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A Study of HDI in Sabarkantha District, Gujarat

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ABSTRACT

Human Development is measured with a basic scale of HDI (UNDP). Presently Government tries to compute and presents the report at India level. This paper covers the basics parameters and presented for 12 tehsils of Sabarkantha district of Gujarat State. It covers computation of each THDI (Tehsil Human Development Index) for based three indicators of HDI. This paper also covers the regression analysis for selected indicators and their individual effect on HDI.

1. Introduction

The genesis of existence of Human Development index to measure human well-being lies in incompetence of World Development Report (WDR), published by World Bank every year since 1978. The report in its all publications captured only economic aspects of growth and ranked countries on the basis of their economic performance and excluded human indicators from its purview. So, a substitute index viz. the Human Development Index (HDI), was created through the assimilation of similar yet disjointed ideas. HDI is used to explore the concept and measurement of global human development. The series of Human Development reports from 1990 to 2010 have been published by UNDP and each incorporated an important theme of human development assessed through human developed indices. However, the birth of the HDI begins quite some time previous to this and at a separate institution.

A central figure in the development of the HDI was Mahmoud ulHaq, an economist, who in 1978 was working at the World Bank.

The HDI was primarily developed to measure "the basic concept of human development to enlarge people's choices" (ulHaq I, 1995, p.47). Haq states that the purpose of the index was to "measure at least a few more choices besides income and to reflect them methodologically in a sound composite index. He goes on to explain that:There was also an issue with scaling the index. With the data measured in years, percentages and dollars, a formula needed to be devised to unify the three indicators. By comparing the indicators against separate maximums and minimums, each could be indexed between 0 and 1.

2. Computation Of HDI

Basically three major indicators covers to compute the HDI – they are Life Expectancy, Health and Education. The basics calculation has to be defined with sub indicators. Following is the details for final computation of HDI.

CALCULATING THE LIFE EXPECTANCY AT BIRTH INDEX

It is the index of relative achievement of the country in life expectancy at birth

$$LineExpectancyatBirthIndex = \left[\frac{LE_y - LE_{min}}{LE_{max} - LE_{min}}\right]$$

Where, LE_y = Life expectancy for a particular country, y

CALCULATING THE EDUCATIONAL INDEX

It measure country's relative achievement in adult literacy and combined primary, secondary and higher secondary .First index for adult literacy and combined gross enrolment is calculated. Then these two indices are combined to calculate education index with 2/3rd to adult literacy and 1/3rd to gross enrolment

$$EducationIndex = \left[\frac{2}{3}(AdultLiteracyIndex) + \frac{1}{3}(GrossEnrolmentIndex)\right]$$

Where,

$$AdultLiteracyIndex = \left(\frac{ActualValue - MinimumValue}{MaximumValue - MinimumValue}\right)$$

And

$$GrossEnrolmentIndex = \left(\frac{ActualValue - MinimumValue}{MaximumValue - MinimumValue}\right)$$

CALCULATING THE HEALTH INDEX

UNDP uses life expectancy as the health parameter to assess health status. The life expectancy and other parameterssuch as IMR, CBR, CDR, TFR, GFR, TMFR, GMFR health related facilities and amenities were calculated for each of the tehsil of the study area.

FERTILITYLEVEL:

Population is a dynamic variable and keeps on changing. Increase due to birth and decrease due to death affect the population size of an area. Thus the birth and death are the two most important vital events. Natural increase is the excess of population by births over decrease of population by deaths at a given point of time. The births have direct correlation with the fertility.

DEATHRATE:

Death process in demographic alter menology is called as mortality. Statistical data on causes of death help us in controlling the spread of diseases and suggests new curative methods to medical authorities.

CRUDEBIRTHRATE(CBR): Ratio of the numbers of live births in a year to the mid-year population.(Normallyexpressedper1,000populations).

$$CBR = \frac{No.oflivebirthsduringtheyear}{Mid-yearpopulation} \times 1000$$

CRUDEDEATHRATE(CDR): Ratio of the numbers of deaths in a year to the mid- year population, normally expressed per1,000 populations.

$$CBR = \frac{No.ofdeathduringtheyear}{Mid-yearpopulation} \times 1000$$

AGESPECIFIC FERTILITYRATE (ASFR):

Number of live births in a year to female population in any specified age group normally expressed per 1,000 women.

