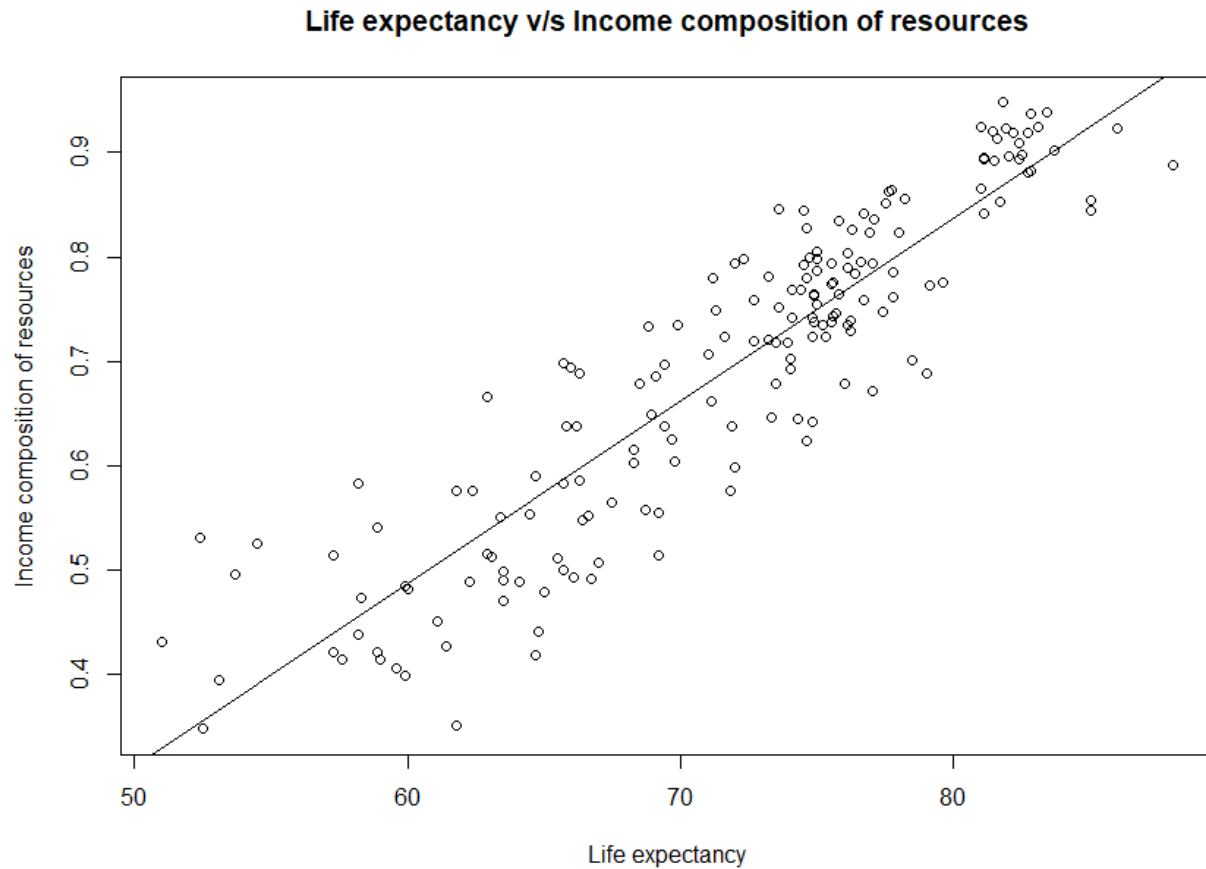
$Z_{\text{cal}} > Z_{\text{tab}}$  Therefore, null hypothesis is rejected at 5% l.o.s.

### **Conclusion:**

We can conclude that there is significant difference between proportions of infant deaths and under-five deaths.

