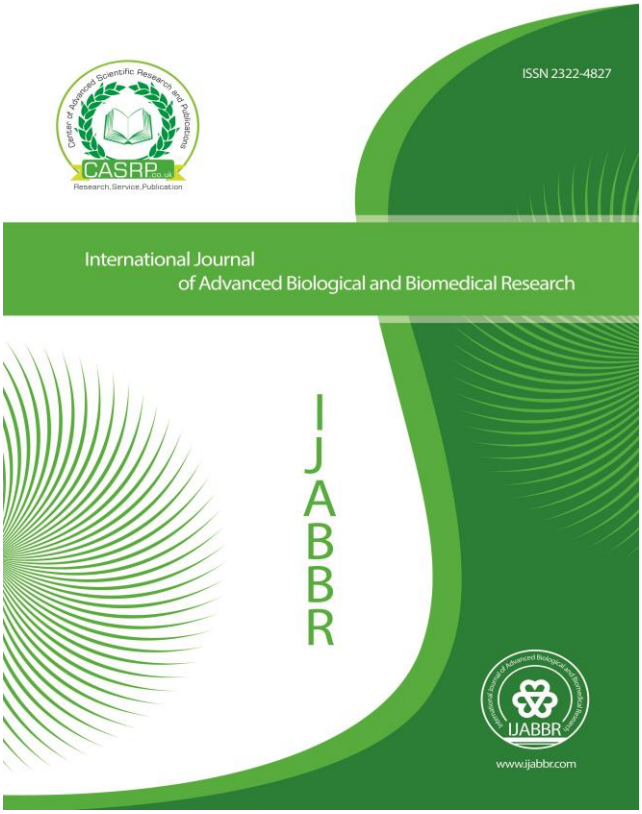

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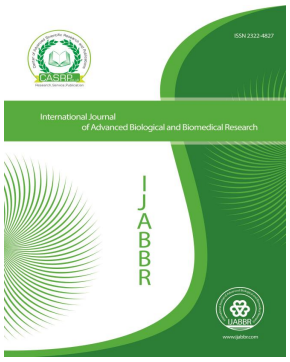

Original Article **Open Access**

Study of Surplus Biocappacity (SB) and Human Development Index (HDI) Sustainable Development Index in the Chaharmehal va Bakhtiari Province

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Abstract

Chaharmahal and Bakhtiari Province is one of the 31 provinces of Iran and located on the southwestern part of the country. Its capital is Shahrekord. It has an area of 16,332 square kilometers and a population of 857,910. To study of human development used the Surplus Biocappacity (SB) and Human Development Index (HDI). This research accrued in the shahr-e-kord, Boroojen, Farsan, Ardal, Lordegan and Kohrang region (chaharmehal va Bakhtiari Province). our research used the raw data in related the Surplus Biocappacity (SB) and Human Development Index (HDI) include number of death, student in the primary, guidance, high school, tertiary and number of Adult Literacy in the calendar of 2010 year. Results showed that the quantity of human development index and sub- index in the shahr-e-kord was higher the other region of chaharmehal va Bakhtiari Province, but this index in the Kohrang region was lowest quantity. because the the quantity of family income, level of education and life Expectancy index in this region are lowest in the chaharmehal va Bakhtiari Province. Other region of province arranged the Boroojen (17%), Lordegan (17%), Farsan (13%) and Ardal (12%) have a maximum of effect on the human development. Overall results showed that the shahr-e-kord (center of chaharmehal va Bakhtiari Province) has a maximum of human development, and Kohrang region have a minimum of human development. Authors suggested increasing the human development of Kohrang region more focused in this region and determinate the

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more financial resource and managements.

Keywords: Surplus Biocappacity (SB), Human Development Index (HDI), Sustainable Development, chaharmehal va Bakhtiari Province, Kohrang, shahr-e-kord.