$$ASFR = \frac{No.\ oflivebirthsinaparticularagegroup}{Mid-yearfemale\ populationofthesameagegroup} \times 1000$$

AGESPECIFIC MARITAL FERTILITY RATE(ASMFR): Number of live births in a year to married female population in any specified age group normally expressed per1,000 married women.

$$ASMFR = \frac{No.\ oflivebirthsinaparticularagegroup}{Mid-yearmarriedfemale\ populationofthesameagegroup} \times 1000$$

GENERALFERTILITYRATE(GFR): Number of live births per 1,000 women in the reproductive age-group(15-49)years in a given year

$$GFR = \frac{No.\ oflivebirthsinayear}{Mid-yearfemale\ populationintheagegroup(15-49)years} \times 1000$$

GENERALMARITAL FERTILITY RATE(GMFR):

Numberoflivebirthsper1,000marriedwomen in reproductive age-group(15-49)years in a given year.

$$GMFR = \frac{No.\ oflivebirthsinayear}{Mid-yearmarriedfemale\ populationintheagegroup(15-49)years} \times 1000$$

TOTAL FERTILITY RATE (TFR):

It is obtained as the total of the age specific fertility rates (number of children bornper woman of the particular age) for the entire reproductive age span. It provides the average number of children that will be born to a woman under the fertility levels indicated by the age specific fertility rates assuming that there is nomortality of women till the completion of reproductive period.

$$TFR = \frac{5 \times \sum_{15-19}^{45-49} ASFR}{1000}$$

TOTALMARITALFERTILITY RATE(TMFR):

Average number of children that would be born to a married woman if she experiences the current fertility pattern throughout there productive span(15-49)years assuming that there is nomortality of women till the completion of reproductive period.

$$TMFR = \frac{5 \times \sum_{15-19}^{45-49} ASMFR}{1000}$$

AGE-SPECIFICMORTALITYRATE(ASMR):

Number of deaths in a particular age and sex group per 1,000 population of the same age group.

$$ASMR = \frac{No.\ of in a particular age group}{Mid-year population of the same age group} \times 1000$$

INFANTMORTALITYRATE(IMR):

Ratio of the number of infant deaths (deaths of children below one year) in a year to the number of live births in that year.

$$IMR = \frac{No.\ of infant deaths during the year}{No.\ of live births during the year} \times 1000$$

CALCULATING THE GDP INDEX

GDP index is calculated adjusting GDP per capita to PPP US$. In HDI income is used as a substitute for all dimension of development not included in health and education.

$$GDPIndex = \left(\frac{\log ActualValue - \log MinimumValue}{\log MaximumValue - \log MinimumValue}\right)$$

CALCULATING THE HDI

Once the dimension indices are calculated determining HDI is easy as HDI is simple arithmetic average of three indices

$$HDI = \sqrt[3]{[(LifeExpectancyIndex)(EducationIndex)(GDPIndex)]}$$

HDI thus can be defined as the mean of means as the indicator indices are summed and averaged with equal weight to determine the final HDI value. The interesting concern here is determining minimum and maximum values termed as goal post by UNDP.

3. The Sabarkantha District Profile:

The name of the district is named after the region and the river Banas which is flowing through the district. The word Kantha means a location of the river. The district entitles of the ground situated on an around the river Banas.

The district encompasses the past generous states of Palanpur, Radhanpur, Tharad, Vav, Danta, Deodar and Thara and the old agency thanas of Varohi, Shihori, Santalpur, Bhabhar and the sub thana of Suigam. Of these, Palanpur and Radhanpur rated as first states, whereas Danta was next to that. Palanpur was substantial state and has an incessant history right from fifteenth Century when it club with the Bombay State.

Total population of the district is 25,04,244 covers 10,757 sq. km. of area the density of population is 232.80 sq. km. Table 4.1 indicating the highest population is covered by Deesa tehsil and Palanpur and these two are the urban areas of the district. Tharad is stands third which shields most of the rural area of the district.

As per 2011 Census sex ratio of 930 females per 1,000 males has been recorded in the district against 920 of the state. The highest sex ratio of 951 females is recorded in the district during 1961 census while the lowest sex ratio of 919 females is recorded in the district during 1931.

It would be very interesting to understand disparity in literacy levels among the tehsils of Sabarkantha by location. Lower literacy in females has resulted into lower overall literacy among tehsils and it is inevitable to consider and take steps urgently. Female literacy in Sabarkantha is 61.71% in 2011 which is higher than district average of 64.44%. But a dismal performance is exhibited by many tehsils of Sabarkantha with female literacy much lower than district average. That is also one very important

reason for low HDI in Sabarkantha district, and district missed its rank when inter district comparison of human development is done.

