ORIGINAL ARTICLE

Suicide Rates in the Telugu States of India and their Relationship to Developmental Indicators

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Background	Macroeconomics, development, and health are in some way connected and impact suicide rates.
Aim	Analyse the relationship between the Human Development Index (HDI) and other developmental indices and suicide rates in Telugu States of India.
Subjects and Methods	Information relating to suicides of India, Combined Telugu state, and separated states, was extracted from the Indian government's official website on Accidental Deaths & Suicides in India. National Crime Records Bureau, Ministry of Home Affairs, Govt. of India website for different years. The data for the Subnational Human Development Index (SHDI) and other developmental indices- Health Index (HI), Education Index (EI), Income Index (II), Fertility Rate (FR), and Gini Index (GI) was obtained from the Global Data Lab and MacroTrends. The suicide rates were correlated to the SHDI and other indices by the Pearson Correlation Coefficient.
Results	The Telugu share of total Indian suicides in 56 years (1966–2021) showed a rising trend. There was a total of 350,500 suicides between 1966 and 2013, averaging 20 suicides per day in the united Telugu state. After bifurcation (2014–2021), there were 120,785 suicides, averaging 41 suicides per day. HDI reported medium human development and fertility rates declining towards replacement levels. While Telugu state, before bifurcation, was in tune with India in significant relationship with all the parameters, after bifurcation the relationship turned opposite and non-significant, except for II.
Conclusions	Developmental measures, in general, have an impact on suicide rates. This should be factored in with other parameters, keeping cultural factors in mind while thinking of preventive measures.
Keywords	Andhra Pradesh, Correlation, Fertility rate, Gini Index, Human Development Index, Suicide rate, Telangana, Telugu states.

INTRODUCTION

Suicide was, is, and will continue to be a burning, debating, and researched topic. Apart from demographics, the association of suicide with variables like BMI, (Perera *et al*., 2015) Culture, (Stack, 2021) Economics, (Hamermesh and Soss, 1974) Lunar phase, (Biermann *et al*., 2005) Menstruation, (Dogra *et al*., 2007) Property rights, (Anderson and Genicot, 2015) Season (Chaudhari *et al*., 2018), War, (Somasundaram and Rajadurai, 1995) Weather, (Pervilhac *et al*., 2020) etc., were probed. The degree to which a nation, state, or region has developed has been measured by factors such as the adult literacy rate, educational attainment, fertility rate, satisfaction of basic needs, gender development, gross domestic product, per capita income, percentage of the population living in poverty, standard of living, number of years spent in school, etc., but these parameters do not adequately capture the full extent of development. The Human Development Index (HDI), Health Index (HI), Education Index (EI), Income Index (II), Fertility Rate (FR), and Gini Index (GI) are just a few of the new indices that have appeared. HDI as per UNDP (United Nations Development Programme) was a composite index measuring average achievement in the three basic dimensions of human development- a long and healthy life, knowledge, and a decent standard of living

(United Nations Development Programme Technical note 1, XX 2021-2022). Basing on the index, countries are divided into four groups: very high human development (0.8–1.0), high human development (0.7–0.79), medium human development (0.55–0.70), and low human development (below 0.55) (Subnational Human Development Index SHDI, XX 2019). Global Data Lab (XXb) describes various indices -Health Index is the Health Component of SHDI and uses life expectancy at birth (LEXP) as indicator; Educational index is the Education Component of SHDI and measured with two indicators- mean years of schooling of adults aged 25+ (MYS) and expected years of schooling; Income Index is the Standard of Living Component of SHDI and the natural logarithm of Gross National Income per capita in 2011 US$ PPP (LGNIc) is used as indicator. Total fertility rate is the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates (XXa). The Gini Index is a summary measure of income inequality. The Gini coefficient ranges from 0, indicating perfect equality (where everyone receives an equal share), to 1, perfect inequality (where only one recipient or group of recipients receives all the Income (Gini Index - Census. gov, XX). These indices were correlated with S. Rate by researchers.

The Telugu state, Andhra, represent the first state in India to be carved out based on language in October 1953. After the merger of Nizam's Hyderabad, into the Indian Union, Telugu language speaking dominated areas were merged into Andhra to form Andhra Pradesh (AP) in November 1956. In June 2014 AP was bifurcated into Andhra and Telangana following an agitation by the later. Andhra was a Moderate human development state. Andhra' contribution towards India' suicide was substantial - around 10%. There were no recorded reports about the relationship between Telugu state suicides and developmental indices. With the aim of finding the relationship between Suicide rates and developmental indices of the Telugu state before and after bifurcation, an analysis of available records was undertaken.

