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Geographical analysis of income and well-being: Revisiting old debate

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Abstract
This paper uses data from the online statistical database (2012) of the World Bank and the United Nation Human Development Report (2011) to investigate intra-income distribution in different income-groups countries and to study the relationship and the impact of per capita income over subjective and objective social welfare or well-being. The results from cross countries analysis unearthed that high income countries have higher disparity or inequality among themselves than the low income countries and middle income countries in the world. The per capita income has significantly positive relation and strong impacts on subjective as well as objectives well-being or happiness.

Keywords: income, well-being, physical quality of life, overall life satisfaction, correlation and scatter plots

1. Introduction

The income-happiness or well-being is an old-age debate in academic environment. However, the early master piece in this debate is found in Easterline's (1974) seminal work, where a core question was being addressed e.g. whether, there is *'evidence that economic growth is positively associated with social welfare, i.e., human happiness*' (Ball and Chernova 2008:500) [2]. Even Prior to that or afterwards, scholars from diverse discipline of social sciences try to establish the relationship of people's well-being or happiness (by taking objectives and/or subjective indicators together or individually) with economic development (i.e. per capita income). Generally we confront two kinds of argument in existing literatures with respect to the relationship between income and of people's well-being in a society. A group of scholars argued that desirable outcomes even economic are caused by well-being rather than other way around. People high in well-being later earn higher incomes and perform better. The strong social relations are critical to well-being (Diener *et al*. 2004) [8]. Per capita income though a good measure of development and it has also strong linkages with other dimensions of developmental such as health, education, and basic facilities but, still it does not capture multidimensional facets of development. It is a part of the whole not whole in itself. There is a little doubt that per capita income or even the quality of its distribution does not ensure unilateral guarantee of success in human development (as cited in Ray 1998: 29) [14]. A significant positive relationship between absolute and relative income with people's happiness within country has been unearthed from some studies (Diener *et al*. 1995; Ball and Chernova 2008) [6, 2]. But quantitative changes in relative income have much larger effects on happiness than changes in absolute income. But, these effects of income have minimal with other non-economic factors like personal relation, job satisfaction, health etc. In other words, happiness that money can buy (whether absolute or relative) is small as compare to happiness provided by small non-economic things. Easterlin (2001), in his paper "*Income and happiness: Towards a unified theory"* found subjective well-being varies directly with income and inversely with material aspiration. The material aspiration increases proportion with income in one hand and rise in income do not cause well-being to rise, either for higher or lower income groups on the other, because it will generate equilateral growth in material well-being. Ed. Diener *et al*. (1993) [5], while dealing with the problem of correlation between income and subjective well-being unearth that change in income did not produce effects beyond the effects of income level per se. It produces lesser increase in subjective well-being at higher income levels. In other words, there is diminishing return of higher income on happiness across nations (Frog & Stutzer 2002). Beside, poorly educated do not derived greater happiness from a specific level of income. Absolute argument states that as income helps individuals to meet certain universal needs and therefore that income, at least at lower levels, is a cause of subjective well-being. Acemoglu *et al*. (2008) [1], locates positive relation from the cross country analysis between income and democracy. In other words, a positive correlation is found between change in income and democracy over last five hundred years. Some other scholars found puzzling relation between income and other indicators of well-being (Streeten 1994; Easterlin 2001). In other words, rise in income is not necessarily rises the quality of life or happiness. According to Morris (1980:95) [13] **'**Gross National Product (GNP) is the standard measure of progress but does not show how output is distributed'. Another group of scholars argued that GDP per capita acts as a good proxy for most aspects of to Samuel Johnson (1776),"life is a process from want to want, not from enjoyment to enjoyment" (as cited in Easterlin 2002:157) which clearly states, how much income is essential in the day to day life, to meet our requirements?. For example it can be argued that rising income levels ultimately and inevitably translate into better educational, health, nutritional standard of population in a society. It is really a believe about the world, that the universal features of economic development- health, life expectancy, literacy and so on- follow in some natural way from the growth of per capita GNP, perhaps with the passage of time. It is believed that economic forces positively affect every other socio-economic outcome (Ray 1998) [14]. On this ground, an attempt has been made to study the dynamic relationship between income and other indicators of quality of life or people's well-being across countries.