EDUCATION INDEX

Educational index for the tehsils of North Gujarat is calculated on the same basis as in HDRs, UNDP. The literacy rate of the tehsils have been given 2/3rd weightage and gross enrolment rate has been assigned 1/3rd weightage. The tehsils are ranked on the basis of the educational index for all years 2011. In 2010 Dhanera is on the first position with highest educational index of 0.756 and Dhanera has consistently exhibited high educational index. The tehsil has first position for 2008 and 2009.In 2009 and 2010 its position dwindles by one rank and in 2009 it is on third position. Kankrej tehsil improved its position over five years from fifth in 2009 to first in 2010. Similarly for all the tehsils the table showing the status is shown below.

Table 1: Educational Index of Tehsils of Sabarkantha District

TEHSILS	2009	RANK	2010	RANK	2011	RANK
Vav	0.682	8	0.746	5	0.763	3
Tharad	0.707	7	0.739	7	0.720	5
Dhanera	0.643	9	0.621	12	0.688	8
Dantiwada	0.628	10	0.702	8	0.699	6
Amirgadh	0.713	5	0.744	6	0.586	11
Danta	0.72	4	0.761	4	0.776	2
Vadgam	0.524	12	0.647	11	0.683	9
Palanpur	0.743	2	0.804	1	0.795	1
Deesa	0.756	1	0.665	10	0.663	10
Deodar	0.709	6	0.77	3	0.762	4
Bhabhar	0.571	11	0.693	9	0.698	7
Kankrej	0.735	3	0.797	2	0.468	12

Educational index for the tehsils of Banskantha is calculated on the same basis as in HDRs, UNDP. The literacy rate of the tehsils have been given 2/3rd weightage and gross enrolment rate has been assigned 1/3rd weightage. The tehsils are ranked on the basis of the educational index for all years 2009-2011. In 2009 Deesa is on the first position with highest educational index of 0.756 and during 2010 and 2011 Palanpur has consistently exhibited high educational index. The tehsil has first position for 2010 and 2011.

Table 2 Medical Facilities Index

TEHSILS	Hospital	Dispensary	Primary Health Centre	Primary Health Sub Centre	Maternity and Child Welfare Centre/	Family Welfare Centre	Community Health Workers	COMBINE HDI
Vav	0.00118	0.00336	0.00202	0.00294	0.00949	0.00130	0.00403	0.00347
Tharad	0.00176	0.00252	0.00059	0.00056	0.00496	0.00174	0.00319	0.00219
Dhanera	0.00134	0.00336	0.00234	0.00008	0.00470	0.00130	0.00403	0.00245
Dantiwada	0.00176	0.00504	0.00025	0.00264	0.00722	0.00174	0.00630	0.00357
Amirgadh	0.00101	0.00336	0.00025	0.00017	0.00454	0.00102	0.00361	0.00199
Danta	0.00185	0.00336	0.00059	0.00042	0.00613	0.00188	0.00395	0.00260
Vadgam	0.00143	0.00504	0.00025	0.00008	0.00672	0.00144	0.00596	0.00299
Palanpur	0.00076	0.00168	0.00059	0.00092	0.00386	0.00072	0.00210	0.00152
Deesa	0.00143	0.00252	0.00143	0.00017	0.00580	0.00144	0.00328	0.00229
Deodar	0.00202	0.00420	0.00059	0.00042	0.00731	0.00202	0.00487	0.00306
Bhabhar	0.00160	0.00252	0.00118	0.00017	0.00571	0.00174	0.00336	0.00232
Kankrej	0.00143	0.00420	0.00025	0.00017	0.00588	0.00144	0.00479	0.00259

The above table presents scenario of birth rate and death rate in Sabarkantha district. All the 12 tehsils are measure for the scales. It is noticed that compare to 2009 there is dramatics chance in figures of 2011.