1. Introduction

Human development was originally defined as “a process of enlarging people's choices” that enables them “to lead a long and healthy life, to acquire knowledge and to have access to resources needed for a decent standard of living” (UNDP, 1990). The UNDP index (HDI) represents a synthetic measure in which the attainment in life expectancy at birth, education, and (the log of) per capita income – as a proxy for other dimensions of human development not directly associated to health and education (UNDP, 2001) – provide a reduced form of a country's achievements in terms of human development. Since 1990, the United Nations Development Programmer (UNDP) has published a series of annual Human Development Reports (HDRs) in which the human development index (HDI) is computed for each country. This index has become an important alternative to the traditional one-dimensional measure of development (i.e. the gross domestic product) (Sagar and Najam, 1998). The Human Development Index (HDI) aims to provide a broader characterization of “development” than is possible by focusing on national income alone. For this purpose, the index aggregates country-level attainments in life expectancy and education, as well as income. The index has been published since 1990 in the UNDP's Human Development Reports (HDRs). The several study on the human development accrued in the several country include: The researcher studied the human development index (Yet another redundant composite development indicator) and used simple statistical analysis and composition of the HDI and its usefulness as a new index of development. It concludes that the HDI is both flawed in its composition and, like a number of its predecessors, fails to provide insights into intercountry development level comparisons which preexisting indicators, including GNP per capita, alone cannot (McGillivray, 1991). The researcher studied of the inequality-adjusted human development index and constructs Gini coefficients, for a set of 20 developing countries, measuring inequalities in annual income, educational attainment, and life-span attainment. These calculations are combined with data from the HDI to produce an Inequality-Adjusted Human Development Index (IAHDI). The implications of this proposed index for evaluating and promoting development are considered (Hicks, 1997).The researcher studied of the human development index and evaluates how well these reports have lived up to their own conceptual mandate and assesses the ability of the HDI to further the development debate. They find that the reports have lost touch with their original vision and the index fails to capture the essence of the world it seeks to portray. In addition, the index focuses almost exclusively on national performance and ranking, but does not pay much attention to development from a global perspective. We propose the incorporation of three simple modifications for the index as a first step to overcome these shortcomings (Sagar and Najam, 1998). The researcher studied of Modified Human Development Index and discusses two categories of technical issues related to the HDI for 1995: those related to the components and those relevant to the structure of the index. The data from the Human Development Report 1995 for 174 countries are used to test the robustness of the suggested index and the results are compared to those of the HDI. The new index is then used to delineate, with some justification, different groups of countries at various levels of human development (Noorbakhsh, 1998).The researcher studied of the human development index and sustainability and analysis of 155 countries leads to the conclusion that the indicated human development of 42 countries is potentially unsustainable. Most of these countries have a low HDI, which means that even this low achievement is not sustainable into the future. The results make a case for both a policy reform within these countries and for external assistance to help maintain at least this low level of human development (Neumayer, 2001). The researcher studied of till the human development index do us part and presents the results of recalculating the HDI for a simplified sample of 114 countries using various methodologies employed by the UNDP. The results are a set of deviations of recalculated HDI ranks compared to the original ranks given in the HDRs. The volatility that can result from such recalculation is shown to be substantial (±10–15 ranks), yet reports in the popular press are frequently sensitive to movements of only a few ranks. Such movement can easily be accounted for by changes in the HDI methodology rather than genuine progress in human

