

Exploring the Intersection of Religion, Education, and Economic Welfare: A Global Analysis

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Abstract—This study explores the intricate relationship between religiousness, educational attainment, and economic welfare, as reflected in the Human Development Index (HDI), across five countries: Norway, Australia, Saudi Arabia, India, and Afghanistan. Utilizing datasets spanning 1990 to 2010, the analysis focuses on identifying correlations between non-religiosity, education, and HDI. The study employs dimension reduction, correlation analysis, and regression models to extract meaningful insights. Findings reveal diverse relationships between these factors across different socio-cultural contexts. The study highlights the complexity of societal development and the nuanced roles played by education and religious beliefs in shaping it. This research provides valuable perspectives for policymakers and contributes to the broader understanding of global human development dynamics.

Index Terms—Human Development Index, Religious Beliefs, Educational Attainment, Economic Welfare, Global Analysis, Dimension Reduction, Regression Analysis, Societal Development

I. INTRODUCTION

In a world shaped by complicated social dynamics and evolving ideologies, understanding the relation between fundamental aspects like religious beliefs, educational attainment, and societal progress remains a comprehensive and intriguing analysis. This study embarks on an exploration of the intertwined relationships between religiousness, education, and the Human Development Index (HDI), seeking to unravel their interconnected impacts on global development.

A. Overview

Religiousness, a cornerstone of cultural identity and belief systems that helps humanity to rule big communities, often stands as a defining element within societies. Examining its correlation with the Human Development Index (HDI), a comprehensive metric gauging nations' overall development, provides insight into how faith and societal progress interplay.

Education, a fundamental catalyst for individual and collective advancement, significantly impacts economic growth and social welfare. Investigating the relationship between education levels and the HDI provides a nuanced perspective on the role of knowledge and skills in shaping overall societal development. Education not only empowers individuals but also lays the foundation for prosperous, knowledge-based economies, making it a critical aspect of societal progress.

This study delves into an extensive dataset spanning the period from 1990 to 2010, a time marked by profound global transformations. By examining this era, we aim to capture the dynamic shifts in religiousness, educational achievements, and HDI, unraveling the evolving trends and correlations during this significant period.

Through a comprehensive analysis, this research seeks to uncover patterns, discern correlations, and provide insights into how religious beliefs and education intertwine with a nation's progress. These findings hold the potential to inform policymakers and stakeholders, guiding future strategies for societal and educational reforms aimed at fostering holistic development.

B. Motivation

Understanding the complex links between religious beliefs, educational achievement and societal progress is of paramount importance in today's global environment. Deeply embedded in the fabric of societies, these elements play crucial roles in shaping values, guiding behavior and influencing policy decisions, thus significantly affecting a nation's development trajectory.

Acting as a reservoir for cultural identity and social norms, religiosity often plays a fundamental role in shaping societies. By examining correlations between religious beliefs and a country's Human Development Index (HDI), we aim to uncover potential insights into how faith-based values influence various aspects of societal well-being. Examining religiosity and its relationship with the HDI can shed light on the impact of faith on social cohesion, ethical frameworks and the provision of social services, and provide valuable insights for policymakers and social scientists.

Education is a critical determinant of a nation's progress, universally recognized as a powerful tool for individual empowerment and social progress. Examining the relationship between education and HDI helps to illuminate the multifaceted impact of knowledge and skills on social development. Identifying correlations between education and HDI can inform strategies for improving education systems, promoting economic growth and supporting social equity.

The importance of this study lies in its potential to uncover nuanced relationships and trends between religiosity, education and social development. By exploring these dynamics, we can

gain insights into how these factors interact and influence the broader landscape of social well-being, offering avenues for informed policy interventions and social reforms.

Moreover, analyzing historical trends from 1990 to 2010, together with the rapid social changes occurring on a global scale, provides a valuable context for understanding the evolution of these relationships. By examining this transformative period, we aim to capture nuanced shifts and correlations, providing a holistic view of the intertwined effects of religious beliefs, education and social progress.

This research aims to provide evidence-based insights that can shape strategies to promote inclusive, knowledge-driven and socially cohesive societies in an ever-evolving world

Research Questions

This study aims to explore the multifaceted relationships between religiousness, educational attainment, and societal development within the available temporal frameworks. The overarching research question followed by related sub-questions is as follows:

Main Research Question:

How do religiousness, educational attainment, and societal development interact within the context of the Human Development Index (HDI) during the available timeframes (1945 to 2010 for religious data and 1990 to 2021 for other datasets)?