Table 3 HDI of Birth Rate and Death Rate

TEHSILS	2009		2010		2011	
	Birth Rate Index	Death Rate Index	Birth Rate Index	Death Rate Index	Birth Rate Index	Death Rate Index
Vav	0.606	0.392	0.496	0.074	0.653	0.424
Tharad	0.517	0.544	0.652	0.576	0.522	0.458
Dhanera	0.543	0.294	0.560	0.391	0.554	0.302
Dantiwada	0.333	0.561	0.584	0.736	0.086	0.571
Amirgadh	0.576	0.386	0.610	0.405	0.593	0.323
Danta	0.637	0.701	0.549	0.426	0.542	0.428
Vadgam	0.314	0.625	0.584	0.719	0.000	0.622
Palanpur	0.613	0.523	0.552	0.476	0.601	0.491
Deesa	0.592	0.456	0.587	0.428	0.624	0.475
Deodar	0.549	0.499	0.606	0.488	0.561	0.416
Bhabhar	0.608	0.501	0.579	0.588	0.515	0.575
Kankrej	0.487	0.401	0.463	0.470	0.412	0.460

Parameters other than IMR, CMR, Birth Rate and Death Rate affected to the health parameter are discussed herewith in above table are respectively TFR, TMFR, GFR, GMFR, Child- Women ration and Mean age at marriage. Number of live births per 1,000 women in the reproductive age-group (15-49) years in a given year can be determine for GFR, Number of live births per 1,000 married women in reproductive age-group (15-49) years in a given year is the GMRF

TRF is obtained as the total of the age specific fertility rates (number of children born per woman of the particular age) for the entire reproductive age span. It provides the average number of children that will be born to a woman under the fertility levels indicated by the age specific fertility rates assuming that there is no mortality of women till the completion of reproductive period.

Table 4 Tehsil Wise Indices of TFR, TMFR, GFR GMFR, C & W Ratio and Mean Age at Marriage

Tehsil	TFR	TMFR	GFR	GMFR	Child Woman Ratio		Mean age at marriage
					0-4	5-.9	
Vav	0.613	0.398	0.622	0.487	0.676	0.522	0.418
Tharad	0.626	0.406	0.634	0.497	0.690	0.532	0.427
Dhanera	0.638	0.414	0.647	0.507	0.704	0.543	0.435
Dantiwada	0.651	0.422	0.660	0.517	0.718	0.554	0.444
Amirgadh	0.664	0.431	0.673	0.527	0.732	0.565	0.453
Danta	0.677	0.439	0.687	0.538	0.747	0.576	0.462
Vadgam	0.691	0.448	0.700	0.549	0.762	0.587	0.471
Palanpur	0.705	0.457	0.715	0.560	0.777	0.599	0.481
Deesa	0.719	0.466	0.729	0.571	0.792	0.611	0.490
Deodar	0.733	0.476	0.743	0.582	0.808	0.623	0.500
Bhabhar	0.748	0.485	0.758	0.594	0.824	0.636	0.510
Kankrej	0.763	0.495	0.773	0.606	0.841	0.649	0.520

Source: Statistical Abstract of North Gujarat 2011

TMFR is the Average number of children that would be born to a married woman if she experiences the current fertility pattern throughout her reproductive span (15-49) years assuming that there is no mortality of women till the completion of reproductive period. Child woman ratio (0-4) is based on number of children in the age group 0-4 years per 1,000 women in the age group 15-49 years and child woman ratio (5-9) Number of children in the age group 5-9 years per 1,000 women in the age group 15-49 years.

Table 5: Health Index

TEHSILS	2009	2010	2011
Tharad	0.519	0.290	0.528
Dhanera	0.611	0.389	0.535
Dantiwada	0.631	0.359	0.619

Amirgadh	0.838	0.459	0.720
Danta	0.525	0.282	0.422
Vadgam	0.620	0.284	0.609
Palanpur	0.748	0.459	0.768
Deesa	0.733	0.461	0.713
Deodar	0.700	0.391	0.697
Bhabhar	0.528	0.291	0.517
Kankrej	0.650	0.407	0.621

Table 6 Life Expectancy Index in Tehsils

TEHSILS	LIFE EXPECTANCY INDEX
Vav	0.612
Tharad	0.594
Dhanera	0.597
Dantiwada	0.624
Amirgadh	0.642
Danta	0.607
Vadgam	0.601
Palanpur	0.615
Deesa	0.619
Deodar	0.595
Bhabhar	0.603
Kankrej	0.612

The above figure presents tehsil wise presentation of life expectancy index. Amirgadh stand first before Dantiwada and Deesa whereas Tharad and Deodar stands last in position.