2. Objectives

1. To study the distribution of income inequality between developed and developing nations of the world.
2. To examine the relationship between the per capita income and social welfare or well-being.
3. To study whether GNI per capita is one of the strongest predictors of social welfare or well-being of people.

3. Materials and Methods

This paper uses data from online statistical database (2012) of the World Bank and the United Nation Human Development Report (2011). A wide range of indicators from different domains of development have been selected for this analysis. These include, economic indicators (i.e. GNI per capita, at PPP in US$) social indicators (like adult literacy rate); health and sanitation indicators (like life expectancy at birth, infant mortality rate or IMR, improved sanitation facilities, access to safe drinking water, physicians per 1000 population and immunization of children), Job related indicators (employment in agriculture sector, service sector and female labor force participation rate, unemployment rate), fertility and gender inequality and some other indicators in a cross countries perspective. In order to measure the country's quality of life or well-being, an index has been constructed i.e. the Physical Quality of Life Index (PQLI) by taking three important indicators (i.e. adult literacy, infant mortality rate and life expectancy at birth) and all are equally weighted. However, this index is slight different from what Morris David Morris was constructed in 1970s. 'The Physical Quality of Life Index (PQLI) is a summation of complex social interrelationships on which no theoretical explanation imposes any given weights/biases. Equal weight is assigned to each component. The PQLI facilitates international and regional comparisons by minimizing developmental and cultural ethnocentricities' (Morris 1980:95) [13]. The index is constructed in the following way.

$$PQLI = \frac{1}{3}\sum\left\{LEB\left(\frac{x1}{x1}\right) + LIT\left(\frac{x2}{x2}\right) + IMR\left(\frac{\bar{x3}}{x3}\right)\right\}$$

This PQLI ranges from 0 to 1. The higher is the value of PQLI, better will be the level of well-being and vice-versa. In addition to that, scatter plot and correlation matrix including both C. Spearman rank correlation and Karl Pearson's coefficient of correlation have been used and for subjective well-beings, data directly taken from Statistical Annex of Human development Report, 2011. Besides, for classification of countries on the basis of level of per capita income, thresholds levels as proposed for different income groups by World Bank (2010) are considered. In order to measure absolute inequality in the distribution of income purpose coefficient of variation (C.V) has been used**.**

4. Results and Discussion

Table 1 shows that out of one seventy five countries of the world only twelve countries falls under the category of low income followed by forty-eight countries under lower middle income, similar amount of countries fall under upper middle income group, sixty five countries are in high income groups. In the economical progress ladder, the bottom five countries are Congo, Liberia, Eritrea, Burundi and Niger while the some Scandinavian and east and south-east Asian countries (i.e. Qatar, Luxembourg, Norway, Macao SAR China, and Singapore). So far the distribution of income is concerned, prior to 1949 due to lack of data on income across countries no analysis was done but Prof. Theils for the first time apply Pareto's formula in order to estimate distribution of income at global level in1949 where Pareto- coefficient was 0.66 the most unequal income distribution in so far (Diener 2004) [8]. The present paper finds highly skewed distribution of income (C.V= 109.5%) across countries at global level. But the intra-group inequality is the lowest among the Low Income group Countries (LIC) (C.V= 0.3). This finding contradicts with the earlier findings (i.e. income distribution within developing countries is more unequal than developed counterpart) of Ray (1998) [14] whose analysis was based on 1995 data of World Development Indicators from the World Bank. This is followed by Upper Middle Income (UMIC). Among different income group, the high income countries are characterized by more unequal distribution of per capita income. The high income group (HIC) countries are thirty-nine times (38.7) higher than the Low Income Countries (LIC). The probable reasons could be under reporting of income in developing/ low developed countries as compare to developed countries. Similarly, if we look at the indicators of other dimensions of development across income groups, than we find that LIC are worse off in terms of life expectancy at birth, infant mortality as well as adult literacy. But distributional pattern is more homogenous than any other groups. In other words, LIC exhibits similar kinds of characteristics as it is in income distribution. In case of life expectancy at birth, higher variability is found among the HIC while LMIC and UMIC are at same level so far as variability is concerned.

