

Development Analysis of Norway, Croatia, and Greece

Economic, Social, Environmental and Health Indicators

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Objective

- **Analyze** key development indicators, including economic, social, environmental, and health metrics, for Norway, Croatia, and Greece using data.table.
- **Compare trends** over time to identify patterns, disparities, and improvements in development indicators across the three countries.
- **Visualize insights** using appropriate graphical representations to enhance understanding of complex data.
- **Investigate policy impacts** by exploring how government initiatives and external factors have shaped development in each country.
- **Generate actionable findings** that can inform further research or policy recommendations.

Read data and Clean Data

```
# Read the data and Rename columns
nor <- fread("indicators_nor.csv", skip = 1)
hrv <- fread("indicators_hrv.csv", skip = 1)
grc <- fread("indicators_grc.csv", skip = 1)
setnames(nor, old = names(nor),
          new = c("Country", "ISO3", "Year",
                  "Indicator", "Code", "Value"))
setnames(hrv, old = names(hrv),
          new = c("Country", "ISO3", "Year",
                  "Indicator", "Code", "Value"))
setnames(grc, old = names(grc),
          new = c("Country", "ISO3", "Year",
                  "Indicator", "Code", "Value"))

# Merge all datasets into one
combined <- rbind(nor, hrv, grc)

# Assign correct classes
combined[, Year := as.integer(Year)]
combined[, Value := as.numeric(Value)]
```

Quick Data Exploration

```
# 1. Dimensions and structure  
str(combined)
```

```
Classes 'data.table' and 'data.frame': 222731 obs. of 6 variables  
 $ Country   : chr  "Norway" "Norway" "Norway" "Norway" ...  
 $ ISO3      : chr  "NOR" "NOR" "NOR" "NOR" ...  
 $ Year      : int   2022 2021 2020 2019 2018 2017 2016 2015 2014  
 $ Indicator: chr   "Fertilizer consumption (% of fertilizer prod  
 $ Code      : chr   "AG.CON.FERT.PT.ZS" "AG.CON.FERT.PT.ZS" "AG.C  
 $ Value     : num   17.7 18.4 16.9 17.8 18 ...  
 - attr(*, ".internal.selfref")=<externalptr>
```

Interpretation:

The dataset contains **222,731** observations and **6** variables. The key fields are:

Country, ISO3, and Indicator: stored as character variables.

Year: stored as an integer.

Value: numeric, which holds the actual data for each indicator.

This confirms the data was read in correctly and type conversion (via `data.table`) worked as intended.

```
# 2. Unique values(combined$Indicator)
unique(combined$Country)
```

```
[1] "Norway" "Croatia" "Greece"
```

```
length(unique(combined$Indicator))
```

```
[1] 3303
```

The dataset includes data from three countries: **Norway, Croatia, and Greece**. There are 3,303 unique indicators, which suggests the dataset is very rich in variables spanning multiple sectors like health, education, economy, etc.

Count by Country

```
combined[, .N, keyby = Country]
```

Key: <Country>

	Country	N
	<char>	<int>
1:	Croatia	65137
2:	Greece	78279
3:	Norway	79315

Norway - 79,315 records and Greece - 78,279 records and Croatia - 65,137 records

All countries are well-represented, and no country appears to be significantly under-sampled. This ensures fair comparative analysis is possible.

Summary of Top Indicators (by Mean Value)

```
indicator_summary = combined %>%  
  group_by(Indicator) %>%  
  summarise(  
    min_value = min(Value, na.rm = TRUE),  
    mean_value = mean(Value, na.rm = TRUE),  
    max_value = max(Value, na.rm = TRUE),  
    count = n()  
  ) %>%  
  arrange(desc(mean_value))
```



```
head(indicator_summary$Indicator,n = 10)
```

```
[1] "GNI (constant LCU)"
[2] "Net domestic credit (current LCU)"
[3] "GNI: linked series (current LCU)"
[4] "Gross domestic income (constant LCU)"
[5] "GDP: linked series (current LCU)"
[6] "Gross value added at basic prices (GVA) (constant LCU)"
[7] "GDP (constant LCU)"
[8] "Broad money (current LCU)"
[9] "Gross national expenditure (constant LCU)"
[10] "GNI (current LCU)"
```

The top indicators (by average value across years and countries) include:

1. GNI (constant LCU)
2. GDP (constant LCU)
3. Gross value added at basic prices
4. Broad money
5. Net domestic credit

These are mostly economic indicators, indicating high monetary values. This tells us the dataset contains extensive economic metrics in local currency units (LCU), making them useful for macroeconomic trend analysis.

