

## Distribution of socioeconomic factors among the new patients of skin cancer in Iran

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### Abstract

**Background:** The global burden of cancer due to population growth and aging and various environmental factors is increasing. Skin cancer is the most common cancer among Iranians, especially in men. There is strong evidence from both industrialized and less developed countries that cancer incidence and survival is related to socioeconomic factors. The aim of the present study was to investigate the distribution of socioeconomic factors including Human Development Index (HDI), unemployment rate, and urbanization ratio among new patients of skin cancer in Iran.

**Methods:** The data was extracted from a longitudinal database of 30 provinces of the country from 2007 to 2012. The database was part of cancer registry of the Ministry of Health and Medical Education. There were 180 new cases of skin cancer, which were selected for the study. Socioeconomic data were collected from the Statistical Center of Iran, which included variables including HDI, urbanization ratio, and unemployment rate. For data analysis StataCorp. 2009. Stata Statistical Software: Release 11. College Station, TX: StataCorp LP., was used.

**Results:** The average number of skin cancer cases with a mean±SD of 20.2±10.19 was higher in men than in women (14.6±7.45). The maximum number of skin cancer cases in men and women belonged to Isfahan Province (32.9) and Yazd Province (23.9), respectively. The fixed effect model showed that each year, the risk of skin cancer increases 20% in men and 19% in females ( $P<0.05$ ). It also showed that urbanization rate and Log HDI were independent predictors of skin cancer in both genders (female: urbanization rate OR=-1.32, Log HDI OR=-3.04) (male: urbanization rate OR=-1.19, Log HDI OR=-3.33).

**Conclusion:** These findings suggest the independent role of HDI and urbanization as two concepts of social determinants of health, on the number of skin cancer cases.

**Keywords:** Iran; Socioeconomic Factors; Skin Neoplasms

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## Introduction

Cancer is one of the most important causes of death worldwide. According to the Ministry of Health and Medical Education, after cardiovascular diseases and accidents, cancer is the third leading cause of death in Iran. Skin cancer, as one of the most common malignant cancers in the body, is a growing, painful, and costly disease (1). Studies in Iran have shown that skin cancers alone account for 5.2% to 32.7% of all cancers (2).

According to the record of cancer rate in Iran in 2004, 15.7% of all malignancies were related to skin cancer, and according to 2009 reports, skin cancer with 9114 cases had a high percentage of cancers. During the years 2004 to 2008, skin cancer was reported as the most common cancer (4). The trend of incidence for this cancer is reported to be increasing in Iran (2). Millions of people around the world are living with this disease. The annual incidence is an increasing threat to public health. Many factors increase the risk of skin cancer (5). On the other hand, the conditions in which people grow up, live, and work affect their health, and inequality in these conditions leads to health inequality (6).

The effect of socioeconomic environment on cancer survival has been documented in several countries demonstrating that cancer patients living in affluent regions have better survival chance than those living in deprived districts. The socioeconomic environment seems to be linked to the rate of survival from cancer (7). The majority of studies on socioeconomic inequalities in cancer survival examined differences in 5-year survival. Demographic and socioeconomic factors influence the delivery of health care in many cases. Insurance status, race, and gender have all been demonstrated to influence decision-making in health care through differential access to care or via discrepancies in choices of treatment in different groups of patients (8). Various studies have consistently shown that the overall

prevalence and mortality of cancer is higher in less desirable socioeconomic classes mainly due to the increase of inequality indicators in certain areas (9).

Ecological models indicate that individual's behavior towards healthcare is influenced by his or her physical environment and also by interpersonal and other social determinants of health (10).

The present study was conducted to evaluate the distribution of three socioeconomic variables including the Human Development Index (HDI), unemployment rate, and urbanization ratio among new patients of skin cancer.

## Methods

A cross-sectional study was conducted on Iranian population from 2007 to 2012. Data related to social economic variables was collected from the *Statistical Yearbook* of Iran's provinces developed by Statistical Center of Iran. These variables included unemployment rate, urbanization ratio, and the HDI. The HDI is a composite statistic of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development.