Table 7: Per Capita Bank Deposit Index

TEHSILS	Index 2009	Index 2010	Index 2011
Vav	0.26132	0.25944	0.26038
Tharad	0.03196	0.02444	0.02632
Dhanera	0.1927	0.15134	0.14476
Dantiwada	0.01034	0.0094	0.0094
Amirgadh	0.07896	0.06956	0.07238
Danta	0.06768	0.05734	0.0564
Vadgam	0.01222	0.01222	0.01128
Palanpur	0.1175	0.12314	0.141
Deesa	0.09306	0.07896	0.08178
Deodar	0.047	0.03948	0.03948
Bhabhar	0.24628	0.2162	0.21526
Kankrej	0.06768	0.05734	0.05546

POVERTY INDEX

The tehsil-wise poverty index is calculated from the data of percentage of families below poverty line. The goal post thus decided for this indicator is 100 as maximum and 0 as minimum. The 0% population below poverty line is desirable so the minimum goal post is set at 0. As the tehsils with most of its population above poverty line is the most developed tehsil the index thus arrived is deducted from one to arrive at the correct figure. The index for the year 2009 and 2010 is the same as the pilot project was initiated in 2010.The data for the year 2011 is the latest data after the completion of the pilot project that is when the main project was launched.

Table 8Tehsil Wise Poverty Index

TEHSILS	Poverty Index 2009	Poverty Index 2010	Poverty Index 2011
Vav	0.691	0.691	0.733
Tharad	0.686	0.686	0.819
Dhanera	0.630	0.630	0.722
Dantiwada	0.598	0.598	0.692
Amirgadh	0.663	0.663	0.683
Danta	0.733	0.733	0.868
Vadgam	0.515	0.515	0.523
Palanpur	0.704	0.704	0.880
Deesa	0.662	0.662	0.851
Deodar	0.283	0.283	0.869
Bhabhar	0.180	0.180	0.791
Kankrej	0.620	0.620	0.779

INCOME INDEX

As already mentioned the Tehsil Gross Domestic Product (TGDP) is not recorded so surrogate–indicators Per Capita Bank Deposit and percentage of population below poverty line have been used to calculate composite income index. The goal post for per capita bank deposit is decided on the same lines as that in Human Development Report, Gujarat. The maximum value decided is 3.3 times more than the tehsil with maximum bank deposit for that year and the minimum value is half the value of the tehsil with lowest per capita bank deposit Hence for all the three periods undertaken in the study different maximum and minimum values are used. For the poverty index the goal post is 0 and 100. Both the indicator is given 50% weightage and the composite income index thus worked out is exhibited in the Table 4.46 below

Table 9 Income Index of Tehsils of Sabarkantha District

TEHSILS	Composite Income Index **2009**	Composite Income Index **2010**	Composite Income Index **2011**
Vav	0.451	0.450	0.476
Tharad	0.453	0.449	0.404
Dhanera	0.473	0.454	0.415
Dantiwada	0.451	0.450	0.336
Amirgadh	0.454	0.449	0.362
Danta	0.455	0.451	0.443
Vadgam	0.451	0.451	0.256
Palanpur	0.439	0.442	0.489
Deesa	0.455	0.449	0.446
Deodar	0.454	0.450	0.435
Bhabhar	0.465	0.451	0.482
Kankrej	0.456	0.451	0.400

Compare to 2009 and 2010 the Income Index of each of the tehsil found unstable in order.

REGRESSION ANALYSIS:

The OLS regression model can be extended to include multiple instructive variables by simply adding additional variables to the equation. The form of the model is the same as single response variable (Y), but Y is predicted by multiple explanatory variables (X1 to Xn).

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \cdots + \beta nXn.$$

The interpretation of the parameters (α and β) is defined as constant and coefficient respectively. α indicates the value of Y when all vales of the explanatory variables are zero. Each β parameter indicates the average change in Y that is associated with a unit change in X, whilst controlling for the other explanatory variables in the model. Model-fit can be assessed through comparing deviance

measures of nested models. For example, the effect of variable X3 on Y in the model above can be calculated by comparing the nested models:

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \cdots + \beta nXn + \epsilon$$

.

The change in deviance between these models indicates the effect that X3 has on the prediction of Y when the effects of X1 and X2 have been accounted for (it is, therefore, the unique effect that X3 has on Y after taking into account X1 and X2). The overall effect of all explanatory variables on Y can be assessed by comparing the models. The significance of the change in the deviance scores can be assessed through the calculation of the F-statistic. As with the simple OLS regression, it is a simple matter to compute the R-square statistics.

