

DSO545



Final Project

# Human Development Index

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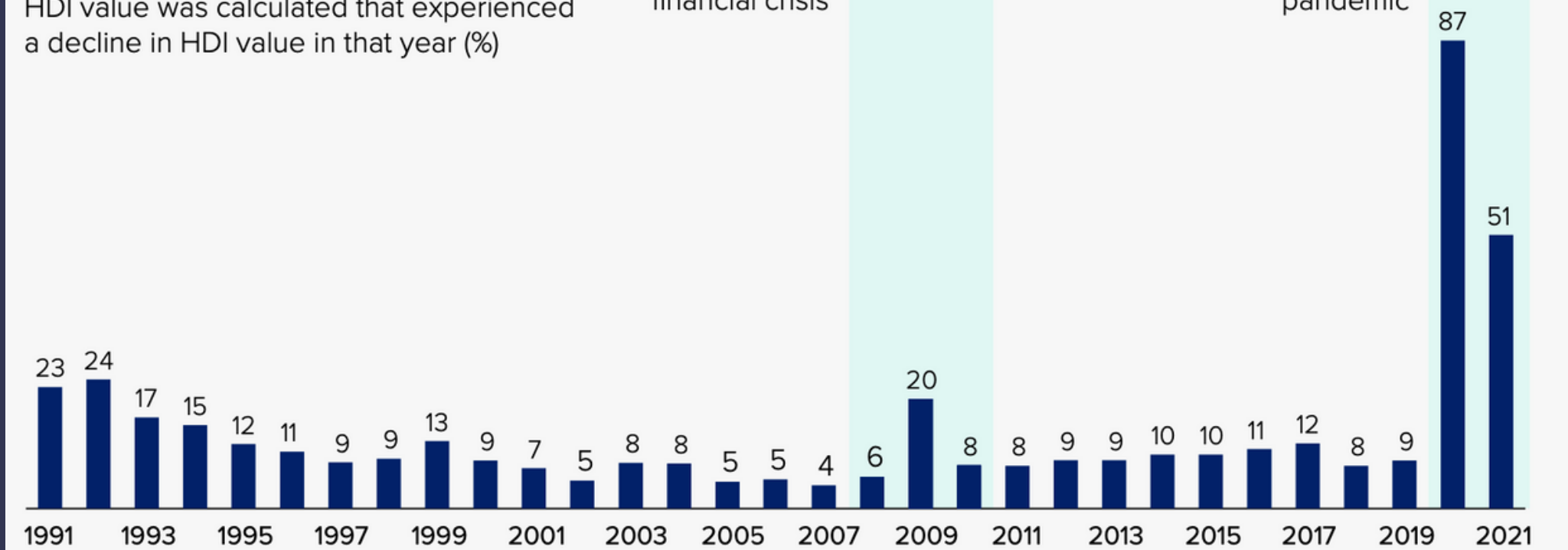
Sylvia Li

# HDI with COVID-19

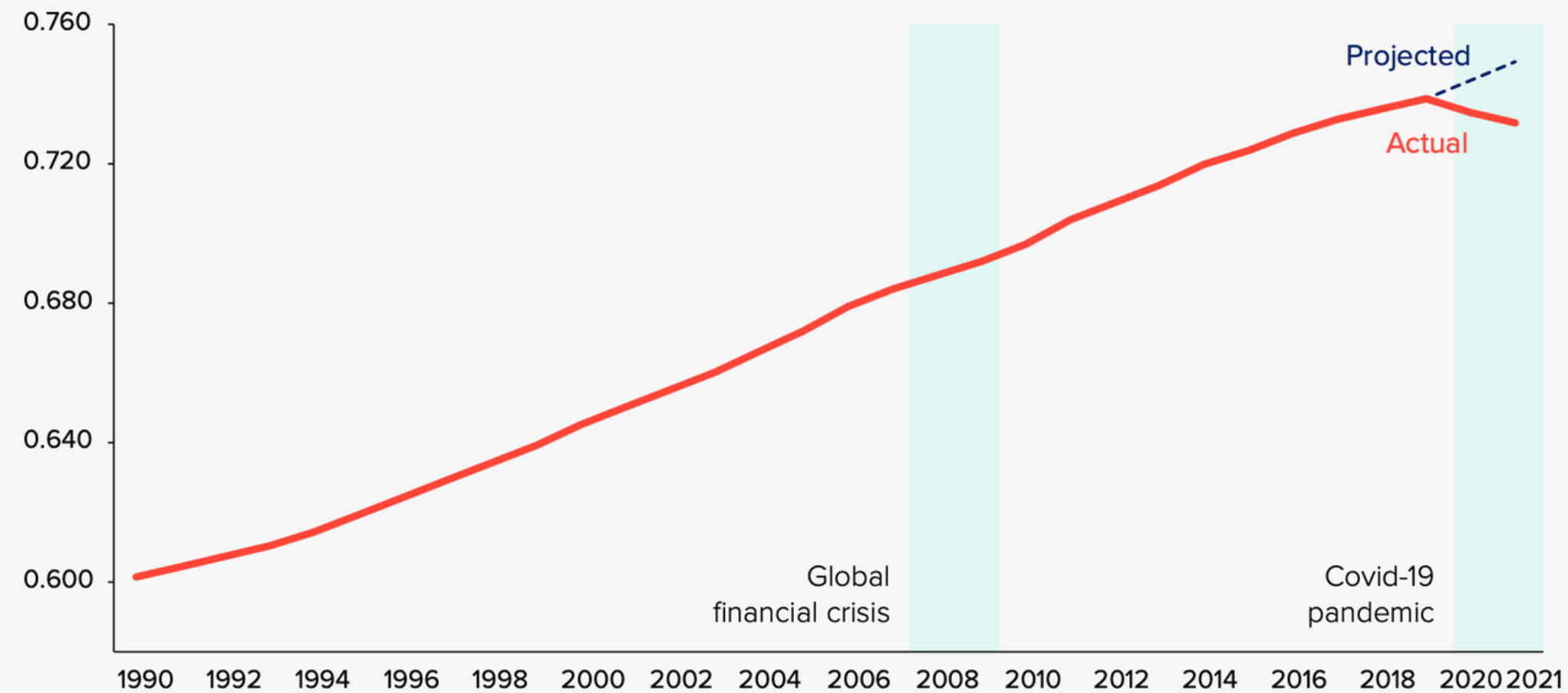
Share of countries for which an  
HDI value was calculated that experienced  
a decline in HDI value in that year (%)

