# Corruption and Environment: Wider Perspective to Human Development Index, Cross-Country Analysis

PRINCY JAIN

**Abstract:**
*United Nations Development Programme provides Human Development Index which serves as a reliable measure of level of development of the nations. It includes health index, education index and income index calculated using varied economic variables. The objective of this study is to make this development indicator more comprehensive by introducing corruption and environment as additional parameters for measuring extent of development of nations.*

**Keywords:** *Cross-Country analysis, Corruption, Education index, Environment, HDI*

## 1. Introduction

The HDI serves as a frame of reference for both social and economic development. It is a summary measure for monitoring long-term progress in a country's average level of human development in three basic dimensions: a long and healthy life, access to knowledge and a decent standard of living. Still HDI neglects important aspects of development, such as disparities in access to the benefits of public goods and services, environment and ecosystem health, freedom from military burdens, population growth rate etc.

The paper will involve the introduction of environment and corruption index [one by one] in HDI and show the results [for 2010] to evaluate the variations in the human development scores. Hence, the paper will help understand the deprivations inflicted on people in some countries that earlier HDI could not convey.

## 2. Environment and Corruption: Dimensions of human development

Human development is the expansion of people's freedom and capabilities to lead lives they value. Many ends are necessary for a good life; ends that can be intrinsically as well as instrumentally valuable, like biodiversity or natural beauty may be valuable to us over and above the health implications of quality of environment. Environmental health which measures stresses to human health, and ecosystem vitality, which measures ecosystem health and natural resource management, are two important components of the Environment performance Index (EPI), and thus, EPI shall be an important indicator of human development.

Moreover, human development relates to capability deprivation, and thus, it is also affected by the degree of transparency in a country. Corruption is commonly defined as the misuse of public office for personal gain. Corruptive practices include bribery, kickbacks, coercion, and related activities that provide an unfair advantage to one party. These practices undermine fair trade, waste resources, defraud the public, and increase human suffering. When funding goes to corrupt officials instead of the intended public infrastructure, the community suffers for the loss of those funds. The amount of public expenditure misguides about the nation's human development, since it depends on the level of corruption that how much of the benefit of that expenditure reaches the public in reality.
Hence, to judge the countries on basis of actual levels of social and economic well-being an indicator should be constructed which takes into consideration the environment quality and degree of corruption across nations.

## 3. Model and Methodology

$$C = \frac{(CPI - CPI^{min})}{(CPI^{max} - CPI^{min})}, E = \frac{(EPI - EPI^{min})}{(EPI^{max} - EPI^{min})}$$

Where, CPI is Corruption Perceptions Index and E is Environmental Performance Index

Since even the worst countries will also enjoy some basic level of environmental quality and some transparency in the political systems, and even the best ones may not be able to achieve a full score on environment and corruption, little manipulation is done with the indicators to transform them into indices between 0 and 1, so that the true position of countries relative to the rest of world can be accessed. Further, this makes the index a pure number, and now the index is comparable to other indicators of human development which are calculated in a similar fashion. The maximum and minimum are the observed values for 2010 i.e. $CPI^{max}$=9.3(New Zealand, Denmark, and Singapore) and $CPI^{min}$=1.1(somalia[1*]), $EPI^{max}$=93.5(Iceland) and $EPI^{min}$=32.1(Sierra Leone).*(note: 1. Somalia is not in the list of countries that are included by UNDP in HDI computation.)

Once the corruption and environment index is constructed, we can compute the new human development index that accounts for these indicators along with income, education, and health dimensions. It will be the geometric mean of the four normalised indices measuring achievements in each dimension.

A, B and D represent Income index, Education index and Life Expectancy index respectively. HDI'' refers to HDI after introducing environment within health index and HDI''' refers to HDI after introducing corruption index.

$HDI=(ABD)^{1/3} \rightarrow ABD=(HDI)^3$

**HDI'''**$=(ABDC)^{1/4} = (ABD)^{1/4}.C^{1/4} = (HDI^3)^{1/4}.C^{1/4} = HDI^{3/4}.C^{1/4}$

Since environment quality of any nation will majorly affect health status of the population, it can be perceived as a determinant of health indicator, and thus, the new health indicator can be based on both life expectancy and environment performance. Hence, the new environment adjusted HDI i.e. HDI'' can be computed as the geometric mean of income, education, and health index ,where health index is the geometric mean of life expectancy index and environment index.