Indicator selection

```
# Select 5 meaningful indicators
selected_indicators <- c(
  "GDP per capita (current US$)",
  "Life expectancy at birth, total (years)",
  "School enrollment, tertiary (% gross)",
  "CO2 emissions (metric tons per capita)",
  "Fertility rate, total (births per woman)"
)
```

```
analysis_dt <- combined[Indicator %in% selected_indicators]

# Summary analysis using keyby: mean and sd of values
summary_stats <- analysis_dt[, .(
  Mean_Value = mean(Value, na.rm = TRUE),
  SD_Value = sd(Value, na.rm = TRUE)
), keyby = .(Country, Indicator)]
```

Country	Indicator	Mean_Value	SD_Value
Croatia	Fertility rate, total (births per woman)	1.714687	2.730652e-01
Croatia	GDP per capita (current US\$)	10519.324065	5.293320e+03
Croatia	Life expectancy at birth, total (years)	72.552079	3.476596e+00
Croatia	School enrollment, tertiary (% gross)	47.085093	2.070604e+01
Greece	Fertility rate, total (births per woman)	1.707344	4.444345e-01
Greece	GDP per capita (current US\$)	11265.200150	8.908021e+03
Greece	Life expectancy at birth, total (years)	76.628548	3.562055e+00
Greece	School enrollment, tertiary (% gross)	60.435676	4.589285e+01
Norway	Fertility rate, total (births per woman)	1.990312	4.311748e-01
Norway	GDP per capita (current US\$)	38568.720974	3.435735e+04
Norway	Life expectancy at birth, total (years)	77.686288	3.180180e+00
Norway	School enrollment, tertiary (% gross)	54.543894	2.516330e+01

Mean Interpretation

- Norway consistently reports higher average values across GDP per capita, life expectancy, and fertility rate, which reflects its status as a high-income and well-developed nation.
- Greece shows moderate values, particularly in life expectancy and tertiary education, where it even surpasses Norway.
- Croatia typically has the lowest average values across most indicators, suggesting different economic and social development stages.

Standard Deviation Interpretation

- GDP per capita has high variability across all three countries, especially Norway, indicating significant changes over time due to economic cycles, inflation adjustments, or currency fluctuations.
- Fertility rate and life expectancy show low standard deviation, which reflects stable year-over-year values — these indicators typically change slowly.
- School enrollment in tertiary education shows moderate variability, suggesting policy reforms, demographic shifts, or educational investments affected different years differently.

Life Expectancy Over Time by Country

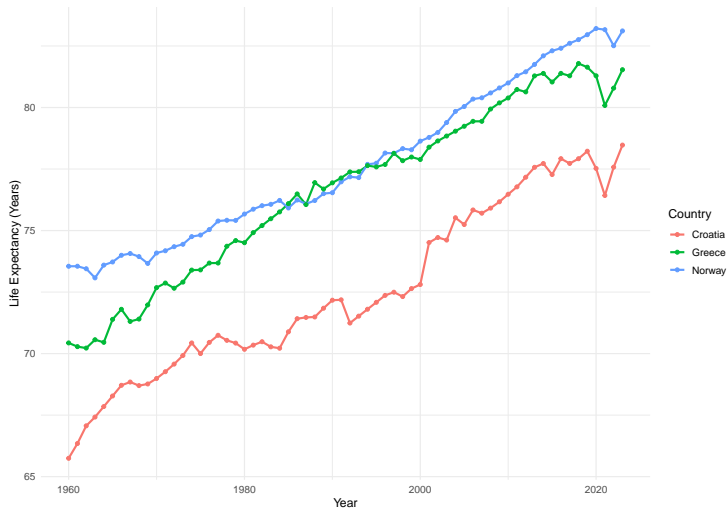


Figure 1

The plot shows a steady increase in life expectancy across all three countries from 1960 to 2022:

- Norway has consistently led with the highest life expectancy, surpassing 82 years in recent years.
- Greece shows strong growth, closely trailing Norway after 1990.
- Croatia started at a lower baseline (~65 years in 1960) but has steadily improved, reaching over 78 years by 2022.

All three countries demonstrate positive long-term health outcomes, with narrowing gaps between them in recent decades.

Average GDP per Capita Over Time (All Countries Combined)

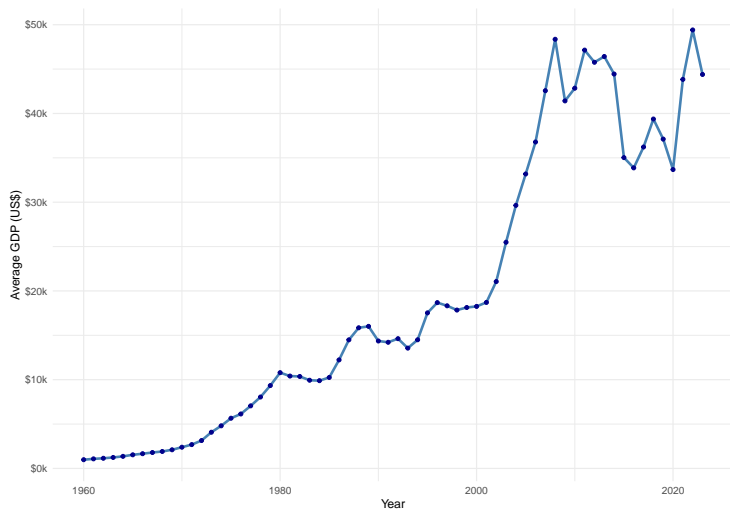


Figure 2

The plot shows the average GDP per capita across Norway, Greece, and Croatia from 1960 to 2022

- There is a steady economic growth trend from 1960 through the early 2000s.
- A sharp rise occurs after 2000, driven largely by Norway's high GDP values.
- Fluctuations post-2008 reflect the global financial crisis, and the dips around 2020 likely capture the COVID-19 economic impact.

Despite volatility, the overall trend reflects long-term economic development and recovery across the three countries.