The data of cancer incidence was collected from the National Cancer Registry, non-Communicable Disease Control administration, and cancer unit of the Ministry of Health and Medical Education. In Iran, cancer registry program is being executed across the country by the cancer department of the Center for Disease Control affiliated to the Ministry of Health and Medical Education. In this program, cancer registry experts of the health deputies of Medical Sciences Universities across Iran receive new cases of cancer from the pathological-diagnostic centers under supervision (including governmental and nongovernmental centers). After doing necessary processes, they submit their information to the Center for the Non-Communicable Diseases. This information is annually published in the

form of “The Official Report on Cancer Cases Registered”.

The panel data used in the current study was analyzed using StataCorp. 2009. Stata Statistical Software: Release 11. College Station, TX: StataCorp LP. To select the best model, different models were estimated. Finally, the model with maximum R-squared was selected. The appropriate model for examining the relationship between socioeconomic variables and skin cancer in men and women was estimated as follows:

$$\ln Y_f = A x_1 + B x_2 + C x_3 + D x_4 + E$$

$$\ln Y_m = A x_1 + B x_2 + C x_3 + D x_4 + E$$

$\ln = \log$

$X_1 =$  unemployment rate

$X_2 =$  urbanization rate

$X_3 =$  HDI

$X_4 =$  year

$E =$  intercept

$Y_f =$  number of new cases of skin cancer in women

$Y_m =$  number of new cases of skin cancer in men

## Results

Table 1 shows the distribution of the new cases of skin cancer among men and women. The mean number of skin cancer cases was higher in men than in women (20.2±0.19 vs. 14.6±7.45). According to Table 2 and Figure 1, the mean of unemployment rate of the country was 11±2.97 between 2007 and 2012, the highest unemployment rate was in Lorestan province with the mean of 17.5, and the lowest unemployment rate was in East

Azarbaijan province with mean of 6.4. According to Table 2 and Figure 2, the mean HDI of the country was 0.04±0.741, the highest rate of HDI was in Tehran province with the mean of 0.8, and the lowest rate of HDI was in Sistan and Baluchestan province with the mean of 0.6 at the same time. According to Table 2 and Figure 3, the mean urbanization ratio in Iran was 0.5±0.65, the highest urbanization ratio was in Qom province with an average of 0.93, and the lowest urbanization ratio was observed for Mazandaran province with the mean of 0.38.

Figure 4 shows that the maximum and minimum skin cancer incidence in men belonged to Isfahan Province (32.99) and Sistan and Baluchestan Province (4.07), respectively.

Also, the maximum skin cancer incidences in females belonged to Yazd Province (23.9) and the minimum incidence belonged to Isfahan (4.79), Golestan (4.79), and Gilan (4.79) provinces.

Table 3 shows the fixed effect model regarding the evaluation of the relationship between skin cancer in men and women and socioeconomic factors. No significant relationship was observed between unemployment rate and the number of new cases of skin cancer in both sexes. For a unit of increase in urbanization ratio, skin cancer decreases 1.1% in men and 1.3% in women. For 1% increase in HDI, the number of cancer cases decreases 3.3% in males and 3% in females. The model shows that each year, skin cancer increases 0.2% in men and 0.19% in females.