Table 1: Distribution of GNI Per Capita and other basic Indicators of Well- Beings

Income groups		GNI per capita, PPP (current international $)	Life Expectancy at Birth	Infant Mortality Rate	Adult Literacy Rate
Low Income(LIC) countries (US $ 0-1005)	Avg.	741.7	53.7	78.1	59.2
	SD	216.3	5.8	25.2	11.7
	C.V	0.3	0.1	0.3	0.2
	N	12	12	12	9
Lower Middle Income(LMIC) countries(US $ 1006-3975)	Avg.	2238.1	61.5	51.5	71.0
	SD	901.1	7.8	22.4	18.9
	C.V	40.3	12.7	43.6	26.6
	N	48	47	48	30
Upper Middle Income (UMIC) Counties(US $ 3976-12275)	Avg.	7309.1	70.8	22.7	90.1
	SD	2387.8	6.5	17.1	10.7
	C.V	32.7	9.1	75.5	11.9
	N	47	47	47	27

High Income(HIC) Countries(12276<)	Avg.	28733.2	76.6	8.5	95.9
	SD	14328.9	6.0	11.5	4.2
	C.V	49.9	7.8	134.6	4.4
	N	68	65	66	31
Global Avg.	Avg.	13792.7	69.2	29.1	83.2
	SD	15098.2	9.9	28.0	17.9
	CV	109.5	14.3	96.1	21.5
	N	175	171	173	97

Source: Estimated by me by using data from data.worldbank.org/data.../world-development-indicators/wdi-2012. Classification of countries is done on the basis of threshold levels of GNI Per Capita in terms of US $ PPP. as decided by World Bank for the year 2010.

Results from table-2., show that the correlation between per capita income and well-being (both objective i.e. physical quality of life as well as subjective i.e. overall life satisfaction) across nations are found to be positively significant (r1=0.73 and r2=0.67 respectively. This indicates that, wealthy nations are happier than less wealthy nations (Diener 1995, 2004; Easterline 2001; Ball and Chernova 2008) [6, 8, 2]. In other words, higher the per capita income better will be the level of well-being and vice- versa. One of the important fact also comes out from the table i.e. when we go for rank correlation, that means when we are correlate between the ranks of per capita income of nations with that of corresponding well-being ranks, than we get higher coefficient of correlation value in both the cases (0.85>0.73 and 0.76> 0.67). According to Prof. P. Das Gupta (1993) per capita income is correlated even more highly with other indicators of well-being if we considered the ranks rather than cardinal measure. In other words, we get higher degree of statistical significance (Ray 1998: 31) [14]. Rank correlation also gives an important fact that, though the correlation between per capita income and objective as well as subjective well –being is positive and statistically significant, still we can't argue that per capita income solely responsible for well-being of people. This can only possible when the correlation becomes unity or one. That means when the ranks of per capita income exactly correspond to the ranks of well-being. Though correlation between these two set of variables is positive and statistically significant, but it substantially falls when we take other non-economic factors such as quality of government, job satisfactions, interpersonal relation etc. into consideration (Helliwell 2003) [12]. This is also evident from the scatter plots. Figure-1 and 2 shows the scatter plot between per capita income and physical quality of life in which 54.3% of variability of the Physical Quality of Life and 45.6% of the variability overall life satisfaction is explained alone by per capita income respectively. So, from this finding it can argue that though per capita income is not the only determinant of well-being but it still remained as one of the strong determinants.