SUBJECTS AND METHODS

The official suicide statistics of the Government of India 2021, as displayed by NCRB-ADSI (Accidental Deaths & Suicides in India, XX) were used to collect information on suicides in Telugu state (before and after bifurcation) and India for the years 1966–2021. HDI, HI,

EI, III, FR, and GI were accessed from different sources (Subnational Human Development Index SHDI, XX; XX, XXa; XX, XXb, XX, XXc; India Fertility Rate 1950-2021 | MacroTrends, XX). These were correlated with S. rate to find relationship by Pearson Correlation Coefficient using Statskingdom calculator (XX, XXd).

RESULTS

Suicide data for India was available from 1964 and for Andhra from 1966. HDI and other indices were available from 1990. FR and GI were available from 1992. Telangana scores high in both S. rate and HDI, compared to India and AP. India recorded 48,83,526 suicides between 1964 and 2021 averaging 231 suicides/day. Andhra recorded an average of 20 suicides per day between 1966 and 2013. It more than doubled to 41 suicides per day after bifurcation (2014-21). Telugu share % of suicides in 56 years showing a rising trend, averaged 9.78%.

Figure 1 Show HDI of India, Andhra, and Telangana between 2014 and 2021.

While Telugu state, before bifurcation, was in tune with India in significant relationship with all the parameters, after bifurcation the relationship turned opposite and non-significant, except for II.

Table 1 gives details of Pearson Correlation Coefficient of Suicide rate with developmental parameters of India, Andhra Pradesh before and after bifurcation, and Telangana.
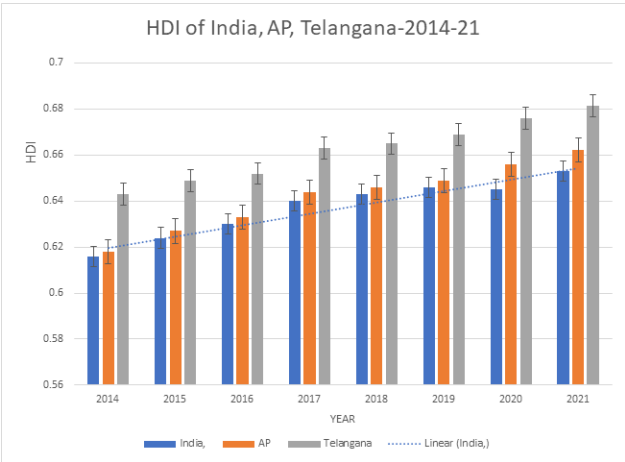

Figure 1: HDI of India, AP, Telangana-2014–21.

Table 1: Details of pearson correlation coefficient of suicide rate with developmental parameters of India, Andhra Pradesh before and after bifurcation, and Telangana

		AP	AP	Telangana
S. RATE (Dependent variable)	India (1990–2021)	Before Bifurcation (1990–2013)	After Bifurcation (2014–2021)	
		r value, *p* value, Relationship, Positive/Negative		
Human Development Index (HDI)	*r* (30)=0.613, *p*<0.001 Positive	*r* (22)=0.812, *p*<0.001 Positive	*r* (6)=0.385, *p*=0.346 Negative	*r* (6)=0.908, *p*=0.002 Negative
Health Index (HI)	*r* (30)=0.6376, *p*<0.001 Positive	*r* (22)=0.802, *p*<0.001 Positive	*r* (6)=0.516, *p*=0.191 Negative	*r* (6)=0.583, *p*=0.129 Negative
Educational Index (EI)	*r* (30)=0.5958, *p*<0.001 Positive	*r* (22)=0.812, *p*<0.001 Positive	*r* (6)=0.583 *p*=0.13 Negative	*r* (6)=0.773, *p*=0.024 Negative
Income Index (II)	*r* (30)=0.6112, *p*<0.001 Positive	*r* (22)=0.832, *p*<0.001 Positive	*r* (6)=0.163, *p*=0.701 Positive	*r* (6)=0.545, *p*=0.163 Negative
Fertility rate (FR)	*r* (28)=0.734, *p*<0.001 Negative	*r* (20)=0.941, *p*<0.001 Negative	*r* (6)=0.273, *p*=0.5613 Positive	*r* (6)=0.889, *p*=0.007 Positive
Gini Index	*r* (28)=0.512, *p*<0.004 Negative	*r* (20)=0.809, *p*<0.061 Negative	*r* (6)=0.685, *p*=0.915 Positive	*r* (6)=0.324, *p*=0.434 Positive