Table 10: Tehsil -Wise Indices in Growth

Tehsils	Index of water Availability	Transportation	Power Supply	Mode of Communication	Credit Societies	Cinema/ Video Hall	Sports Club	Stadium/ Auditorium/ Community Hall	News Paper	Magazine	News Paper & Magazine
Vav	0.587	0.512	0.569	0.574	0.651	0.571	0	0	0.525	0.144	0.573
Tharad	0.621	0.612	0.805	0.452	0.714	0.417	0	0	0.383	0.105	0.418
Dhanera	0.770	0.712	0.789	0.571	0.575	0	0	0	0.280	0.077	0.305
Dantiwada	0.632	0.517	0.773	0.568	0.571	0	0	0	0.204	0.056	0.223
Amirgadh	0.777	0.814	0.758	0.476	0.533	0	0.233	0	0.149	0.041	0.234
Danta	0.845	0.915	0.743	0.476	0.495	0	0.124	0.173	0.109	0.030	0.171
Vadgam	0.810	0.641	0.728	0.522	0.457	0.086	0	0	0.079	0.022	0.324
Palanpur	0.693	0.954	0.987	0.491	0.419	0	0.877	0	0.897	0.187	0.756
Deesa	0.576	0.966	0.967	0.484	0.381	0.119	0	0	0.774	0.137	0.687
Deodar	0.460	0.756	0.564	0.476	0.343	0.087	0	0	0.565	0.100	0.455
Bhabhar	0.343	0.745	0.553	0.469	0.305	0.063	0	0.262	0.412	0.073	0.332
Kankrej	0.227	0.545	0.542	0.462	0.267	0.046	0.249	0	0.301	0.053	0.242
BK	0.612	0.724	0.731	0.502	0.476	0.197	0	0	0.390	0.085	0.393

Source: Statistical Abstract of North Gujarat 2011

APPLICATION TO HDI DATA OF SABARKANTHA DISTRICT

We compute the basic HDI for each of the parameters such as Education (ED_IN), Medical Facilities (MFL_IN) available, Birth Rate (B_IN), Death Rate (D_IN), Total Fertility Rate, Total Marital Fertility Rate, General Fertility Rate, General Marital Fertility Rate, Child Women Ratio for 0-4 and 5-9 Years, Mean age at Marriage, Infant Mortality Rate, Child Mortality Rate (CTG_IN), Health (H_IN), Life Expectancy Index (L_IN), Poverty Index (P_IN), Composite Income Index (CI_IN), Index for Water Availability, Index of Transportation, Index of Availability of Electricity, Mode of Communication, Availability of Banks, Agricultural Society, Credit Society, Availability of sources for entertainment such as-Cinema Hall, Video Theaters etc., Special Amenities such as- Availability of Stadium, Auditorium, Sports Club, Community Hall etc., Readership Index such as- newspapers, periodicals, Magazines (AM_IN) etc. These all have been given a weigh as per UNDP standards and some of them are classified as standards given by the authority. We compute each HDI as explained in methodology in chapter 1.

As discussed earlier, ordinary least square model can determine the individual effect of the parameters on the dependent variable. We studied the Tehsil Human Development in SABARKANTHA district as a dependent variable and discussed variables as independent variables. We construct the multiple OLS model as

$$THDI = \alpha\ (Constant) + \beta 1ED\_IN + \beta 2MLF\_IN + \beta 3B\_IN + \cdots + \beta nXn + \epsilon$$

The multiple OLS than run for results and are presented in following tables. Few of the variables can be taken as a combined effect of index such as index of IMR and CMR can be used as a combined index. Similarly, index for TFR, TMFR, GFR, GMFR, Mean age at Marriage, Child and women ratio are clubbed for calculation. All Amenities and necessities are to be found as AM_IN covers combined index of Water Availability, Newspapers and Magazines, Post and Telegraphs, Electricity, Cinema and Video Theaters, Stadium –Auditorium and community halls etc. as a part of growth.