**HDI''**$=A^{1/3}.B^{1/3}(D^{1/2}.E^{1/2})^{1/3} =(ABD)^{1/3} . (E/D)^{1/6} =HDI. (E/D)^{1/6}$

## 4. Analysis

### *4.1 HDI after introducing corruption index (HDI''')*

Among 'very high development' countries, New Zealand, Sweden, Denmark, Finland, Singapore, are some countries whose human development levels improve when corruption in these nations is taken into consideration; where the outliers are New Zealand ,Denmark and Singapore with highest level of transparency in their systems. Norway maintains its 1st rank with a very slight reduction in HDI due to corruption and new HDI score being 0.934 .In contrast to this, USA, Israel, Italy, Greece, Argentina, and Croatia are relatively more corrupt and experience a deduction in their HDIs. Mexico, Libyan Arab Jamahiriya, Russian federation, Venezuela, Ukraine and Iran saw large reductions in HDI and a loss in their HDI rank.

An Asian 'medium development' nation which showcases exceptionally good performance is Bhutan with marginal increase in HDI from 0.518 to 0.528; whereas Turkmenistan, Paraguay, Maldives, Kyrgyzstan, Equatorial Guinea, and particularly Uzbekistan and Iraq are highly corrupt nations and observe a severe drop in HDI.

For 'low development' countries the corruption adjustment in HDI does not change their position in the HDI ranking much since almost all of them observe severe deteriorations in HDI and remain the least developed countries.

### *4.2 HDI after introducing environment within health index (HDI'')*

There are some 'very high development' countries that do not have a very good environmental quality; some of them are Australia, United States, Republic of Korea, Belgium, Qatar, Bahrain, and the worst performer United Arab Emirates. Whereas there are some countries who are able to maintain higher levels of human development, such as Sweden, Switzerland, Austria, France, Slovakia, Malta, Latvia, and best performance shown by Iceland. Norway still maintains its top rank with maximum environment adjusted HDI value 0.912.

China and India along with Turkmenistan, Mongolia, Uzbekistan, Indonesia, Iraq, and Cambodia have bad environmental quality and experience large enough deductions in their HDI scores. But among the 'medium development' countries there are also some countries which experienced only little deductions in HDI on account of environment performance, these are Suriname, Philippines, morocco, Swaziland and Bhutan.

Among the 'low development' countries, Nepal is one nation that shows a fair performance, rest of them mostly show a very bad performance.

## 5. Discussion

The analysis conveys that in some nations like Italy, Greece, and Argentina which otherwise showcase a very high human development , are actually highly corrupt and thus , in reality their populations are much more deprived in terms of social well-being. In contrast, Bhutan(HDI rank 141), which otherwise is low-medium development country is less corrupt and after adjusting for corruption in HDI is not much worse than Argentina(HDIrank45). Rather, India (HDIrank134) is highly corrupt and is much behind Bhutan.

Further, the study brings out the change in relative positions of countries after introduction of environment index as a part of health index. It can be observed that 'very high development' countries like United Arab Emirates, Qatar, and Bahrain are much behind a 'high development' nation like Cuba and also 'medium development' nation like Suriname when accounted for environment performance. Once again India lies behind Bhutan in adjusted HDI as was case in corruption adjustment; further, Nepal which is otherwise a 'low development nation' is only slightly behind India in adjusted HDI.

## 6. Concluding Remarks

The Human Development Index is potentially a powerful instrument for world social development. But it deserves careful study for validity and consistency with broad and universal public objectives, and it demands development so that it accurately tracks these objectives. In its present form it has some limitations, which can be overcome by widening the scope of HDI by introducing new dimensions and perceiving original HDI as the target(since it will then convey potential human development if the nation performs perfectly on all other dimensions) for policy-formulation.

## References

1. Human Development Report 2012 and 2011 summary.
2. Martin Ravallion (2012). Troubling tradeoffs in the Human Development Index, Journal of Development Economics 99 (2012) 201–209.
3. Niels, C. Lind (1992). Some Thoughts on the Human Development Index, Social Indicators Research, Vol. 27, No. 1, pp. 89-101.

4. Randi Sims, Baiyun Gong, Cynthia P. Ruppel (2012). A contingency theory of corruption: The effect of human development and national culture, The Social Science Journal 49 (2012) 90–97.
5. Transparency International,http://www.transparency.org/policy_research/surveys_indices/cpi.
6. www.undp.org