development (Morse, 2003). The researcher studied the Measuring human development via data envelopment analysis and they develop a DEA-like linear programming model to assess the relative performance of the countries in terms of human development. Then they extend our calculations with a post-DEA goal-programming model to derive estimates of a new development index by using optimal weights for the socioeconomic indicators. Finally, they estimate the relative efficiency of the countries in converting income to human development. We develop and solve for this purpose a pure DEA model with variable returns to scale (Despotis, 2005). The researcher studied of Human Development (Beyond the Human Development Index) and used the 39 indicators to encompass the categories. Of these, eight indicators are highly correlated with the HDI and may therefore be represented by it. But 31 are not highly correlated, suggesting that a full assessment of human development requires a much broader set of indicators than the HDI alone. Following the same procedure, we find that fewer than five mortality rates perform equally as well as the HDI, and income per capita is fewer representatives of other dimensions of human development. The HDI (and the other two broad indicators) are shown to be worse indicators of the extended categories of human development for OECD countries than for developing countries (2006). The researcher studied A Household-Based Human Development Index and illustrates our approach for 15 developing countries. Inequality in the HDI is stunningly large for some countries, particularly in countries with low overall human development, driven mostly by very high inequality in the education and income components of the HDI (HARTTGEN and KLASEN, 2012). The researcher studied human development in Africa and showed that the stagnating life expectancy largely due to the spread of HIV/AIDS and the arresting effect of economic mismanagement and political turmoil on growth, help to explain Africa's falling behind. Human development advancement since the mid-twentieth century is positively associated to being a coastal and resource-rich country and negatively to political–economic distortions. The large country variance of the recovery during the last decade suggests being cautious about the future's prospects (de la Escosura, 2013). The researcher studied of troubling tradeoffs in the Human Development Index and indicated the famous Human Development Index (HDI), which aggregates country-level attainments in life expectancy, schooling and income. The main change was to relax the past assumption of perfect substitutability between its components. Most users will not, however, realize that the new HDI has also greatly reduced its implicit weight on longevity in poor countries, relative to rich ones. By contrast, the new HDI's valuations of extra schooling are now very high—many times the economic returns. An alternative index is proposed that embodies less troubling tradeoffs while still allowing imperfect substitution (Ravallion, 2012). The aims of our research are study of Surplus Biocappacity (SB) and Human Development Index (HDI) Sustainable Development index in the chaharmehal va Bakhtiari Province, southwest of Iran.

2. Materials and methods

2.1. Site description

Chaharmahal and Bakhtiari Province is one of the 31 provinces of Iran (Figure 1). It lies in the southwestern part of the country. Its capital is Shahrekord. It has an area of 16,332 square kilometers and a population of 857,910 (2006).

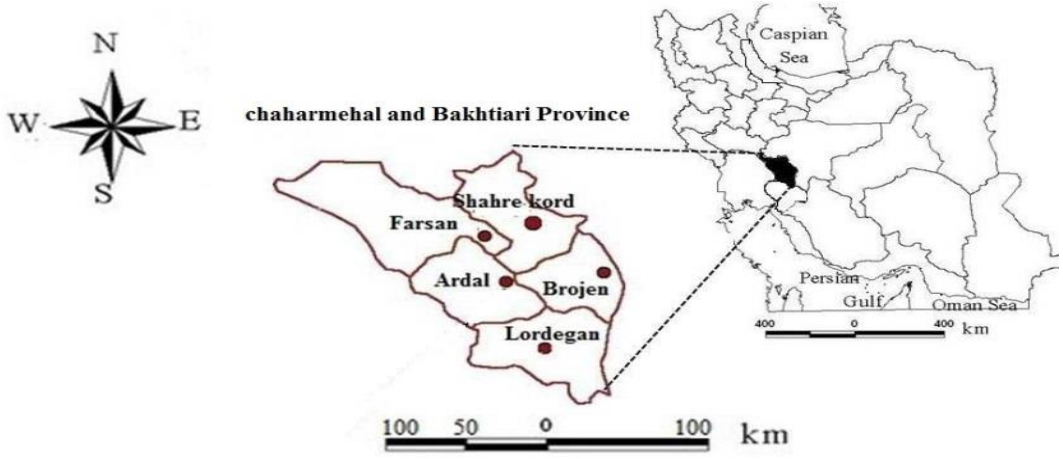

Fig. 1. Study site location in the Zagros region, and Western Iranian state of Iran.