Global  
financial crisis

Covid-19  
pandemic

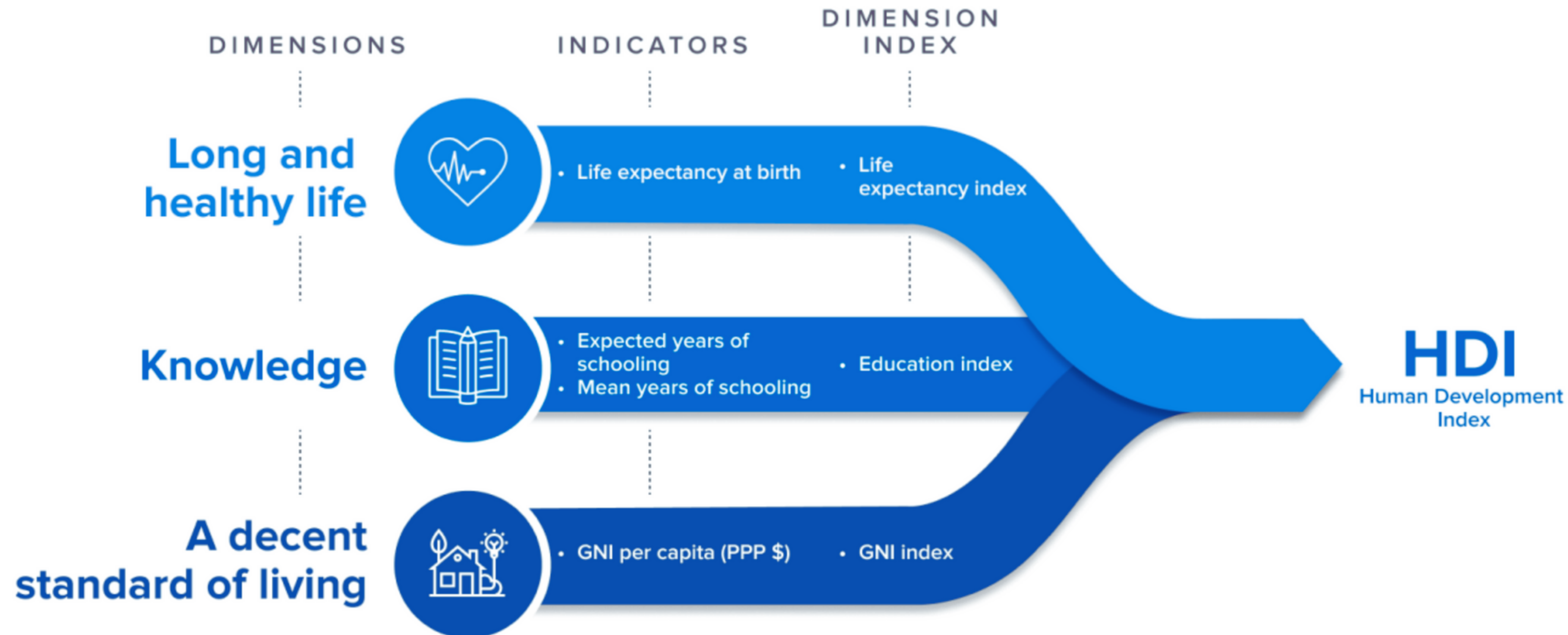


Human Development Index value



# HDI Dimensions and Indicators

$$HDI = (I_{Health} \cdot I_{Education} \cdot I_{Income})^{1/3}$$