**Appendix**

| HDI rank | Country | HDI 2010 | EPI 2010 | CPI 2010 | D 2010 | E | C | HDI" | HDI"' |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Norway | 0.941 | 81.1 | 8.6 | 0.961 | 0.798 | 0.915 | 0.912 | 0.934 |
| 2 | Australia | 0.927 | 65.7 | 8.7 | 0.974 | 0.547 | 0.927 | 0.842 | 0.927 |
| 4 | United States | 0.908 | 63.5 | 7.1 | 0.921 | 0.511 | 0.732 | 0.823 | 0.860 |
| 5 | New Zealand | 0.908 | 73.4 | 9.3 | 0.954 | 0.673 | 1.000 | 0.857 | 0.930 |
| 10 | Sweden | 0.901 | 86 | 9.2 | 0.967 | 0.878 | 0.988 | 0.887 | 0.922 |
| 11 | Switzerland | 0.901 | 89.1 | 8.7 | 0.981 | 0.928 | 0.927 | 0.893 | 0.907 |
| 14 | Iceland | 0.896 | 93.5 | 8.5 | 0.973 | 1.000 | 0.902 | 0.900 | 0.898 |
| 15 | Korea (Republic of) | 0.894 | 57 | . | 0.954 | 0.406 | #### | 0.775 | ##### |
| 16 | Denmark | 0.893 | 69.2 | 9.3 | 0.925 | 0.604 | 1.000 | 0.832 | 0.919 |
| 17 | Israel | 0.886 | 62.4 | 6.1 | 0.968 | 0.493 | 0.610 | 0.792 | 0.807 |
| 18 | Belgium | 0.885 | 58.1 | 7.1 | 0.946 | 0.423 | 0.732 | 0.774 | 0.844 |
| 19 | Austria | 0.883 | 78.1 | 7.9 | 0.957 | 0.749 | 0.829 | 0.848 | 0.869 |
| 20 | France | 0.883 | 78.2 | 6.8 | 0.968 | 0.751 | 0.695 | 0.846 | 0.832 |
| 22 | Finland | 0.88 | 74.7 | 9.2 | 0.943 | 0.694 | 0.988 | 0.836 | 0.906 |
| 24 | Italy | 0.873 | 73.1 | 3.9 | 0.974 | 0.668 | 0.341 | 0.820 | 0.690 |
| 26 | Singapore | 0.864 | 69.6 | 9.3 | 0.962 | 0.611 | 1.000 | 0.801 | 0.896 |
| 29 | Greece | 0.862 | 60.9 | 3.5 | 0.943 | 0.469 | 0.293 | 0.767 | 0.658 |
| 30 | United Arab Emirates | 0.845 | 40.7 | 6.3 | 0.889 | 0.140 | 0.634 | 0.621 | 0.786 |
| 35 | Slovakia | 0.832 | 74.5 | 4.3 | 0.871 | 0.691 | 0.390 | 0.800 | 0.689 |
| 36 | Malta | 0.83 | 76.3 | 5.6 | 0.937 | 0.720 | 0.549 | 0.794 | 0.748 |
| 37 | Qatar | 0.825 | 48.9 | 7.7 | 0.919 | 0.274 | 0.805 | 0.674 | 0.820 |
| 42 | Bahrain | 0.805 | 42 | 4.9 | 0.866 | 0.161 | 0.463 | 0.608 | 0.701 |
| 43 | Latvia | 0.802 | 72.5 | 4.3 | 0.837 | 0.658 | 0.390 | 0.770 | 0.670 |
| 45 | Argentina | 0.794 | 61 | 2.9 | 0.879 | 0.471 | 0.220 | 0.716 | 0.576 |
| 46 | Croatia | 0.794 | 68.7 | 4.1 | 0.891 | 0.596 | 0.366 | 0.743 | 0.654 |
| 48 | Uruguay | 0.78 | 59.1 | 6.9 | 0.896 | 0.440 | 0.707 | 0.693 | 0.761 |
| 51 | Cuba | 0.773 | 78.1 | 3.7 | 0.93 | 0.749 | 0.317 | 0.746 | 0.619 |