Table 2: Correlation between Per Capita Income and level of well-being.

Relation between	Pearson's correlation coefficient	Spearman's rank correlation Coefficient
a) Per capita income and Physical quality of life (r1)	0.737**	0.851**
b) Per capita income and overall life satisfaction(r2)	0.675**	0.765**

**. Correlation is significant at the 0.01 level (2-tailed).

***Source*:** for a) *data.worldbank.org/data.../world-development-indicators/wdi-2012* and for b) Statistical Annex, Human Development Report, 2011.

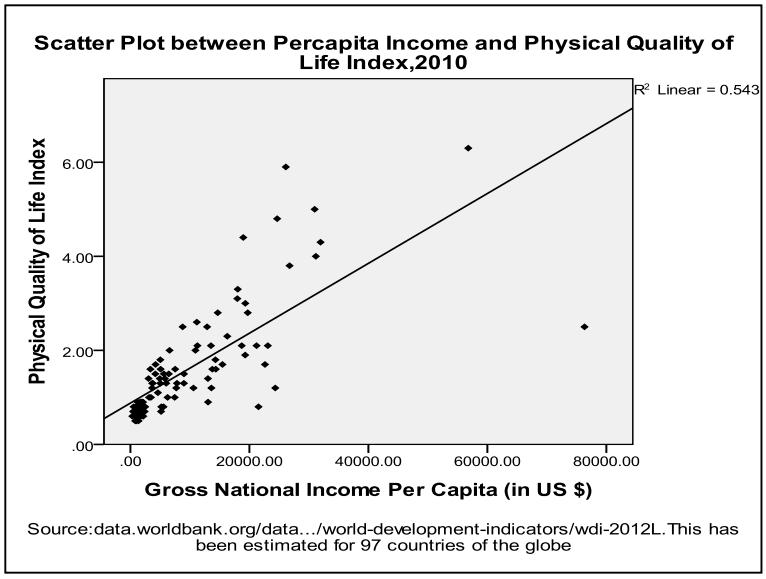
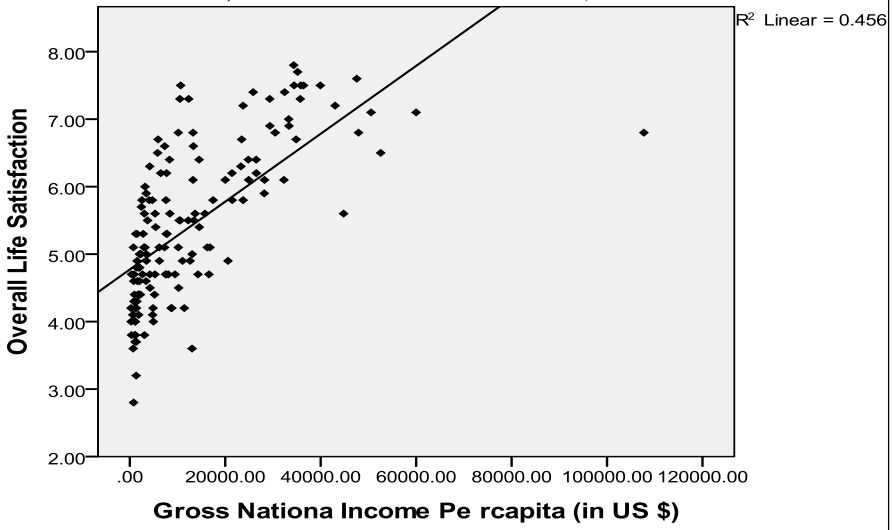


Fig 1



Source: Statistical Annex, Human Development Report, 2011. Estimated for 151 countries of the Globe.

Fig 2.