# Business Question

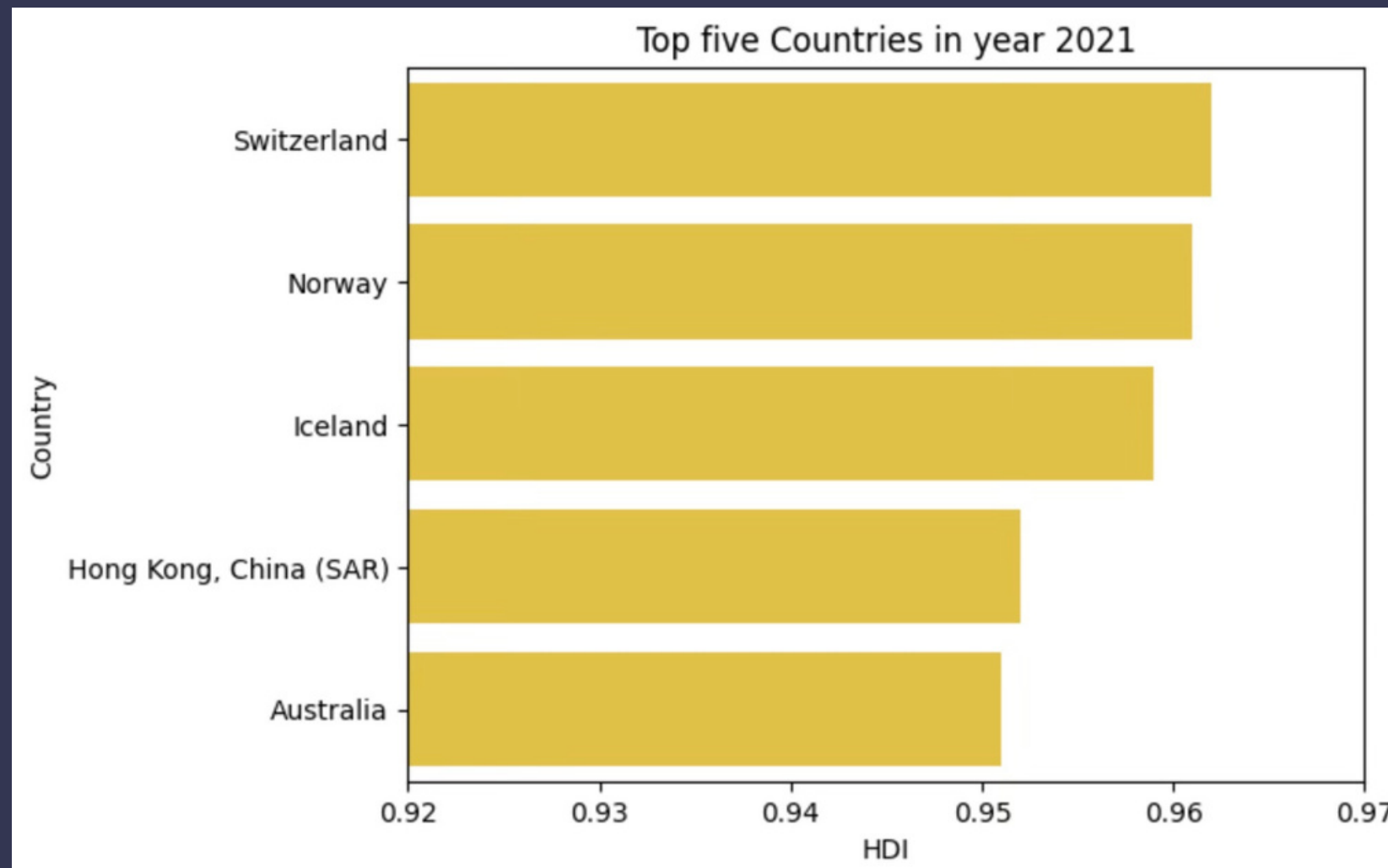
What **key indicators** exhibit a strong relationship with HDI, enabling predictive modeling for **future** HDI trends?