Sub-questions:

- 1) What correlations exist between religious beliefs (1945-2010) and a nation's Human Development Index during the overlapping period (1990-2010)?
 - This sub-question aims to identify any discernible relationships between religiousness and the overall societal progress captured by the HDI within the available overlapping timeframe.
- 2) How does educational attainment (1990-2021) correlate with the Human Development Index across different countries or regions during the available timeframe?
 - Exploring the relationship between education levels and societal development within the available timeframe (1990-2021) provides insights into their interconnectedness as reflected in the HDI.
- 3) To what extent do changes in religiousness (1945-2010) and education levels (1990-2021) account for variations in the Human Development Index over the corresponding periods?
 - This sub-question delves into the relative impacts of shifts in religious beliefs and educational achievements on fluctuations in the HDI, within the respective available temporal frameworks.

Despite the differing timeframes of the datasets, addressing these interrelated research questions will help unravel the complex dynamics between religiousness, education, and societal progress, offering insights into the evolving nature of societal development across diverse contexts and time periods.

II. METHOD

A. Dataset

1) *Overview:* The datasets utilized in this study encompass a comprehensive exploration of global human development and religious adherence, offering multifaceted insights into societal progress and religious demographics across distinct timeframes.

Correlates of War: World Religions

Complementing the examination of human development, the World Religion Project furnishes detailed insights into religious adherence worldwide since 1945. This dataset meticulously documents the number of adherents by religion across international states in half-decade increments. The project's endeavor to categorize religions into families enriches the dataset, providing granularity in understanding religious demographics.

The project's meticulous approach involves a systematic classification of major religions and religious families, achieved through comprehensive literature reviews and data compilation from major sources. This dataset allows for an exploration of religious adherence trends, understanding the distribution of adherents across different religions and families, and tracking changes in religious demographics over time.

Human Development World Index

The Human Development Index (HDI) serves as a pivotal metric, encapsulating key dimensions of human progress - a healthy life, knowledge, and a decent standard of living. By combining normalized indices for health, education, and standard of living, the HDI provides a holistic assessment of a nation's development. Beyond HDI, several composite indices such as the Multidimensional Poverty Index (MPI), Inequality-adjusted Human Development Index (IHDI), and Gender Inequality Index (GII) offer broader perspectives on human development, inequality, and gender disparity.

Within this dataset, a plethora of indicators ranging from life expectancy and education levels to income measures and societal inequalities paint a nuanced picture of global human development. The dataset not only captures achievements in education and health but also addresses societal disparities and gender-based variations, offering a holistic understanding of societal progress beyond mere economic factors.

By leveraging these datasets, this study aims to bridge the understanding between religious adherence, societal development, and the nuanced dynamics shaping our global landscape.

2) *Attributes:* We synchronized the temporal range from 1990 to 2010 by isolating and consolidating relevant columns in the 'Human Development Index' dataset. This alignment enabled a comprehensive analysis and comparison with the 'National Dataset' for shared intervals from 1990, 1995, 2000, 2005, to 2010.

Correlates of War: World Religions

The World Religion Dataset encompasses a range of attributes providing insights into religious adherence globally since 1945. Some key attributes include:

- **Year and State Information:** Observations across different half-decade periods and international states.
- **Religious Adherence:** Details on adherents of major religions (Christianity, Judaism, Islam, Buddhism, etc.) across states.
- **Population Information:** Contextualizing population associated with each religious adherence observation.

Human Development World Index

The Human Development Index (HDI) Dataset includes attributes reflecting various dimensions of global human development. Some essential attributes include:

- **Country Information:** ISO 3-letter country codes and country names.
- **HDI and Components:** Values representing Human Development Index components like life expectancy, education, and income indicators.
- **Gender-related Metrics:** Metrics like the Gender Development Index and Gender Inequality Index.
- **Socioeconomic Factors:** Indicators related to labor force participation, maternal mortality, carbon emissions, etc.

These datasets offer insights into religious demographics and global human development across multiple years (1990, 1995, 2000, 2005, 2010), enabling analysis of trends and changes over time.

B. Method for Answering Research Questions

To effectively analyze our dataset, our first step involved reducing its dimensionality. Given the initial dataset comprised over 300 columns, a dimension reduction was crucial to focus our analysis on the most relevant variables and to avoid issues related to high dimensionality, such as overfitting and computational inefficiency.