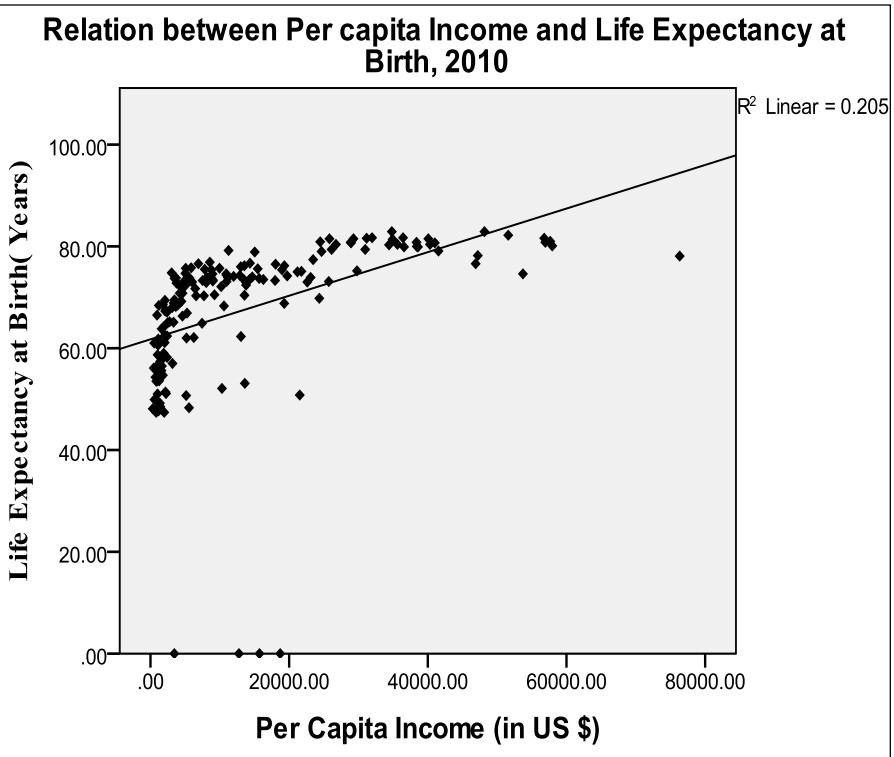


Figure-3 ,Source: http://www.data.worldbank.org/data-catalog/world-development-indicators

Fig 3

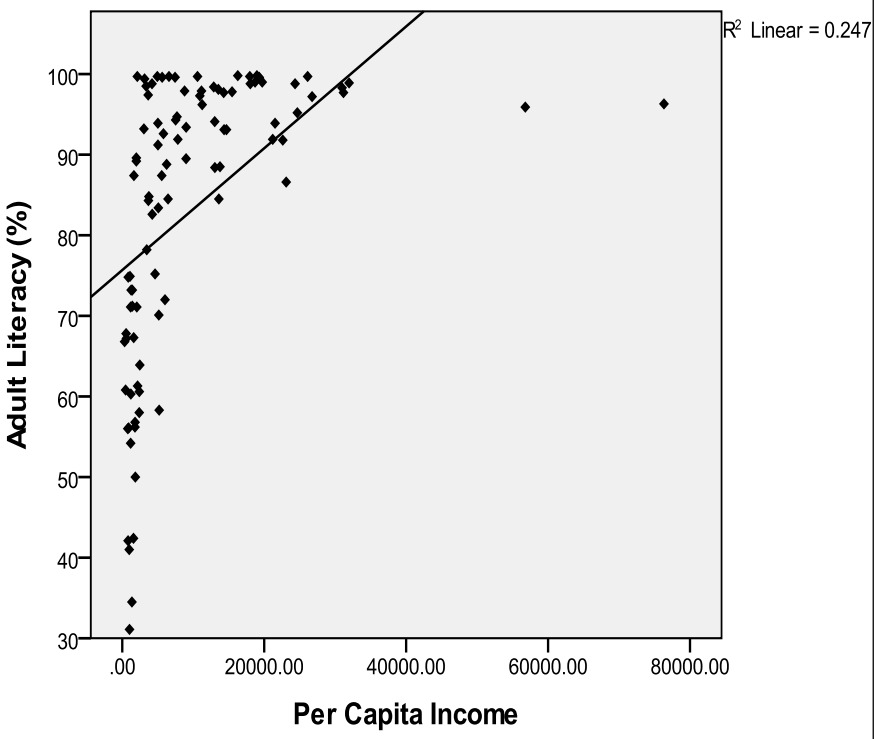


Figure-4
Source: http://www.data.worldbank.org/data-catalog/world-development-indicators