Map	Shahrestan (≈County)	Bakhsh (≈District)	District Center
	Ardal	Central	Ardal
		Miankooh	Sarkhun
	Boroojen	Central	Boroojen
		Boldaji	Boldaji
		Gandoman	Gandoman
	Farsan	Central	Farsan
	Koohrang	Central	Chelgerd
		Bazaft	Chaman-Goli
	Kiar	Central	Shalamzar
		Naghan	Naghan
	Lordegan	Central	Lordegan
		Falard	Mal-e Khalifeh
		Khanmirza	Aluni
		Manj	Manj
	Shahr-e Kord	Central	Shahr-e Kord
		Ben	Ben
		Laran	Soureshjan
		Saman	Saman

Fig. 2. Chaharmahal and Bakhtiari Province (country and district)

This province in the 2006 divided the seven country (sharestan) include shahr-e-kord (368466 population), Boroojen (115286 population), Farsan (90980 population), Ardal (70381 population), Lordegan (177277 population), Kohrang (59192 population) (figure 2). This province have a 25 city, 17 district and 39 district center and in the 2006 have an 857910 population (45.1% lived in the city and 54.9% lived in the village).

2.1.1. Sustainable Development index

Human development is about creating an environment in which people can develop their full potential and lead productive and creative lives in accordance with their needs and interests (UNDP, 1999; UNDP, 2001). An increase in national income does not necessarily imply an increase in human development.2 The most important factors that determine the quality of life are health, nutritional status, morbidity, standard of living and human development (UNDP, 1999) Poverty is a major constraint in developing countries for attaining a good standard of living and human development. In developing countries, a considerable proportion of people are still poor owing to morbidity and poor availability of healthcare facilities (UNDP, 1999; UNDP, 2001). Identification and use of the appropriate indicators are important for the developmental process. In this study, we explored the health scenario with the use of various demographic, socio-economic, health and dietary indicators, and also by using the existing indices to measure poverty, human development and standard of living. The indices Human Development Index (HDI) and Human Poverty Index (HPI) have been calculated on the basis of demographic and socioeconomic indicators (UNDP, 1999; UNDP, 2001).

2.1.2. Human Development Index (HDI)

The HDI is a composite index that measures the average achievement in a Chaharmahal and Bakhtiari Province in three basic dimensions of human development: health, education, and standard of living.

The well-known Human Development Index (HDI) encompasses only three rather basic aspects of human welfare.

2.2. Human Development sub-Index (HDI)2.2.1. life Expectancy at Birth (25 year are minimum and 85 year are maximum)

The trend in the life expectancy of humans during the past thousand years has been characterized by a slow, steady increase and a pattern frequently punctuated by a volatility in death rates caused by epidemics and pandemic infectious diseases, famines, and war (Olshansky *et al*, 1996). This volatility was dramatically curtailed in the mid-19th century as infectious diseases yielded swiftly to improved living conditions, advances in public health, and medical interventions (McNeill, 1976).

$$\text{life Expectancy at Birth} = \frac{LE - 25}{85 - 25}$$

2.2.2. Adult Literacy Ratio (zero is minimum and 100 is maximum)

Relative achievements in each a country's in the adult literacy field measured by gross enrollment rates in primary, guidance, high school and tertiary levels of education. This index calculated according to the following formula.

$$X = \frac{2}{3} \times ALR + \frac{1}{3} \times GEI$$

$$\text{Adult Literacy Ratio} = \frac{ALR - 0}{100 - 0}$$

$$\text{compact rate of gross Literacy} = \frac{GIL - 0}{100 - 0}$$

Today, the economic condition of each country depends on the level of general education, literacy education and human resources.