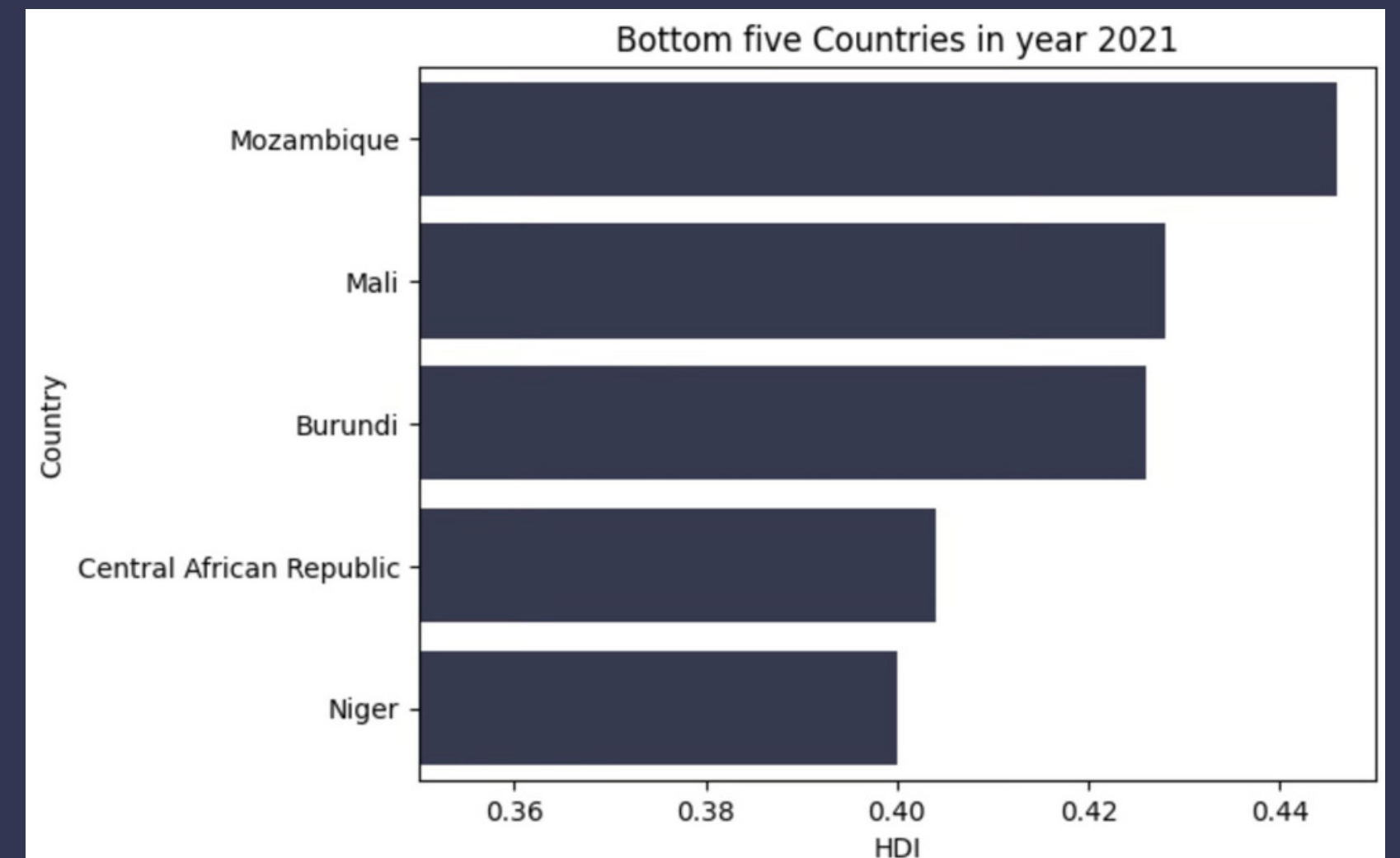
Additionally, how can countries leverage these insights to **enhance and sustain** their development levels?