Fig 4

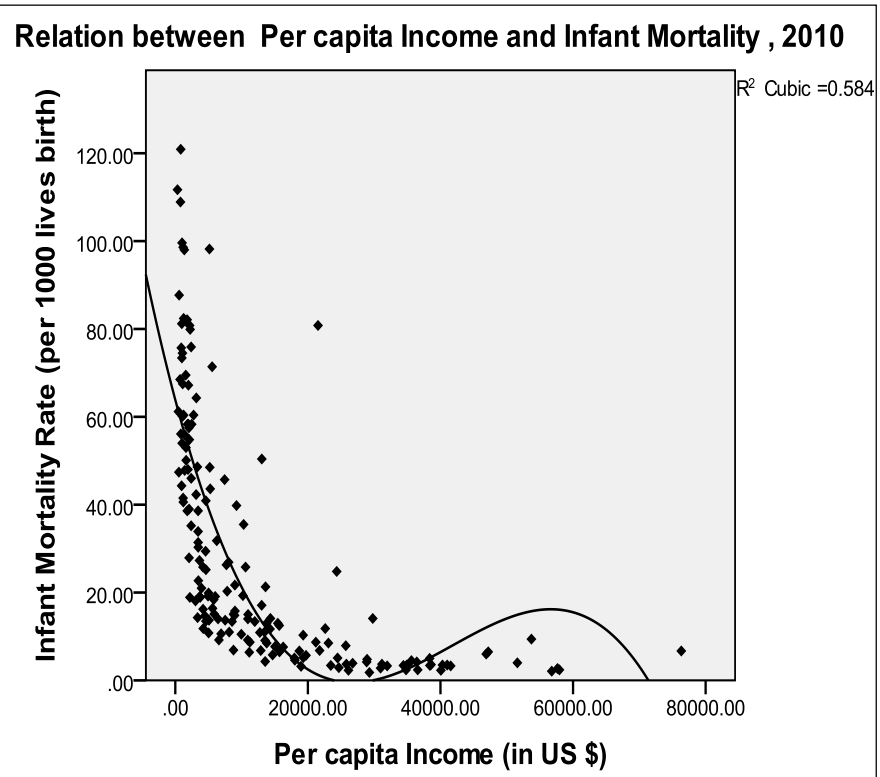


Figure-5 ,Source: http://www.data.worldbank.org/data-catalog/world-development-indicators