2.2.3. Gross Domestic Product GDP (100$ minimum and 40000$ maximum) (Pourasghar sangachin, 2010)

Gross Domestic Product (GDP) measures the size of the country economics. This index includes the value of all goods and services in the specified period during a, usually a year, is produced in a country (World Bank, 2006).

$$\text{Gross Domestic Product GDP} = \frac{logGDP - log100}{log40000 - log100}$$

2.2.4. compact index CI

This index is compact of three indexes (Gross Domestic Product GDP, life Expectancy at Birth and Adult Literacy Ratio)

$$\text{human development index} = \frac{(\text{general education} + \text{Gross Domestic Product} + \text{life Expectancy})}{3}$$

2.3. *Surplus Biocappacity (SB)*

Overall results showed that the *Surplus Biocappacity (SB*) evaluated the bio-ecological footprint and sustainable consumption patterns. To calculate this indicator the productive land and water surface area subtract the ecological footprint area. This index is a function of the amount of ecologically productive areas, consumption and population. In developed countries this indicator is generally low and sometimes negative quantity.

$$Surplus\ Biocappacity\ (SB) = \text{bio} - \text{ecological footprint} - (\text{water surface area} - \text{Productive aired land})$$

In this research used the raw data in related the Surplus Biocappacity (SB) and Human Development Index (HDI) include number of death, student in the primary, guidance, high school, tertiary and number of Adult Literacy in the calendar of 2010 year. Data of mortality in the six cities by sex and age groups not available and this research used the 0.670 `quantity (Proportion of the city's population and GDP).

3. Results and discussion

The HDI assesses intercountry development levels on the basis of three so-called deprivation indicators: life expectancy, adult literacy and the logarithm of purchasing power adjusted per capita GDP (McGillivray, 1991).

3.1. Human Development Index (HDI)

3.1.1. life Expectancy at Birth

Table 1
The methods of life Expectancy at Birth in the 2010 year

number of death	life Expectancy at Birth	location
4431	0.767	In chaharmehal va Bakhtiari Province
2081	0.36	In Shahr-e-kord city

Table 2
Methods of calculate the Gross Enrolment Ratio to the Primary, Secondary and high school in the 2010

Total of population	Primary stage	Guidance stage	High school stage	Tertiary stage
97459	27359	21337	48763	48985
Period/ population	0.992	0.996	0.994	0.187
Gross Enrolment Ratio		0.79*100=79%		

$$\textit{Gross Enrolment Ratio} = 0/79 \quad \frac{79-0}{100-0} = \frac{ALR-0}{100-0}$$

3.1.2. Adult Literacy Ratio

Table 3
Methods of calculate the Adult Literacy Ratio in the 2010

Population more the 15 year	261921
Number of Adult Literacy Ratio	8329
Number of Adult Literacy Ratio/ Population more the 15 year	0/031*100=3/1%

$$\text{Adult Literacy Ratio} = \frac{GIL-0}{100-0} = \frac{3/1-0}{100-0} = 0/031$$

3.1.3. Education index

$$\text{Education} = \frac{2}{3} \times ALR + \frac{1}{3} \times GEI$$

$$\text{Education} = \frac{2}{3} \times 0/031 + \frac{1}{3} \times 0/79 = 0/28$$

3.1.4. Gross Domestic Product (GDP)

Table 4
Methods of calculate the Gross Domestic Product in the 2010

Population	Gross Domestic Product	population
In chaharmehal va Bakhtiari Province	0.670	857910
In Shahr-e-kord city	0.287	368466

3.2. Human development index

$$\text{human development index} = \frac{(\text{general education} + \text{Gross Domestic Product} + \text{life Expectancy})}{3} = \frac{(0.36 + 0.28 + 0.28)}{3} = \mathbf{0.30}$$

3.2.1. Surplus Biocappacity (SB)

Table 5
Methods of calculate the Surplus Biocappacity (SB) in the 2010

Shahr-e-kord city	Productive aired land	water surface area	bio − ecological footprint
	38.684	20.88	109.015
Surplus Biocappacity (S)		49.45	

Table 6
Human development index classes

human development index classes	Very high (HDI)	high (HDI)	medium (HDI)	Low (HDI)
quantity	More 0.788	0.788-0.667	0. 667-0.488	Less the 0.488