**To check if countries that spend a higher proportion of their resources on human development have a higher life expectancy using Scatter plot and Pearson's correlation.**

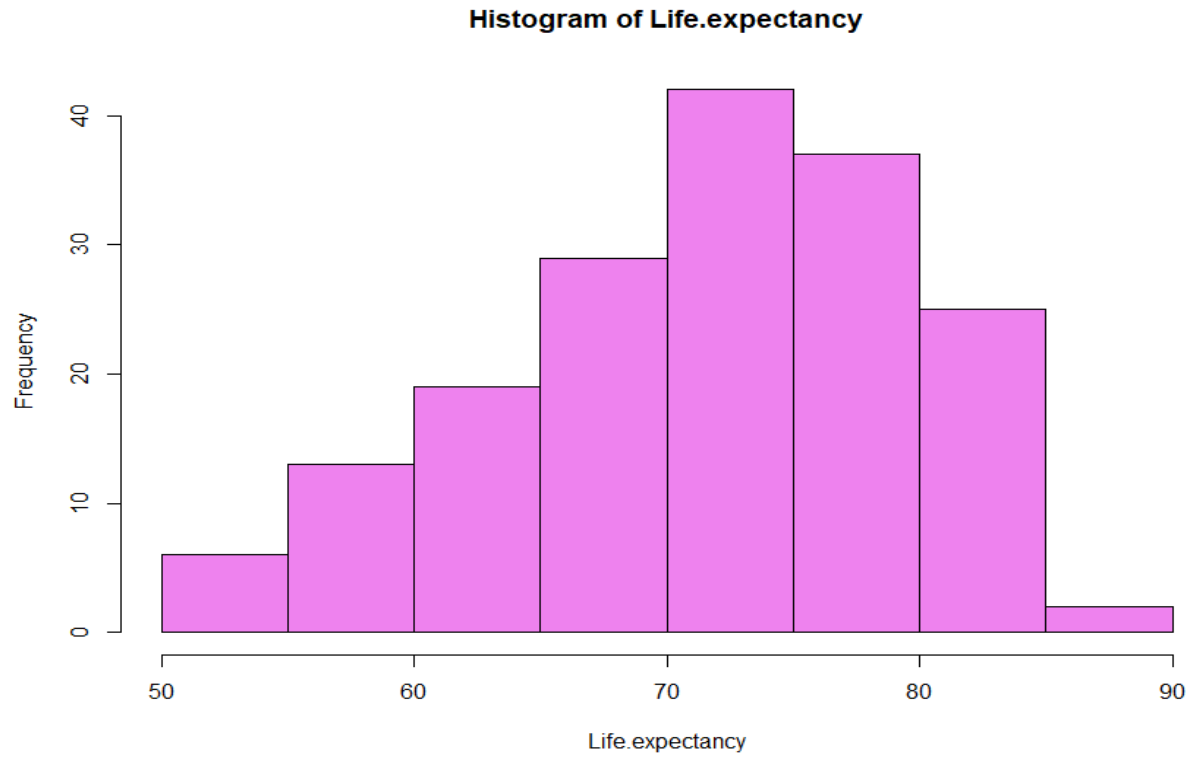
To determine the relationship between life expectancy and income composition of resources



**Correlation coefficient=0.9074**

The regression line explains 90% of variation in the data.

**To check Most Frequent range for life expectancy by using histogram and Frequency Polygon.**



**Conclusion:**

Majority of the people for under range 70-75 years of life expectancy.

## **CONCLUSION**

1. Life expectancy in developed countries is more than that of developing countries.
2. Countries with higher income composition of resources for human development have a better life expectancy.
3. More frequent range for life expectancy is 70-75 years.
4. Countries should spend more on the human development to achieve higher life expectancy.
5. Proportion of infant deaths differ from under five deaths.

## **REFERENCE**

1. 100statistical tests [Gopal K.Kanji]
2. World Health Organisation (WHO) and United Nation.

Website: <https://www.kaggle.com/datasets/lashagoch/life-expectancy-who-updated>

## R- CODE FOR HISTOGRAM

```
> setwd("C:/Users/stat vck/Downloads/life vvj")
```

```
> data<-read.csv("le2015.csv")
```

```
> summary(data)
```

```
      Country      Year      Status      Life.expectan
cy Income.composition.of.resources Length:1045821  Min.    :51.0
Min.    :0.3      Class :character  1st Qu.:66.0
1st Qu.:0.6      Mode  :character  Median :73.9
Median  :0.7      Mean   :2015      Mean   :71.7
Mean    :0.7      3rd Qu.:2015     3rd Qu.:76.7
3rd Qu.:0.8      Max.    :2015     Max.    :88.0
Max.    :0.9      NA's    :1045648  NA's    :10456
48 NA's    :1045648
  Schooling
Min.    : 4.9
1st Qu.:10.8
Median  :13.1
Mean    :12.9
3rd Qu.:15.0
Max.    :20.4
NA's    :1045648
```

```
> Life.expectancy<-data$Life.expectancy
```

```
> hist(Life.expectancy)
```

```
> hist(Life.expectancy,col="violet")
```