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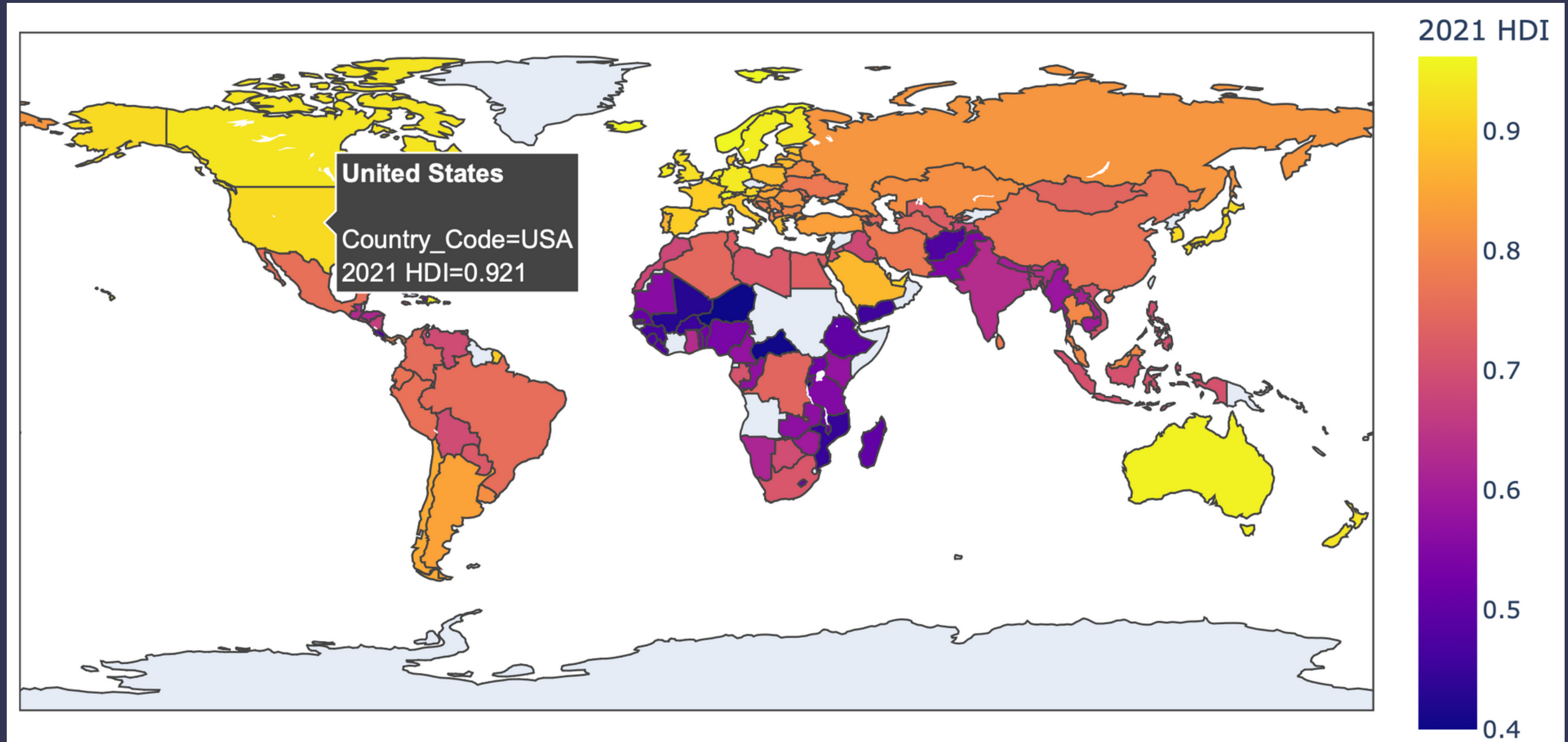
# ◀ Top 5