Fig 5

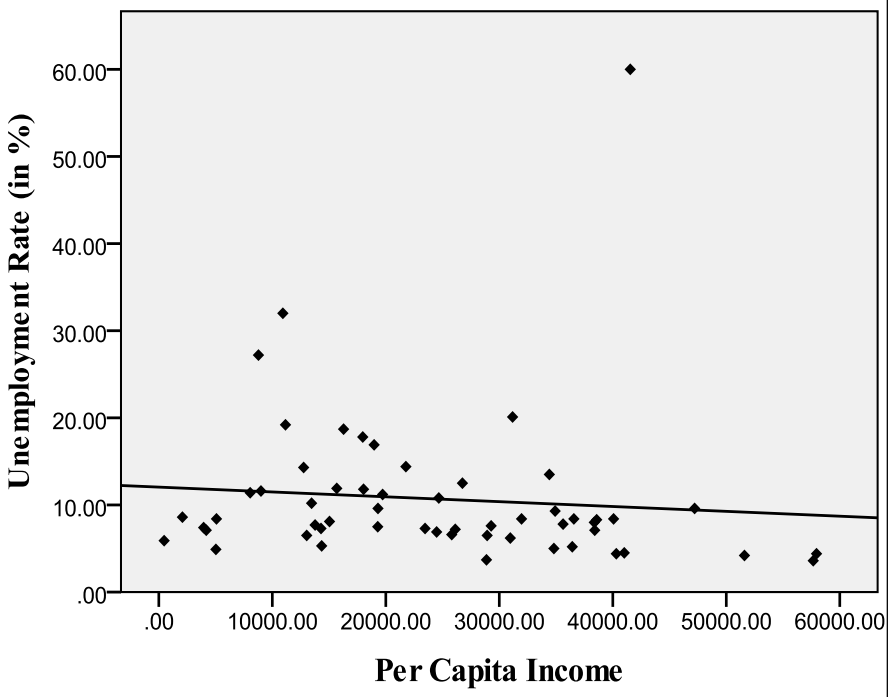


Figure-6 Source:data.worldbank.org/data.../world-development-indicators/wdi-2012.

Fig 6

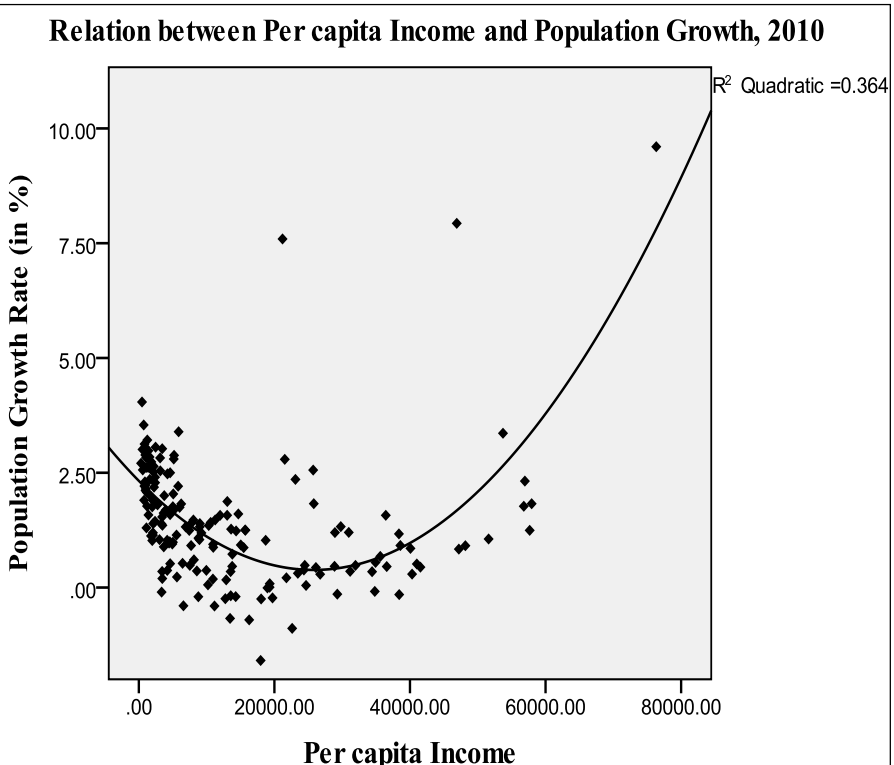


Figure-8, Source: http://www.data.worldbank.org/data-catalog/world-development-indicators