## R-CODE FOR SCATTER DIAGRAM

```
> setwd("C:/Users/stat vck/Downloads/life vwj")
> data<-read.csv("le2015.csv")
> summary(data)
```

Country	Year	Status	Life.expectancy	Income.co
position.of.resources				
Length:1045821	Min. :2015	Length:1045821	Min. :51.0	Min. :0
.3				
Class :character	1st Qu.:2015	Class :character	1st Qu.:66.0	1st Qu.:0
.6				
Mode :character	Median :2015	Mode :character	Median :73.9	Median :0
.7				
	Mean :2015		Mean :71.7	Mean :0
.7				
	3rd Qu.:2015		3rd Qu.:76.7	3rd Qu.:0
.8				
	Max. :2015		Max. :88.0	Max. :0
.9				
	NA's :1045648		NA's :1045648	NA's :1

```
045648
```

```
  Schooling
Min.   : 4.9
1st Qu.:10.8
Median :13.1
Mean   :12.9
3rd Qu.:15.0
Max.   :20.4
NA's   :1045648
```

```
> Life.expectancy<-data$Life.expectancy
> Income.composition.of.resources<-data$Income.composition.of.resources
> plot(x= Life.expectancy,y=Income.composition.of.resources,xlab="Life expectancy",y
lab="Income composition of resources",main="Life expectancy v/s Income composition o
f resources")
> abline(lm(Income.composition.of.resources~Life.expectancy,data),col='black')
```

# DATA

Country	Year	Status	Life expectancy	infant deaths	under-five deaths	Income composition of resources
Afghanistan	2015	Developing	65	62	83	0.479
Albania	2015	Developing	77.8	0	0	0.762
Algeria	2015	Developing	75.6	21	24	0.743
Angola	2015	Developing	52.4	66	98	0.531
Antigua and Barbuda	2015	Developing	76.4	0	0	0.784
Argentina	2015	Developing	76.3	8	9	0.826
Armenia	2015	Developing	74.8	1	1	0.741
Australia	2015	Developed	82.8	1	1	0.937
Austria	2015	Developed	81.5	0	0	0.892
Azerbaijan	2015	Developing	72.7	5	6	0.758
Bahamas	2015	Developing	76.1	0	0	0.79
Bahrain	2015	Developing	76.9	0	0	0.823
Bangladesh	2015	Developing	71.8	92	113	0.575
Barbados	2015	Developing	75.5	0	0	0.794
Belarus	2015	Developing	72.3	0	0	0.798
Belgium	2015	Developed	81.1	0	1	0.895
Belize	2015	Developing	71	0	0	0.706
Benin	2015	Developing	60	25	39	0.481
Bhutan	2015	Developing	69.8	0	0	0.604
Bolivia (Plurinational State of)	2015	Developing	77	8	10	0.671
Bosnia and Herzegovina	2015	Developing	77.4	0	0	0.747
Botswana	2015	Developing	65.7	2	2	0.698
Brazil	2015	Developing	75	42	47	0.754
Brunei Darussalam	2015	Developing	77.7	0	0	0.864
Bulgaria	2015	Developed	74.5	0	1	0.792
Burkina Faso	2015	Developing	59.9	38	61	0.399
Burundi	2015	Developing	59.6	21	31	0.406
Cabo Verde	2015	Developing	73.3	0	0	0.646
Cambodia	2015	Developing	68.7	10	12	0.558
Cameroon	2015	Developing	57.3	45	68	0.514
Canada	2015	Developing	82.2	2	2	0.919
Central African Republic	2015	Developing	52.5	15	21	0.347
Chad	2015	Developing	53.1	46	77	0.394
Chile	2015	Developing	85	2	2	0.845
China	2015	Developing	76.1	157	183	0.734
Colombia	2015	Developing	74.8	10	12	0.724
Comoros	2015	Developing	63.5	1	2	0.498