# Bottom 5 ▶

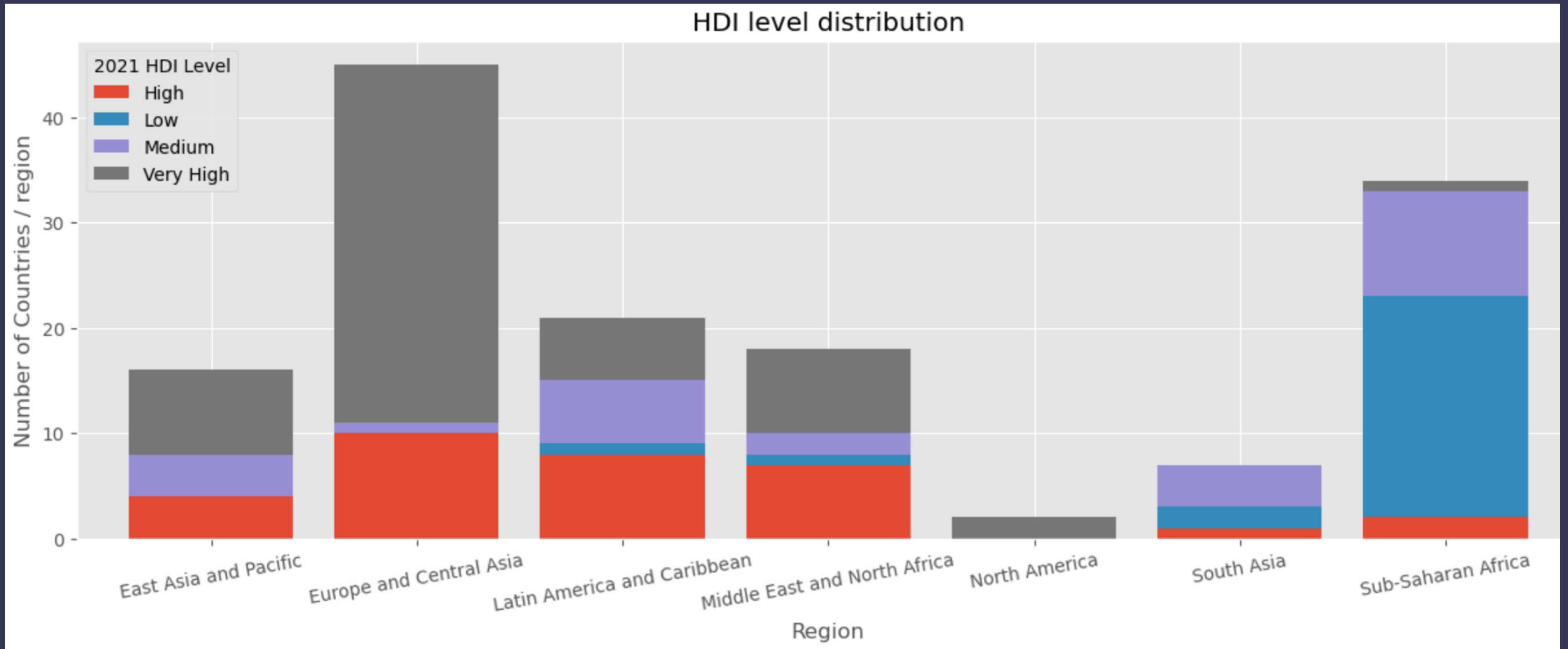


# Mapping 2021 HDI Values



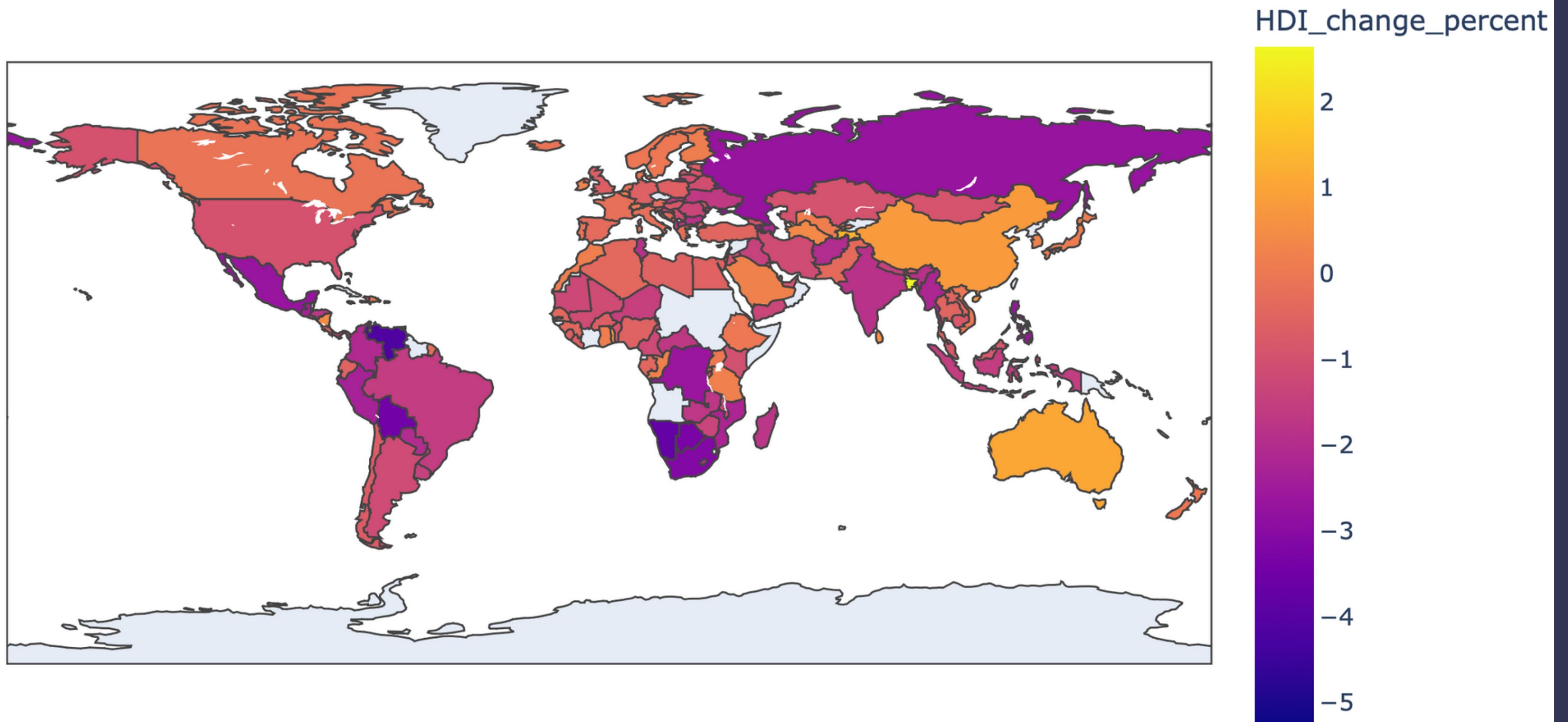


# Descriptive Analysis