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|---|---|---|---|---|---|---|---|---|---|
| 56 | Saudi Arabia | 0.767 | 55.3 | 4.7 | 0.847 | 0.378 | 0.439 | 0.670 | 0.667 |
| 57 | Mexico | 0.767 | 67.3 | 3.1 | 0.895 | 0.573 | 0.244 | 0.712 | 0.576 |
| 60 | Antigua and Barbuda | 0.763 | 69.8 | . | 0.828 | 0.614 | #### | 0.726 | ##### |
| 62 | Trinidad and Tobago | 0.758 | 54.2 | 3.6 | 0.787 | 0.360 | 0.305 | 0.665 | 0.604 |
| 63 | Kuwait | 0.758 | 51.1 | 4.5 | 0.859 | 0.309 | 0.415 | 0.639 | 0.652 |
| 64 | Libyan Arab Jamahiriya | 0.77 | 50.1 | 2.2 | 0.861 | 0.293 | 0.134 | 0.643 | 0.497 |
| 66 | Russian Federation | 0.751 | 61.2 | 2.1 | 0.765 | 0.474 | 0.122 | 0.693 | 0.477 |
| 69 | Costa Rica | 0.742 | 86.4 | 5.3 | 0.934 | 0.884 | 0.512 | 0.735 | 0.676 |
| 73 | Venezuela (Bolivarian Republic of) | 0.734 | 62.9 | 2 | 0.855 | 0.502 | 0.110 | 0.672 | 0.456 |
| 74 | Bosnia and Herzegovina | 0.731 | 55.9 | 3.2 | 0.876 | 0.388 | 0.256 | 0.638 | 0.562 |
| 76 | Ukraine | 0.725 | 58.2 | 2.4 | 0.76 | 0.425 | 0.159 | 0.658 | 0.496 |
| 77 | Mauritius | 0.726 | 80.6 | 5.4 | 0.839 | 0.790 | 0.524 | 0.719 | 0.669 |
| 81 | Dominica | 0.723 | .. | 5.2 | 0.905 | ##### | 0.500 | #### | 0.659 |
| 87 | Colombia | 0.707 | 76.8 | 3.5 | 0.844 | 0.728 | 0.293 | 0.690 | 0.567 |
| 88 | Iran (Islamic Republic of) | 0.707 | 60 | 2.2 | 0.832 | 0.454 | 0.134 | 0.639 | 0.467 |
| 89 | Oman | 0.704 | 45.9 | 5.3 | 0.833 | 0.225 | 0.512 | 0.566 | 0.650 |
| 101 | China | 0.682 | 49 | 3.5 | 0.84 | 0.275 | 0.293 | 0.566 | 0.552 |
| 102 | Turkmenistan | 0.681 | 38.4 | 1.6 | 0.707 | 0.103 | 0.061 | 0.494 | 0.373 |
| 104 | Suriname | 0.677 | 68.2 | . | 0.794 | 0.588 | #### | 0.644 | ##### |
| 107 | Paraguay | 0.662 | 63.5 | 2.2 | 0.824 | 0.511 | 0.134 | 0.611 | 0.444 |
| 109 | Maldives | 0.658 | 65.9 | 2.3 | 0.892 | 0.550 | 0.146 | 0.607 | 0.452 |
| 110 | Mongolia | 0.647 | 42.8 | 2.7 | 0.76 | 0.174 | 0.195 | 0.506 | 0.479 |
| 112 | Philippines | 0.641 | 65.7 | 2.4 | 0.764 | 0.547 | 0.159 | 0.606 | 0.452 |
| 115 | Uzbekistan | 0.636 | 42.3 | 1.6 | 0.757 | 0.166 | 0.061 | 0.494 | 0.354 |
| 118 | Botswana | 0.631 | 41.3 | 5.8 | 0.525 | 0.150 | 0.573 | 0.512 | 0.616 |
| 123 | South Africa | 0.615 | 50.8 | 4.5 | 0.509 | 0.305 | 0.415 | 0.565 | 0.557 |
| 124 | Indonesia | 0.613 | 44.6 | 2.8 | 0.772 | 0.204 | 0.207 | 0.491 | 0.467 |
| 126 | Kyrgyzstan | 0.611 | 59.7 | 2 | 0.748 | 0.450 | 0.110 | 0.561 | 0.398 |
| 130 | Morocco | 0.579 | 65.6 | 3.4 | 0.818 | 0.546 | 0.280 | 0.541 | 0.483 |
| 132 | Iraq | 0.567 | 41 | 1.5 | 0.765 | 0.145 | 0.049 | 0.430 | 0.307 |
| 133 | Cape Verde | 0.566 | .. | 5.1 | 0.852 | ##### | 0.488 | #### | 0.545 |

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|---|---|---|---|---|---|---|---|---|---|
| 134 | India | 0.542 | 48.3 | 3.3 | 0.711 | 0.264 | 0.268 | 0.459 | 0.455 |
| 135 | Ghana | 0.533 | 51.3 | 4.1 | 0.692 | 0.313 | 0.366 | 0.467 | 0.485 |
| 136 | Equatorial Guinea | 0.534 | 41.9 | 1.9 | 0.486 | 0.160 | 0.098 | 0.444 | 0.349 |
| 139 | Cambodia | 0.518 | 41.7 | 2.1 | 0.673 | 0.156 | 0.122 | 0.406 | 0.361 |
| 140 | Swaziland | 0.52 | 54.4 | 3.2 | 0.448 | 0.363 | 0.256 | 0.502 | 0.436 |
| 141 | Bhutan | 0.518 | 68 | 5.7 | 0.738 | 0.585 | 0.561 | 0.498 | 0.528 |
| 157 | Nepal | 0.455 | 68.2 | 2.2 | 0.764 | 0.588 | 0.134 | 0.436 | 0.335 |

Source:1.Corruption Perceptions Index (CPI) as given by Transparency International; data is based on expert assessment and opinion surveys conducted regarding the degree of corruption and reflects only the perceptions of business people.
2. HDI2010, EPI2010, D2010-HDI scores and ranking, EPI scores and life expectancy index respectively, as given by UNDP for 2010.