Congo	2015	Developing	64.7	7	10	0.59
Costa Rica	2015	Developing	79.6	1	1	0.775
Croatia	2015	Developed	78	0	0	0.823
Cuba	2015	Developing	79.1	1	1	0.773
Cyprus	2015	Developed	85	0	0	0.854
Denmark	2015	Developed	86	0	0	0.923
Djibouti	2015	Developing	63.5	1	1	0.47
Dominican Republic	2015	Developing	73.9	6	7	0.718
Ecuador	2015	Developing	76.2	6	7	0.739
Egypt	2015	Developing	79	51	60	0.688
El Salvador	2015	Developing	73.5	2	2	0.678
Equatorial Guinea	2015	Developing	58.2	3	4	0.582
Eritrea	2015	Developing	64.7	5	7	0.418
Estonia	2015	Developing	77.6	0	0	0.863
Ethiopia	2015	Developing	64.8	136	194	0.441
Fiji	2015	Developing	69.9	0	0	0.734
Finland	2015	Developing	81.1	0	0	0.893
France	2015	Developing	82.4	2	3	0.894
Gabon	2015	Developing	66	2	3	0.694
Gambia	2015	Developing	61.1	3	5	0.45
Georgia	2015	Developing	74.4	1	1	0.768
Germany	2015	Developed	81	2	3	0.924
Ghana	2015	Developing	62.4	37	52	0.575
Greece	2015	Developing	81	0	0	0.865
Grenada	2015	Developing	73.6	0	0	0.751
Guatemala	2015	Developing	71.9	10	12	0.637
Guinea	2015	Developing	59	26	40	0.414
Guinea-Bissau	2015	Developing	58.9	4	6	0.421
Guyana	2015	Developing	66.2	0	1	0.638
Haiti	2015	Developing	63.5	14	18	0.49
Honduras	2015	Developing	74.6	3	4	0.623
Hungary	2015	Developed	75.8	0	0	0.834
Iceland	2015	Developed	82.7	0	0	0.919
India	2015	Developing	68.3	910	1100	0.615
Indonesia	2015	Developing	69.1	114	136	0.686
Iran (Islamic Republic of)	2015	Developing	75.5	18	21	0.774
Iraq	2015	Developing	68.9	32	38	0.649
Ireland	2015	Developed	81.4	0	0	0.92
Israel	2015	Developing	82.5	0	1	0.898
Italy	2015	Developed	82.7	1	2	0.881
Jamaica	2015	Developing	76.2	1	1	0.729
Japan	2015	Developed	83.7	2	3	0.902
Jordan	2015	Developing	74.1	4	4	0.741

Kazakhstan	2015	Developing	72	4	5	0.793
Kenya	2015	Developing	63.4	54	75	0.55
Kiribati	2015	Developing	66.3	0	0	0.586
Kuwait	2015	Developing	74.7	0	1	0.799
Kyrgyzstan	2015	Developing	71.1	3	3	0.662
Lao People's Democratic Republic	2015	Developing	65.7	8	11	0.582
Latvia	2015	Developed	74.6	0	0	0.828
Lebanon	2015	Developing	74.9	1	1	0.763
Lesotho	2015	Developing	53.7	4	6	0.495
Liberia	2015	Developing	61.4	8	11	0.427
Libya	2015	Developing	72.7	1	2	0.719
Lithuania	2015	Developed	73.6	0	0	0.846
Luxembourg	2015	Developed	82	0	0	0.896
Madagascar	2015	Developing	65.5	28	38	0.511
Malawi	2015	Developing	58.3	26	38	0.473
Malaysia	2015	Developing	75	4	4	0.787
Maldives	2015	Developing	78.5	0	0	0.701
Mali	2015	Developing	58.2	52	84	0.438
Malta	2015	Developed	81.7	0	0	0.853
Mauritania	2015	Developing	63.1	8	12	0.513
Mauritius	2015	Developing	74.6	0	0	0.779
Mexico	2015	Developing	76.7	30	35	0.758
Micronesia (Federated States of)	2015	Developing	69.4	0	0	0.637
Mongolia	2015	Developing	68.8	1	1	0.733
Montenegro	2015	Developing	76.1	0	0	0.804
Morocco	2015	Developing	74.3	17	20	0.645
Mozambique	2015	Developing	57.6	60	81	0.414
Myanmar	2015	Developing	66.6	39	50	0.552
Namibia	2015	Developing	65.8	2	3	0.637
Nepal	2015	Developing	69.2	17	21	0.555
Netherlands	2015	Developed	81.9	1	1	0.923
New Zealand	2015	Developed	81.6	0	0	0.913
Nicaragua	2015	Developing	74.8	2	2	0.642
Niger	2015	Developing	61.8	49	87	0.351
Nigeria	2015	Developing	54.5	483	747	0.525
Norway	2015	Developed	81.8	0	0	0.948
Oman	2015	Developing	76.6	1	1	0.795
Pakistan	2015	Developing	66.4	352	433	0.548
Panama	2015	Developing	77.8	1	1	0.785
Papua New Guinea	2015	Developing	62.9	10	12	0.515
Paraguay	2015	Developing	74	2	3	0.692
Peru	2015	Developing	75.5	8	10	0.737
Philippines	2015	Developing	68.5	52	66	0.679