DISCUSSION

The HDI is better in Telangana compared to AP. This may be due to state capital, Hyderabad, where there was a phenomenal development even before bifurcation, being part of the newer state and a smaller no of population. Notable development was confined to urban areas. So, an analysis taking urban and rural suicide rates separately and correlating with development may reveal a different picture. Taking the suicide rate, without considering culture, gender, socioeconomic status, etc., may portray a deceptively distorted picture. Development may mean different things to different people. For individuals, who do not have sources for adequate food intake, development may mean obtaining adequate food when they need and desire it. For an individual who does not have a roof for a shelter, having one means development. Development as computed represent a whole composite thing standing for many aspects of many people with the end point being a group/ set of people. On the other hand, endpoint of Suicide broadly is at a personal level. The whole may not strictly reflect the sum of separate parts. So, the correlation or absence of it only generalizes the issue. Developmental indices are broad generalizations that generally may not reflect individual development. Suicide rate was taken into consideration-break-up into sex and age-specific rates' vis a vis the individual components might throw interesting light (Poduri, 2015). The picture of very high and high developmental index countries cannot be extrapolated to low and medium index countries as the concept of development, aspirations of the populace, realities, authenticity and reliability of data and figures, cultures, etc., are vastly different and not always comparable.

In a systemic review, a consistent trend at the personal level showing that poverty in the form of worse economic status, diminished wealth, and unemployment is associated with suicidal ideation and behaviour (Iemmi *et al.*, 2016). A Mexican study concluded that as the HDI increases, there is a vaster possibility of living alone and having suicidal behaviour (Cabello-Rangel *et al.*, 2020). The present analysis did not correlate HDI and components, with age, family type, etc., but results concur with the broad results of Mexican study. Economic development and human development are mutually dependent, and one effects the other. The relationship need not inevitably be of a positive nature. The relationship between elderly suicide rates and the HDI was curvilineal instead of linear (Shah, 2010). A positive correlation between Suicide rates with HDI was reported by some studies (Lee and Pridmore, 2014; Garg and Gupta, 2015). An Indian study reported that per capita income is an important and positive factor for suicide (Mitra and Shroff, 2006). Likewise, another analysis found inflation, per capita real GDP and industrial growth encourages the incidences of suicides (Pandey and Kaur, XX). The present study is, in general, agreement with the above. HDI and income were negatively associated with suicide rates in Muslim countries (Arafat *et al.*, 2022). The present study agrees with this as far as Telangana is concerned. This may be due to cultural background and higher Muslim population. A fitter index suggested is the Inequality-Adjusted Human Development Index (IHDI) - measures the level of human development when inequality is accounted for (INEQUALITY-ADJUSTED HUMAN DEVELOPMENT INDEX, XX). But somehow this has not become widely accepted and implemented. In the United States, between 1933 and 1984, higher fertility rates were associated with lower suicide rates in the 15-44 age group, which is considered to support Durkheim's suicide theory (Lester and Yang, 1992). In contrast, in India, at constant levels of economic development, lower TFR (indicating greater female freedom) may reduce suicide risk among women (Singh *et al.*, 2021). The present study showed a

mixed response-Telangana showed a positive relationship in contrast to Andhra and India. This may be due to a more limited number of years of calculation (eight in comparison with 30+ of rest), background environment, cultural factors, and fast changing norms. With FR reaching the stabilization level, changing political contours, religious impact, rapidly changing gender equations, the impact on female and total suicides in future will be interesting. Suicide and development are multifactorial and multi-dimensional. The differences observed might reflect differences in cultures and need a thorough evaluation. An analysis of correlation of various components of developmental indices with different aspect of suicides may bring out more insights. The fact that Post bifurcation, the parameters have opposite but non-significant, relationship in AP and Telangana indicates the socio-cultural factors are more important in suicide rate. One should remember developmental indices are also part of socio-cultural factors.

Merits and drawbacks

This is the first analysis of developmental parameters and suicides of Telugu states. This analysis suffers from all the deficiencies of a retrospective analysis, apart from not correlating development with individual suicide parameters.

CONCLUSION

Development has an impact on S. Rate. This should be factored in with other parameters, keeping the cultural factors in mind, while thinking of preventive measures.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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