1) *Dimension Reduction:* We selected key indicators that are pivotal to understanding the interplay between religious beliefs, education, and societal development. The primary variables chosen for this analysis were:

- **No Religion Percentage:** To capture the extent of non-religiosity within each country.
- **Human Development Index (HDI):** As a comprehensive measure reflecting overall societal development.
- **Gross National Income (GNI) per Capita:** Providing an economic perspective to the analysis.
- **Expected Years of Schooling:** To gauge the education level within each country.

Additionally, to further enrich our analysis, we considered incorporating other relevant variables such as **Life Expectancy at Birth**, **Gender Inequality Index**, and **Material Footprint**. These additional factors offer broader insights into the development and wellbeing within the countries in question.

2) *Statistical Analysis:* Following the dimension reduction, we embarked on a detailed statistical analysis to address our research questions. This involved:

- 1) *Correlation Analysis:* To explore the relationships between religious beliefs (measured by No Religion Percentage) and HDI, as well as between educational attainment (measured by Expected Years of Schooling) and HDI.
- 2) *Regression Analysis:* Employing multiple regression models to assess the extent to which changes in religiousness and education levels can account for variations in HDI over time.

Each analysis was conducted separately for the selected countries — Norway, Australia, Saudi Arabia, India, and Afghanistan — to allow for a comparative understanding of these relationships in different socio-economic and cultural contexts.

III. RESULTS

A. Descriptive Analysis

To gain a comprehensive understanding of the combined dataset, we embark on a descriptive analysis. This involves exploring the key components and summary statistics encapsulated within the dataset, shedding light on the interplay between religious adherence and human development indicators.

1) *Overview of the Integrated Dataset:* The integrated dataset consolidates a wealth of information from disparate sources, harmonizing religious adherence data and human development indicators for a cohesive analytical experience. Comprising columns delineating religious affiliations, human development indices, and country-specific details, the integrated dataset provides a comprehensive canvas for in-depth analysis.

2) *Key Attributes:* Within this integrated dataset, key attributes encompass:

- **Population and Religious Affiliation:** Percentage breakdowns of religious adherence across various denominations within each country.
- **Human Development Indicators:** A spectrum of metrics reflecting life expectancy, educational attainment, income levels, and gender-related indices, facilitating a comprehensive view of developmental landscapes over time intervals.
- **Geographical Representation:** Spanning a comprehensive array of countries, offering a global panorama for comparative analyses.

This integrated dataset forms the foundation for a holistic exploration of the interrelationships between religious adherence and human development indicators. Next, we delve into specific trends and statistical insights within the dataset.

3) *Central Tendency Measures:* The choice of focusing on data from the year 2010 was deliberate, aiming to capture a snapshot of the most recent trends and patterns. Among the array of available columns, these specific attributes were handpicked for their relevance in reflecting the contemporary state of our dataset.

Population (2010): The statistics revealed a wide-ranging population landscape, with an average of 55.7 million and a

median of 9.4 million. This discrepancy indicates the presence of significant variations among the observed entities, possibly highlighting diverse population sizes across regions.

No Religion Percentage (2010): Notably, the distribution of non-religious populations exhibited interesting diversity, ranging from minimal percentages to higher proportions. The mean of 8% and a median of 3% emphasize the varying degrees of religious affiliations among different entities.

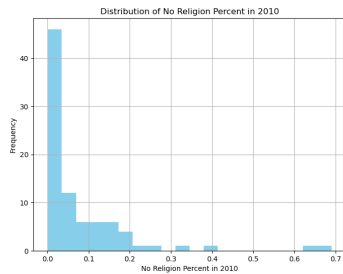


Fig. 1. Histogram for No Religion Percentage (2010)

Human Development Index (2010): A moderate mean HDI of 0.70 signifies a considerable level of overall development. The relatively consistent distribution, centered around the median of 0.71, suggests a balanced development status across the observed entities.

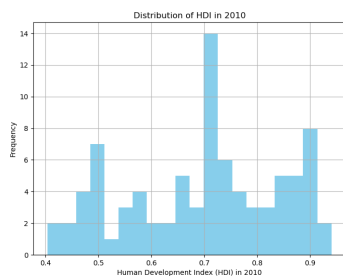


Fig. 2. Histogram for Human Development Index (2010)

Expected Years of Schooling (2010): Educational expectations varied noticeably, with an average of 12.83 years and a median of 12.82 years. However, the mode at 6.02 years hints at certain entities having significantly lower anticipated years of schooling.

Gross National Income Per Capita (2010): Economic disparities were evident, showcased by a mean GNI per capita of 17,759.51 units and a median of 10,165.18 units. This difference indicates varying economic strengths among the observed entities, possibly influenced by outliers.