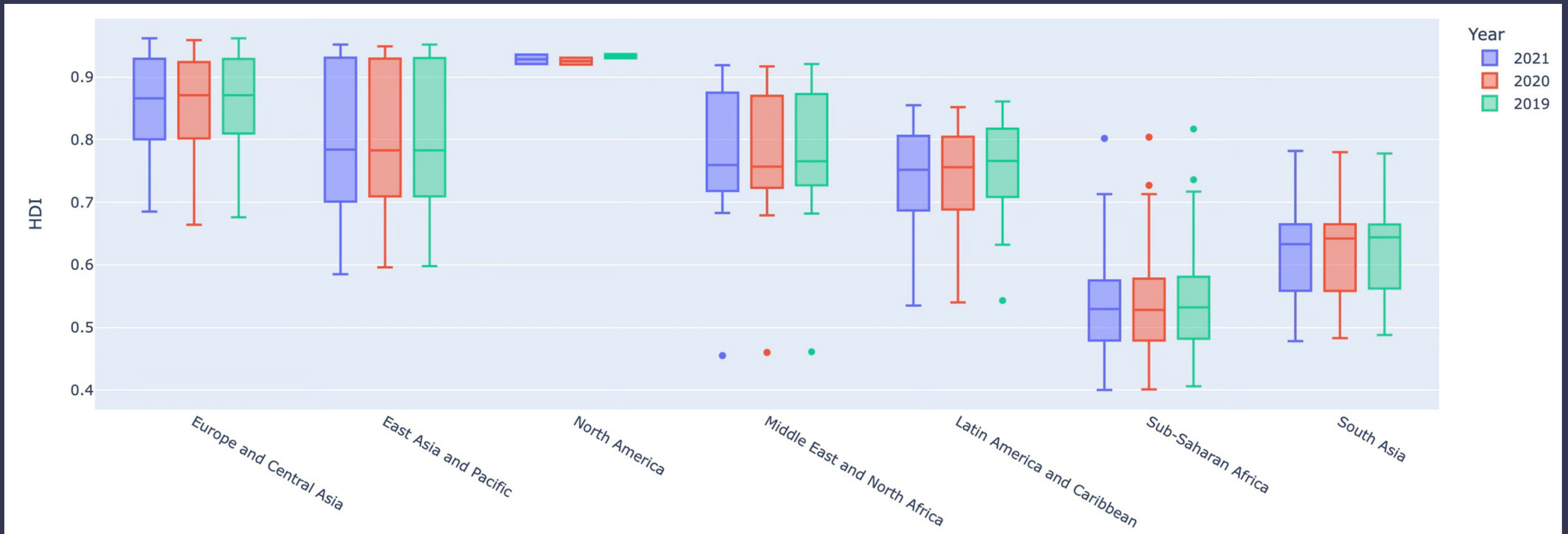
**Different HDI Level counts by Region**

# 2019-21 HDI % Changes





# Descriptive Analysis



HDI Value by Region (2019-2021)