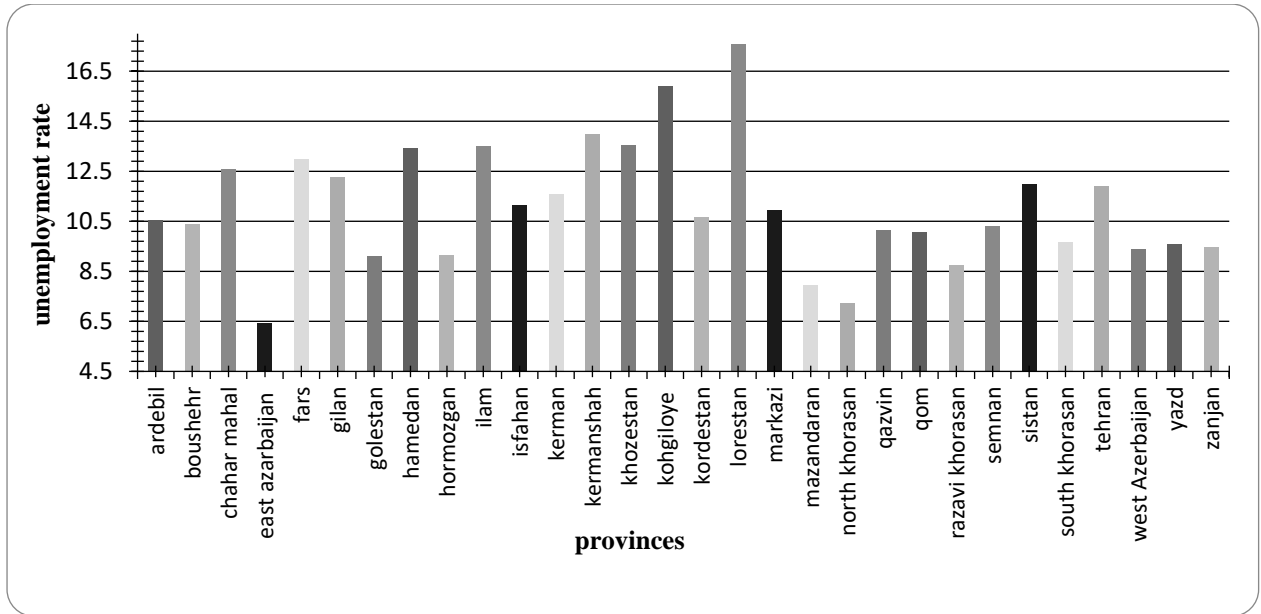


Figure 1. Unemployment rate in provinces of Iran, 2007-2012

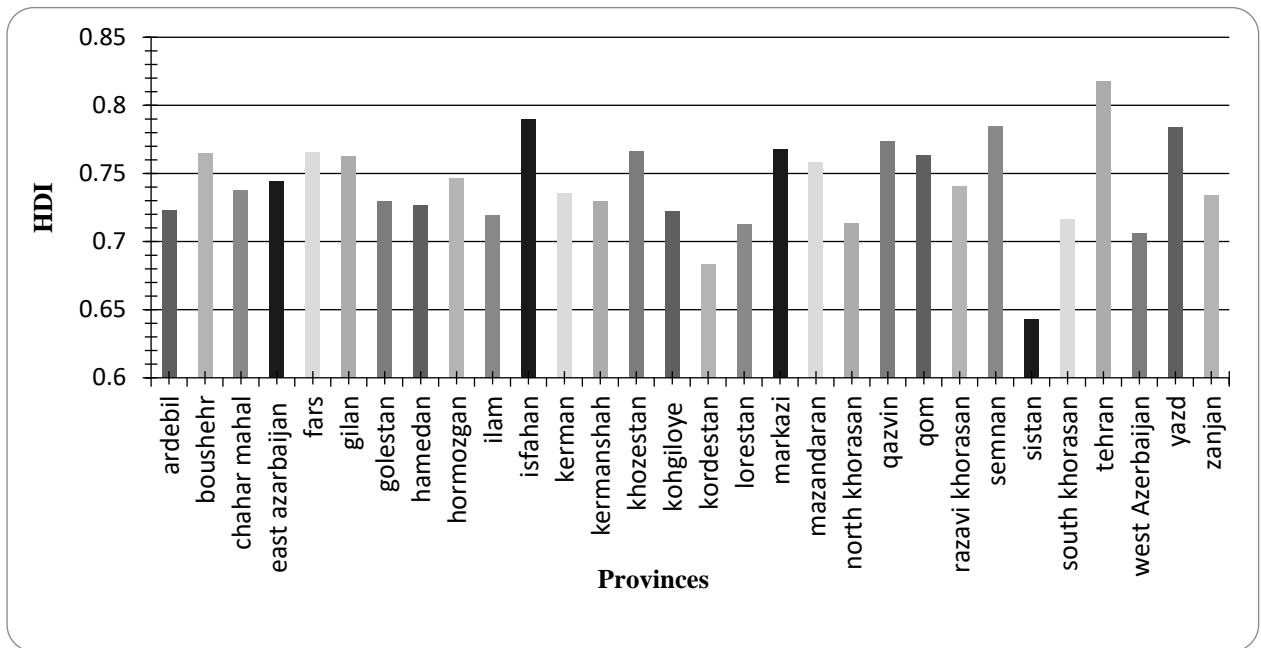


Figure 2. Human Development Index (HDI) in provinces of Iran, 2007-2012

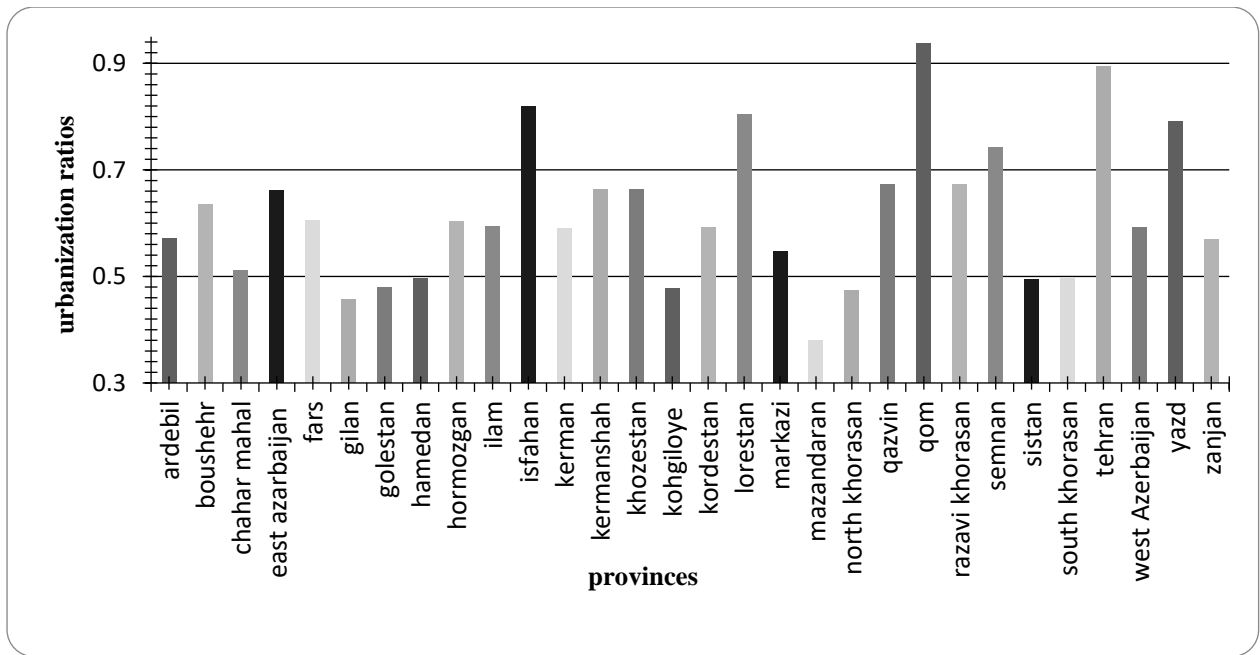


Figure 3. Urbanization ratios in provinces of Iran, 2007-2012

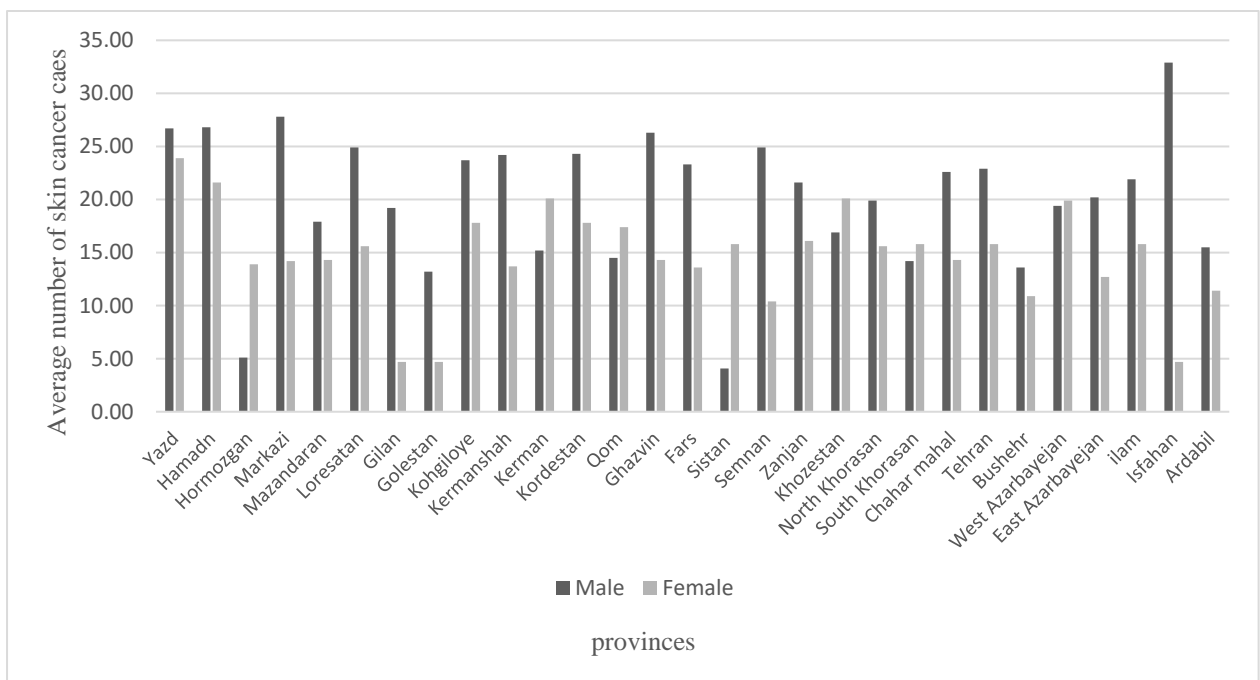


Figure 4. Average number of skin cancer cases in provinces of Iran based on sex, 2007-2012

Table1. Age standardized incidence rate of skin cancer and sex of the participants

Gender	Minimum	Maximum	Mean±SD
Female	1.5	42.44	14.6±7.45
Male	2.22	54.89	20.2±10.19

Table 2. Socioeconomic factors of the study population

Socioeconomic factors	Minimum	Maximum	Mean±SD
Unemployment rate	4.1	20.6	11±2.97
Urbanization ratio	0.31	7.42	0.6±0.52
HDI	0.63	0.854	0.7±0.04

Table 3. Estimation of a fixed effect model for investigating the relationship between skin cancer and socioeconomic factors in males and females

		Unemployment rate	Urbanization rate	Log HDI	Year	intercept	R-squared
		OR	OR	OR	OR	OR	
Sex	Female	-0.006	-1.32*	-3.04*	0.19*	-14.32*	0.39
	Male	0.003	-1.19*	-3.33*	0.2*	-14.87*	0.43

\*P<0.05

**Discussion**

The number of skin cancer cases in men had an increasing trend between 2007 and 2012. Yet, for women, it has a descending trend at first and then it ascends. On the other hand, we witnessed an increase in 2009 in comparison to