Table 7
The human development index in the six regions of chaharmehal va Bakhtiari Province

human development index	shahr-e-kord	Boroojen	Farsan	Lordegan	Ardal	Kohrang
life Expectancy at Birth	**0.360**	**0.132**	**0.070**	**0.126**	**0.067**	**0.044**
Adult Literacy Ratio	**0.031**	**0.035**	**0.029**	**0.048**	**0.022**	**0.036**
Gross Enrolment Ratio	**0.790**	**0.79**	**0.77**	**0.72**	**0.71**	**0.71**
Gross Domestic Product	**0.28**	**0.09**	**0.07**	**0.15**	**0.06**	**0.03**
Human development	**0.30**	**0.16**	**0.13**	**0.17**	**0.12**	**0.11**

Table 8
The Surplus Biocappacity (SB) sub-index in the six regions of chaharmehal va Bakhtiari Province

Surplus Biocappacity (SB) sub-index	shahr-e-kord	Boroojen	Farsan	Lordegan	Ardal	Kohrang
Productive aired land	38.684	30.433	7.556	18.133	5.463	6.933
water surface area	20.88	12.042	25.90	24.184	20.936	6.979
bio − ecological footprin	109.015	186.148	59.541	20.959	126.886	18.334
Surplus Biocappacity (SB)	49.45	49.39	49.39	-21.35	100.48	4.42

Table 9
The human development sub- index in the chaharmehal va Bakhtiari Province

2006	Sustainable development index			
	life Expectancy at Birth	Gross Domestic Product	Education index	Human development
Quantity of index	0.767	0.675	0.814	0.750

Results showed that the quantity of human development index and sub- index in the shahr-e-kord was higher the other region of chaharmehal va Bakhtiari Province and this region (shahr-e-kord) have a better human development, because the quantity of family income, level of education and life Expectancy index in this region are higher in the chaharmehal va Bakhtiari Province, but this index in the Kohrang region was lowest quantity. because the quantity of family income, level of education and life Expectancy index in this region are lowest in the chaharmehal va Bakhtiari Province (table 7 and 8). Other region of province arranged the Boroojen (17%), Lordegan (17%), Farsan (13%) and Ardal (12%) have a maximum of effect on the human development. Overall results showed that the shahr-e-kord (center of chaharmehal va Bakhtiari Province) have a maximum of human development, because this region have a more financial resource and managements. Kohrang region have a minimum of human development because this region located in the thither of shahr-e-kord and have a lowest the financial resource and managements.authors suggested to increase the human development of Kohrang region more focused in this region and determinate the more financial resource and managements.

From similar morphology cluster the percentage occurrence on culture media recorded as, 20% *Trichosporon beigelii* B, 16.6% *Candida zeylanoides,* 13.3% *Rhodotorulaacheniorum,* 13.3% *Kluyveramyces delphensis,* 10% *Guilliermondella selenospora*, 6.67% *Cryptococcus terreus* A, 6.67% *Cryptococcus albidus Var aerus*, 6.67% *Filobasidilla neoformans* and 6.67% *Hyphopichia burtoni*. (1) The highest percentage occurrence on culture media was *Trichosporonbeigelii* B (20%), and the lowest occurrence was *Cryptococcus terreus* A, *Cryptococcusalbidus Var aerus, Filobasidilla neoformans,* and *Hyphopichiaburtoni (*6.7%).

Table 1
Morphological characteristics of the isolated yeasts.

Name of organisms	Pigmentation	Colony color, texture, elevation	Cell size
Trichosporonbeigelii B	White	Raised, circular, smooth	Medium
Candida zeylanoides	White	Raised, circular, smooth, shiny	Large
Rhodotorulaacheniorum	Orange red	Raised, Smooth, mucoid to butyrous colonies	Medium
Kluyveromycesdelphensis	Creamy	Flat, Fury	Medium
Guilliermondellaselenospora	Brown	Raised, circular, smooth	Medium
Cryptococcus terreus A	White	Globose to slightly oval with mucous capsules raised, mucoid	Medium
Cryptococcus albidusvaralbidus	Yellowish Creamy	Raised, furrowed, mucoid	Large

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