These insights paint a nuanced picture of socio-economic and developmental characteristics in 2010. The disparities between mean, median, and mode values in specific attributes highlight the complex and varied nature of these entities, suggesting the need for a deeper exploration of the underlying factors contributing to these differences.

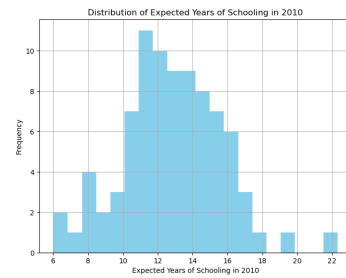


Fig. 3. Histogram for Expected Years of Schooling (2010)

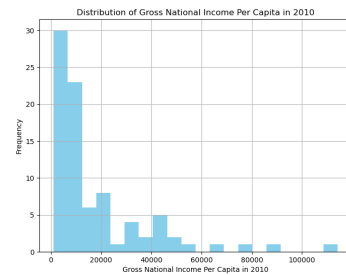


Fig. 4. Histogram for Gross National Income Per Capita (2010)

4) Country Analysis Trends: Selecting representative countries across different characteristics can provide diverse insights into the dataset. Here's five countries representing different regions or attributes:

- **Afghanistan:** Representing a country possibly experiencing challenges in terms of HDI, education, and economic development.
- **Australia:** Reflecting a developed nation with higher HDI, better education, and a stronger economy.
- **India:** A populous country showcasing a mix of varied development levels across different states or regions.
- **Norway:** An example of a country often ranked high in HDI, education, and economic indices.
- **Saudi Arabia:** Representing a country with potential economic strength but possible disparities in education and HDI between population groups.

Selecting these five diverse countries can offer a broad perspective on the dataset, covering various socio-economic and developmental aspects across different regions and development levels.

Religious Adherence Trends: The trends in religious adherence depict diverse patterns across selected countries. Afghanistan shows a consistent religious adherence, while Australia showcases a gradual rise in non-religious populations. India exhibits fluctuating religious patterns due to its diverse demographics.

	Mean	Median	Mode	Std. Deviation
Pop.	55.7M	9.4M	10,067	194.9M
No Relig.	0.08	0.03	0.00	0.12
HDI	0.70	0.71	0.91	0.15
Exp. School.	12.83	12.82	6.02	2.83
GNI Per Cap.	17.8K	10.2K	1.05K	20.6K

TABLE I
CENTRAL TENDENCY MEASURES

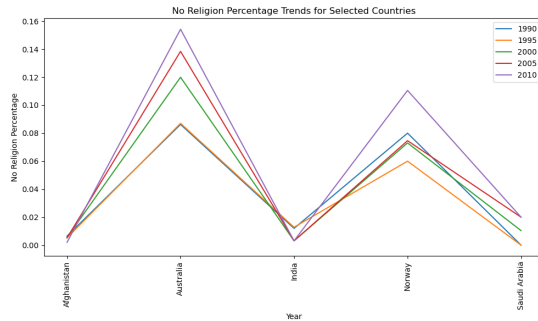


Fig. 5. Trends in non-religious population percentages across selected countries.

Education Trends: In terms of education, Afghanistan lags behind in educational indicators, while Australia boasts higher educational attainment levels. India displays varying educational trends, reflecting regional disparities and diverse education systems but overall still it keeps getting higher in years.

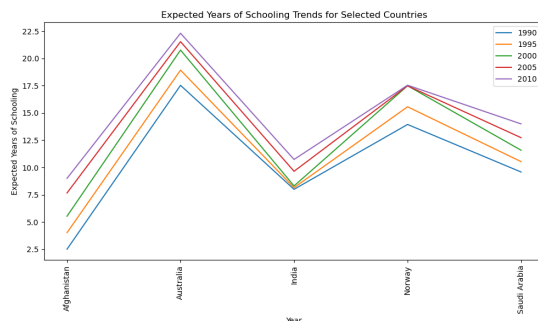


Fig. 6. Trends in expected years of schooling across selected countries.

Economic Trends: Economically, Afghanistan faces challenges evident in economic indicators, while Australia displays stability and development. India's economic trends are diverse, reflecting different economic landscapes across regions and that might be the reason behind this low augmentation.