the other years. It seems that this increase has been not only due to the substantial increase of cancer cases, but also due to promotion of cancer registration system, which increased the number of recognized cases. The increasing trend of cancer cases was also reported in similar studies (12, 13)

The results of our study showed that there was not a significant relationship between the number of skin cancer cases and unemployment rate. In line with our finding, Ruoff et al. reported no significant relationship between unemployment rate and skin cancer between the two genders (14). Singh et al. study showed that areas with less unemployment have a higher rate of melanoma outbreak (6).

Our study showed a negative significant relationship between urbanization ratio and the number of skin cancer cases. In a study by Momenyan et al., skin cancer was less in

urban areas in both genders (15). Also, a study by Kavooosi et al., showed that non-melanoma skin cancers are mostly seen in the individuals working outdoors. No outbreak differences were observed between men and women or rural and urban residents (16). The results of the study by Singh et al. showed reverse results (6).

Moreover, a negative significant relationship was observed between HDI and the number of new cases of skin cancer. In two studies by Ruoff et al. and Hausauer et al., there was a positive significant relationship between skin cancer incidence and both education and the annual family income (14, 19). Also, in a study by Padovese et al., level of education was the most powerful predictor of skin cancer awareness (20). People in higher socioeconomic groups may spend more money for protecting their skin from hazardous exposures. Yet, Singh et al. study indicated that although people with higher socioeconomic status had more money to spend on sun protection products (e.g. sun screen cream and clothing), they expose their bodies more to dangerous UV radiation (6).

Since the risk factors of cancers incidence are diverse, a number of these cases have not been examined in the present study. The values of socioeconomic status are not clear at individual level in Iran. Therefore, the country-level values and reports on cancer registry as well as the information of the Statistical Center of Iran are used. One strength of the study, on the other hand, was investigation in the national wide level.

Considering the independent role of HDI and the urbanization on the number of skin cancer case, it is recommended that these factors be prioritized as important social determinants for skin cancer prevention policies. Also, health care providers should pay more attention to people with lower HDIs in urban areas.

#### *Conflict of interest*

Authors declare no conflict of interests.

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