# World Bank's View on Global Development

## Data Themes



### **POVERTY AND INEQUALITY**

poverty, prosperity,  
consumption, income  
distribution



### **PEOPLE**

population dynamics,  
education, labor,  
health, gender



### **ENVIRONMENT**

agriculture, climate  
change, energy,  
biodiversity, water,  
sanitation



### **ECONOMY**

growth, economic  
structure, income and  
savings, trade, labor  
productivity



### **STATES AND MARKETS**

business, stock  
markets, military,  
communications,  
transport, technology



### **GLOBAL LINKS**

debt, trade, aid  
dependency, refugee,  
tourism, migration

# Introducing **New Variables**



## **POVERTY AND INEQUALITY**

poverty, prosperity,  
consumption, income  
distribution



**GINI  
Index**



## **PEOPLE**

population dynamics,  
education, labor,  
health, gender



**Unemployment  
Rate**



## **ENVIRONMENT**

agriculture, climate  
change, energy,  
biodiversity, water,  
sanitation



**PM  
2.5**



## **ECONOMY**

growth, economic  
structure, income and  
savings, trade, labor  
productivity



**GINI  
Index**



## **STATES AND MARKETS**

business, stock  
markets, military,  
communications,  
transport, technology



**Science &  
Technology**



## **GLOBAL LINKS**

debt, trade, aid  
dependency, refugee,  
tourism, migration



**Political Stability &  
Absence of Violence**

# Preliminary Regression

HDI =

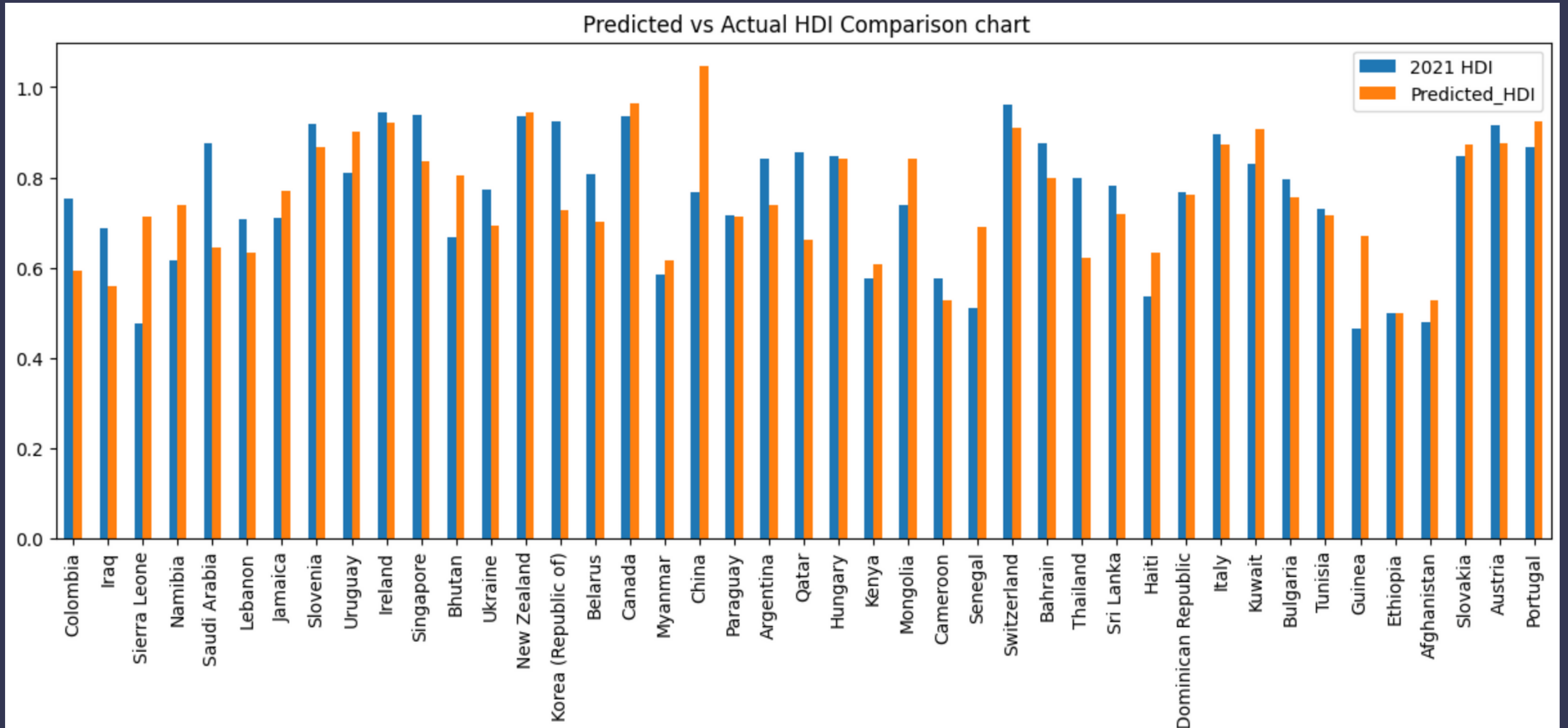
$$\beta_0 + \text{PM2.5} \cdot \beta_1 + \log(\text{Unemployment}) \cdot \beta_2 + \text{Stability} \cdot \beta_3 + \text{Gini} \cdot \beta_4 + \text{S\&J} \cdot \beta_5 + \varepsilon$$

## OLS Regression Results

Dep. Variable:	2021 HDI	R-squared:	0.590			
Model:	OLS	Adj. R-squared:	0.575			
Method:	Least Squares	F-statistic:	39.45			
Date:	Mon, 27 Nov 2023	Prob (F-statistic):	5.89e-25			
Time:	22:36:57	Log-Likelihood:	127.74			
No. Observations:	143	AIC:	-243.5			
Df Residuals:	137	BIC:	-225.7			
Df Model:	5					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]
const	0.9321	0.045	20.720	0.000	0.843	1.021
PM2.5_Recent	-0.0008	0.000	-2.212	0.029	-0.002	-8.5e-05
Log_Unemployment	0.0262	0.011	2.375	0.019	0.004	0.048
Political Stability and absence of violence	0.1016	0.010	9.738	0.000	0.081	0.122
GINI	-0.0043	0.001	-5.109	0.000	-0.006	-0.003
Scientific and Technical journal articles	3.284e-07	1.22e-07	2.685	0.008	8.66e-08	5.7e-07
=====						
Omnibus:	0.842	Durbin-Watson:	2.120			
Prob(Omnibus):	0.656	Jarque-Bera (JB):	0.456			
Skew:	-0.009	Prob(JB):	0.796			
Kurtosis:	3.276	Cond. No.	3.93e+05			
=====						



# New Model Prediction vs Actual



# Conclusion

Understanding influential factors allows for more tailored future plans for each country.

- **Indicators** beyond lifespan and GNI play a crucial role in HDI.
- Our **analysis** focused on five predictors, each influencing human development.
- Our **recommendations** include pushing for policy changes surrounding these indicators.



- Future **efforts** could involve creating more granular models at the local or county level.
- Targeted **approaches** help allocate resources efficiently to improve livelihoods and development.





Thank You  
for Listening