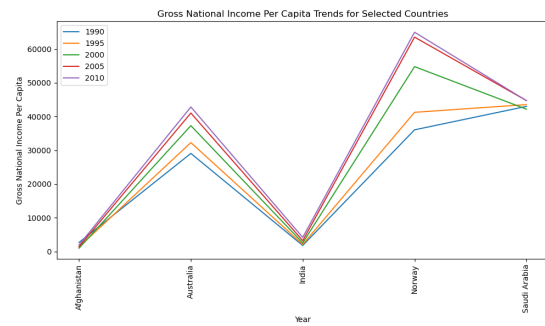


Fig. 7. Trends in Gross National Income (GNI) per capita across selected countries.

Human Development Trends: Regarding the Human Development Index (HDI), Afghanistan's low HDI indicates room for significant developmental improvement, contrasting with Australia's high HDI, reflecting advanced development. Overall, however, we can see that all countries are getting better on the HDI.

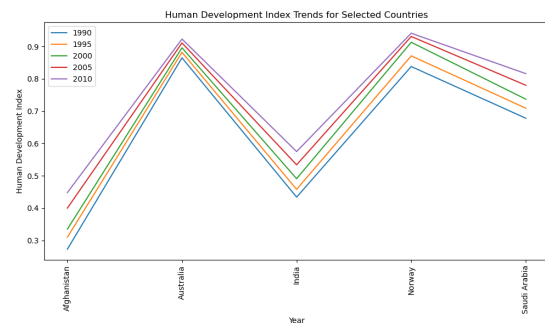


Fig. 8. Trends in Human Development Index (HDI) across selected countries.

These figures display the trends observed in selected indicators among various countries. Each image highlights the variations and changes in the respective indicators over the specified time periods.

5) *Investigating Potential Outliers in 2010 Metrics:* During the comprehensive analysis of various attributes for the year 2010, distinct observations were made concerning different indicators across countries.

Population (2010)

China and India stand out as potential outliers in terms of population. These countries exhibit significant deviations from the norm, reflecting their substantial demographic weight compared to other nations.

Human Development Index (2010)

No outliers were identified for the Human Development Index in the dataset for the year 2010. The distribution of this metric appears consistent across all considered countries during this period.

Expected Years of Schooling (2010)

Australia emerges as a potential outlier in terms of expected years of schooling. This observation signifies a notable difference from the general trend observed across other countries for the given year.

Religious Adherence Percentage (2010)

Estonia and North Korea showcase unique profiles in terms of religious adherence percentages. These countries exhibit distinct patterns compared to the broader distribution, suggesting a divergence from the norm within this metric.

Gross National Income Per Capita (2010)

Liechtenstein and Qatar are identified as potential outliers in gross national income per capita. These countries portray significant deviations from the mean, indicating distinctive economic circumstances compared to other nations.

Identifying such outliers provides valuable insights into exceptional cases within the dataset, potentially indicating specific socio-economic or developmental characteristics deserving further scrutiny.

B. Analysis for Answering Research Questions

We begin our analysis by addressing our sub-questions:

• What correlations exist between religious beliefs and a nation's HDI?

Country Code	Pearson Coefficient	Alpha
NOR	0.4835	0.4093
AUS	0.9669	0.0072
SAU	0.9482	0.0140
IND	-0.8305	0.0816
AFG	-0.8715	0.0542

TABLE II

PEARSON CORRELATION COEFFICIENTS AND ALPHA BY COUNTRY

- *Norway*: Exhibited a moderate positive correlation (0.4835) between non-religiosity and HDI, but the result was not statistically significant ($\alpha = 0.4093$), indicating an inconclusive relationship.
- *Australia*: Demonstrated a strong positive correlation (0.9669), which was statistically significant ($\alpha = 0.0072$). This suggests a substantial link between non-religiosity and higher HDI.
- *Saudi Arabia*: Also showed a strong positive correlation (0.9482) with statistical significance ($\alpha = 0.0140$), indicating a similar trend to Australia.
- *India*: Revealed a strong negative correlation (-0.8305), yet the result was not statistically significant ($\alpha = 0.0816$), leading to an ambiguous interpretation.
- *Afghanistan*: Indicated a strong negative correlation (-0.8715), but with a p-value marginally exceeding the typical threshold of significance ($\alpha = 0.0542$), suggesting a potential but not definitive relationship.

These varied results across different countries suggest that the relationship between religious beliefs and HDI is complex and may be influenced by other societal, cultural, economic, and political factors.

• How does educational attainment correlate with the Human Development Index across different countries?