Poland	2015	Developed	77.5	2	2	0.852
Portugal	2015	Developed	81.1	0	0	0.841
Qatar	2015	Developing	78.2	0	0	0.855
Romania	2015	Developed	75	2	2	0.798
Russian Federation	2015	Developing	75	13	15	0.805
Rwanda	2015	Developing	66.1	11	15	0.493
Saint Lucia	2015	Developing	75.2	0	0	0.735
Saint Vincent and the Grenadines	2015	Developing	73.2	0	0	0.72
Samoa	2015	Developing	74	0	0	0.702
Sao Tome and Principe	2015	Developing	67.5	0	0	0.565
Saudi Arabia	2015	Developing	74.5	7	8	0.845
Senegal	2015	Developing	66.7	19	26	0.491
Serbia	2015	Developing	75.6	1	1	0.775
Seychelles	2015	Developing	73.2	0	0	0.781
Sierra Leone	2015	Developing	51	22	30	0.431
Singapore	2015	Developed	83.1	0	0	0.924
Slovakia	2015	Developed	76.7	0	0	0.842
Slovenia	2015	Developed	88	0	0	0.888
Solomon Islands	2015	Developing	69.2	0	0	0.514
South Africa	2015	Developing	62.9	42	52	0.665
South Sudan	2015	Developing	57.3	26	39	0.421
Spain	2015	Developed	82.8	1	1	0.882
Sri Lanka	2015	Developing	74.9	3	3	0.764
Sudan	2015	Developing	64.1	58	85	0.488
Suriname	2015	Developing	71.6	0	0	0.723
Swaziland	2015	Developing	58.9	2	3	0.541
Sweden	2015	Developed	82.4	0	0	0.909
Switzerland	2015	Developed	83.4	0	0	0.938
Syrian Arab Republic	2015	Developing	64.5	6	8	0.553
Tajikistan	2015	Developing	69.7	10	11	0.625
Thailand	2015	Developing	74.9	8	9	0.738
The former Yugoslav republic of Macedonia	2015	Developing	75.7	0	0	0.746
Timor-Leste	2015	Developing	68.3	2	2	0.603
Togo	2015	Developing	59.9	13	20	0.484
Tonga	2015	Developing	73.5	0	0	0.718
Trinidad and Tobago	2015	Developing	71.2	0	0	0.779
Tunisia	2015	Developing	75.3	3	3	0.723
Turkey	2015	Developing	75.8	15	18	0.764
Turkmenistan	2015	Developing	66.3	6	7	0.688
Uganda	2015	Developing	62.3	66	93	0.488
Ukraine	2015	Developing	71.3	4	5	0.748
United Arab Emirates	2015	Developing	77.1	1	1	0.836

Uruguay	2015	Developing	77	0	0	0.794
Uzbekistan	2015	Developing	69.4	15	17	0.697
Vanuatu	2015	Developing	72	0	0	0.598
Venezuela (Bolivarian Republic of)	2015	Developing	74.1	9	10	0.769
Viet Nam	2015	Developing	76	28	35	0.678
Yemen	2015	Developing	65.7	37	47	0.499
Zambia	2015	Developing	61.8	27	40	0.576
Zimbabwe	2015	Developing	67	22	32	0.507