Fig 7

Besides, the relationship between income and other indicators of development i.e. social, demographical, economic, infrastructure, political has been workers out separately. The results suggest (Figure-3) a positive correlation between these two variables. In other words, as we move into the range of countries with very high per capita income, life expectancy also at high level but far from the perfect, otherwise data will lie on smooth curve linking these two set of variables. Similarly, adult literacy line fitted to this data of per capita income, has a positive slope. In other words, higher the per capita income across countries better will be the level of literacy among adults. But this relation is not linear at all stages of development. For example, in this case income has diminishing returns. It means rise in income will lead up to cent percent literacy among adults up to certain limit, beyond that any further increase of income, does not contributes further increase in adult literacy. In this case only 25% variability of adult literacy is explained by per capita income. In figure-5 the slop of the curve states that with the rise of income per capita across nations, there is substantial decline of infant mortality rate **(**Figure-5). This also suggest that as the per capita income in low developed countries is minimal and majority of their people's income is just only for hand to mouth, they are incapable of enhancing their medical facilities, nutritional facilities, child and mother care systems etc. and hence, their mortality of infant is higher. Thus, in this context, income has a very strong role on decline infant mortality rate. From cross country analysis, around 59% of the variability of infant mortality is explained by per capita income. Similarly, the relationship between per capita income and unemployment (Figure-6) is negative where the fitted line shows a downward trend. This means with the increasing order of income among countries, there is decline share of unemployment. However, this, deviate from perfect because countries data are away from the trend line and distributed randomly. We can also argue that the countries with having higher per capita income can be more diversified in terms of economic activities and have greater amount of saving and investment in more productive work such as industrial or service sectors and hence can generate employment opportunities to their youths and have less or no unemployed person, than their counter less developed nations. But the correlation ($r=-0.09$ $p<0.01$) is not statistically significant.

The demographic transition models of different developed countries of the world who have reached their final stages as early as 1950s, we find that, as the development proceeds, birth and death rates decline and hence lead to low or negative growth rates of population. But in case of developing countries, though death rates declined with the developmental process but birth rates still remain high, that widen the gap between birth rate and death rate and hence high growth rate of population remains (Ray 1998: 34) [14]. Population growth has both positive and negative effect on income. When population growth supplies laborers to labor market and when they are engaged, then it can increase or undisturbed the income but when the supply of laborers due to high growth of population is more than the demand then, it will generate unemployment or disguised employment in low productive agriculture works. Thus, it has adversely affects the income level of nations. The scatter plot shows that as per capita income goes up, there is decline in population growth and vice-versa. But this relation is not statistically significant ($r=-0.028$). Besides, per capita income has significantly high positive association between immunization of children, percentage of population access to improve sanitation, percentage of population access to safe drinking water. On the other hand, it has significantly negative relation with percentage employment in agriculture, fertility rate and gender inequality ($p<0.1$) whereas physicians per 1000 population, female labor participation etc. are not statistically significant. We can argue from the above facts that per capita income is still strongly related with various indicators of well being even at present time.

5. Conclusion

So, from this analysis we can conclude that it is the tendency of developmental process to be uneven. The distribution of global per capita income is such that the richer countries are nearly thirty nine times higher than the poor countries in the world and all three categories of countries except High Income Countries (HIC), do have lower per capita income than global average. While the high income countries have an average income which is nearly twice than global average. This shows that the level of disparities among different categories of countries is very uneven. Similarly, within different categories, the HIC have higher disparity or inequality among themselves than the low income countries LMI and/or UMI countries in the world.

The association between well-being both subjective as well as objectives with per capita income is very strong and statically significant. It has also strong explanatory power over well-being or happiness of the people. The statistical significance of correlation increases as we considered ranks rather than cardinal measure exactly. The association between per capita income and other indicators of well-being such as life expectancy at birth, adult literacy, immunization of children, and percentage of population access to improve sanitation, percentage of population access to safe drinking water etc are found to be significantly positive. On the other hand, infant mortality rate, employment in agriculture, fertility rate and gender inequality, are significantly negatively correlated with it. But, the physicians per 1000 population, female labor participation etc. are not statistically significant with per capita income. This indicates that, wealthy nations are happier or more welfare than less wealthy nations (Diener, 1995, 2004; Easterline, 2001; Ball and Chernova, 2008) [6, 8, 2]. In other words, higher the per capita incomes better will be the level of well-being and vice- versa. So, economic indicator like per capita income is extremely important in the early stage of well-being.

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