- *Norway*: A strong positive correlation (0.9716) was observed, statistically significant ($\alpha = 0.0057$), sug-

Country Code	Pearson Coefficient	Alpha
NOR	0.9716	0.0057
AUS	0.9887	0.0014
SAU	0.9989	0.00004
IND	0.9620	0.0088
AFG	0.9929	0.0007

TABLE III

PEARSON CORRELATION COEFFICIENTS AND ALPHA FOR EDUCATION AND HDI BY COUNTRY

gesting a clear link between higher education levels and HDI.

- *Australia*: Demonstrated a similarly strong positive correlation (0.9887) with significant statistical backing ($\alpha = 0.0014$), reinforcing the notion that education significantly impacts HDI.
- *Saudi Arabia*: Exhibited an extremely strong positive correlation (0.9990), with a very low p-value ($\alpha \approx 4.06 \times 10^{-5}$), indicating a robust relationship between education and HDI.
- *India*: Revealed a strong positive correlation (0.9620) with statistical significance ($\alpha = 0.0088$), pointing to a substantial association between educational attainment and HDI.
- *Afghanistan*: Showed a very strong positive correlation (0.9929) and was statistically significant ($\alpha = 0.0007$), highlighting the importance of education in relation to HDI.

Across all five countries, there is a consistent and statistically significant positive relationship between educational attainment and HDI. This consistency underscores the critical role of education in societal development and its impact on improving human development indices.

• To what extent do changes in religiousness and education levels account for variations in the Human Development Index?

Country	R ²	P-NoRelig	P-EduYrs	F-Stat Prob
NOR	0.997	0.866	0.211	0.0642
AUS	0.999	0.482	0.401	0.0373
SAU	0.998	0.839	0.398	0.0560
IND	1.000	0.159	0.049	0.0101
AFG	1.000	0.030	0.026	0.00692

TABLE IV

OLS REGRESSION ANALYSIS RESULTS BY COUNTRY

- *Norway*: The model indicates a high R-squared value (0.997), suggesting that changes in religiousness and education levels account for a significant portion of the variance in HDI. However, individual predictors like religiousness did not show a significant impact ($P > |t|$ for noreligion_percent = 0.866).
- *Australia*: Similar to Norway, the model shows a high explanatory power (R-squared = 0.999), but the influence of religiousness is not statistically significant ($P > |t| = 0.482$).
- *Saudi Arabia*: The model has an R-squared of 0.998, indicating a good fit. However, neither religiousness

nor education showed a statistically significant impact.

- *India*: The model demonstrates excellent fit ($R\text{-squared} = 1.000$) with statistically significant coefficients for all predictors, indicating that both religiousness and education significantly impact HDI.
- *Afghanistan*: This model also shows a perfect fit ($R\text{-squared} = 1.000$), with all predictors, including religiousness and education, having a statistically significant impact on HDI.

These results suggest that while changes in religiousness and education levels can account for a significant portion of the variance in HDI in all countries, the individual impact of these factors varies. In some cases, such as in India and Afghanistan, both factors play a significant role, while in others, like Norway and Australia, their individual impacts are not statistically significant.

IV. CONCLUSION

A. *Summary and Future Works*

This study embarked on an in-depth analysis of the interplay between religiousness, educational attainment, and the Human Development Index (HDI) across five diverse countries: Norway, Australia, Saudi Arabia, India, and Afghanistan. Through a meticulous process of dimension reduction, we concentrated our analysis on key indicators including No Religion Percentage, HDI, Gross National Income (GNI) per Capita, and Expected Years of Schooling.

Our findings revealed that the relationship between non-religiosity and HDI varied significantly across countries, with some showing strong positive correlations and others displaying non-significant trends. In the case of educational attainment, a more consistent pattern emerged, highlighting a strong positive correlation with HDI across all examined nations. This underscores the pivotal role of education in driving human development.

Moreover, the regression analysis provided insights into how changes in religiousness and education levels influence HDI. While the impact of these factors varied, the analysis suggested their significant role in shaping societal development.

Future Works: Looking forward, this study opens avenues for further research. Considering the complexity of societal development, future analyses could benefit from incorporating additional aspects of development such as the Gender Inequality Index, Life Expectancy at Birth, and Material Footprint per Capita. These indicators could provide a more holistic view of development, allowing for a richer understanding of the multifaceted nature of human progress. Additionally, expanding the scope to include more countries and conducting longitudinal studies over extended periods could offer deeper insights into global trends and country-specific dynamics.

In conclusion, our study highlights the intricate relationship between religiousness, education, and human development, providing valuable insights for policymakers and researchers interested in the multifaceted nature of societal progress.