TABLE 11: OLS, Dependent variable: THDI of Sabarkantha District

	Coff.	*Std. Error*	*t-ratio*	*p-value*
Const.	0.623961	0.252935	2.467	0.075
ED_IN	0.556855	1.67691	-0.3321	0.079589
MFL_IN	0.5972	155.16	0.3325	0.079562
B_IN	0.107357	0.374506	-0.2867	0.082227
D_IN	-0.327576	1.06156	-0.3086	0.080945
CTG_IN	-0.420424	1.49464	-0.2813	0.082544
CIC_IN	-1.83191	5.24142	-0.3495	0.078595
H_IN	1.62753	4.05251	0.4016	0.075688
L_IN	0.319939	1.15724	0.2765	0.02828
P_IN	-0.399212	1.23788	-0.3225	0.080140
CI_IN	1.32523	3.16909	0.4182	0.074785
AM_IN	0.68735	1.40206	0.4902	0.070982

Mean dependent var	0.392583	S.D. dependent var	0.045008
Sum squared resid	0.000904	S.E. of regression	0.030061
R-squared	0.999517	Adjusted R-squared	0.994689
F(11, 1)	188.2086	P-value(F)	0.056799
Log-likelihood	-39.93	Akaike criterion	-57.8730
Schwarz criterion	-52.5390	Hannan-Quinn	-59.8478

The present analysis of OLS regression as discussed early can be represented in table. Related statistics justify the model many parameters are found highly correlated and it caused the issue of multi-colleniarity. Due to that the p- value of each of the parameter can be obtained high. The main aim of this discussion is to study individual impact of the selected parameters on HDI.

The constructive model can be represented as follows:

$$THDI = +\beta 1ED\_IN + \beta 2MFL\_IN + \beta 3B\_IN + \cdots + \beta nXn + \epsilon$$

$$THDI = 0.62 + 0.56\ ED_{IN} + 0.39\ MFL_{IN} + 0.107\ B_{IN} - 0.379\ D_{IN} - 0.42CTG_{IN} - 1.83CIC_{IN} + 1.627\ H_{IN} + 0.319L_{IN} - 0.399\ P_{IN} + 1.325\ CI_{IN} + 0.687\ AM_{IN}$$

The THDI presented as a dependent variable which is affected by various parameters ED_IN presents education index (0.56) positively affect the THDI, shows that improvement in education will gain 56%of tehsil level HDI. Medical facilities MFL_IN indicates positive effect (0.39) indicating that improving of medical facilities will increase the human development. Birth Rate (B_IN) is upturn in optimistic direction (0.107) favored development in human development. Death rate (D_IN) is obtained negatively (-0.327) is indicating that the district must need to manage advanced strategies to diminish it. Similarly, CTG covers Total Fertility Rate, Total Fertility Marital Rate, Child Women Ratio 0-4 and Child Women Ration 5-9, Mean age at marriage have combined and coefficient found is (-0.420). The all the said parameters have negative impact on THDI and must be improve. CIC covers Infant Mortality Rate and Child Mortality Rate. It is found to be (-1.83) negative and affects the THDI. Health index is found (1.627) and have positive impact on THDI, indicating improve at tehsil levels of Sabarkantha District. Regression coefficient for life expectancy is also obtained positive (0.319) shows improvement in statues of tehsils in THDI. The poverty index have negative impact (-0.399) and reduce the THDI. Composite income coefficient is noticed (1.325) is positive but must be higher for better THDI. The amenities covers: availability of water, transportation facilities which covers bus and railway, availability of electricity, banks credit society, agricultural societies, co-operative societies, mode of communication covers availability of post and telegraph offices, cinema and video theaters, sports club, stadium, auditorium, community halls, newspapers and magazines. The combined index presented to check their impact on THDI. It is noticed (0.687) and has the highest impact on THDI in improvement.

Each of the parameter has been presented for testing by multiple ordinary least square. The interest is to study the variability among the indices defined. We lay down the hypothesis that high variation of the parameters does not affect the THDI at 5% level of significant. The test result of F (11, 1) = 188.20 is not satisfied and reject the hypothesis, it means that high variation in each parameters affects TDHI.

The sum squared residual found lower (0.0009) as there is multi-colliniarity among the selected variables. R- Squared value is found high significant (0.99) as well adjusted R-squared is (0.99) shows the fit model of THDI. Log- likelihood (-39.93), Schwarz Criterion (BCI = -52.67), Akaike Criterion (AIC = -57.87), Hannan Quinn Criterion (-59.84) are found best fit compare to best fit nested model comparison values. P- Values are found significance and justify the model for best fit for study. Finally the standard error of the model is found much least (0.03), shows least deviation in model. It presented that each parameter have direct impact on THDI.

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