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## ORIGINAL ARTICLE

# Epidemiology and Inequality in the Incidence and Mortality of Nasopharynx Cancer in Asia

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### Abstract

**Objectives:** One of the most common head and neck cancers is nasopharynx cancer. Knowledge about the incidence and mortality of this disease and its distribution in terms of geographical areas is necessary for further study and better planning. Therefore, this study was conducted with the aim of determining the incidence and mortality rates of nasopharynx cancer and its relationship with the Human Development Index (HDI) in Asia in 2012.

**Methods:** The aim of this ecologic study was to assess the correlation between age-specific incidence rate (ASIR) and age-specific mortality rate (ASMR) with HDI and its components, which include the following: life expectancy at birth, mean years of schooling, and gross national income per capita. Data about SIR and SMR for every Asian country for 2012 were obtained from the global cancer project. We used the correlation bivariate method for the assessment. Statistical significance was assumed if  $p < 0.05$ . All reported  $p$  values are two-sided. Statistical analyses were performed using SPSS (Version 15.0, SPSS Inc.).

**Results:** A total of 68,272 cases (males, 71.02%; females, 28.97%; sex ratio, 2.45) and 40,530 mortalities (males, 71.63%; females, 28.36%; sex ratio, 2.52) were recorded in Asian countries in 2012. The five countries with the highest ASIR of nasopharynx cancer were Malaysia, Singapore, Indonesia, Vietnam, and Brunei, and the five countries with the highest ASMR were Indonesia, Vietnam, Singapore, Malaysia, and Brunei. The correlation between HDI and ASIR was 0.097 ( $p = 0.520$ ) [0.105 in men ( $p = 0.488$ ) and 0.119 in women ( $p = 0.901$ )]. The correlation between HDI and ASMR was  $-0.102$  ( $p = 0.502$ ) [ $-0.072$  in men

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( $p = 0.633$ ) and  $-0.224$  in women ( $p = 0.134$ ).

**Conclusion:** Nasopharynx cancer is native to Southeast Asia. The highest incidence and mortality rates are found in Malaysia, Singapore, Indonesia, Vietnam, and Brunei. No significant relation was found between the standardized incidence and mortality rates of nasopharynx cancer and the HDI components. Further studies are recommended in Southeast Asian countries in order to find the etiology of cancer, as well as its diagnosis and treatment.

## 1. Introduction

Cancer is the leading cause of mortality, with a high financial burden, and one of the major public health concerns at the international level [1,2]. Head and neck malignancies are among the relatively common cancers in humans that affect several anatomic sites of the head and the neck [3]. One of the most common head and neck cancers is nasopharynx cancer [4,5], which has a very unique distribution pattern. Worldwide, about 86,500 cases of nasopharynx cancer and 50,000 deaths arising from it [6] are reported annually. According to the International Agency for Research on Cancer report in 2008, more than 80% of patients with nasopharynx cancer are in Asia, and only 5% of these cancers are reported in Europe. Specifically, 71% of new nasopharynx cancer cases are recorded in East and Southeast Asia, and 29% are diagnosed in South and Central Asia and North and East Africa [7].

Nasopharynx cancer is native to Southeast Asia, where the prevalence rate is 15–50 cases per 100,000 people [8]. For the United States and the rest of the world, the incidence of less than 1 case per 100,000 people per year is reported [9]. In addition to geographic diversity, it seems that some ethnic groups are prone to nasopharynx cancer. These groups include the Bidayuh in Borneo, the Nagas in northern India, and the Inuits in the North pole, which have an age-standardized incidence rate of more than 16 per 100,000 people among men each year [10].

In terms of heterogeneous epidemiological patterns, in addition to nonenvironmental risk factors such as sex, ethnicity, and family history [11], other factors—such as smoking [12], salted fish consumption, especially in childhood [12–18], nitrosamine in some food items traditionally used in southern China [19,20], and use of traditional herbal medicines in the Asian population [12,21–23], as well as nonfood risk factors such as occupational exposures to formaldehyde, wood dust, smoke, and chemicals [7,12,22,24]—may be involved in the pathogenesis of nasopharynx carcinoma [25]. Nasopharynx cancer, in comparison to other head and neck tumors, has different epidemiological, staging, and treatment characteristics. Most patients are diagnosed when they are in advanced stages [26,27].

The Human Development Index (HDI) is a useful tool to compare the incidence and mortality rates of cancer at the global level [28–30] and is one of the indicators to check the status of illnesses and deaths between countries. In fact, this index has been observed to be related with the incidence and mortality rates of many diseases; it is considered a good index to obtain information regarding the status of a specific disease in different countries. The HDI is composed of three basic dimensions: life expectancy at birth, adult literacy rate, and gross domestic product (GDP) per capita. The relationship between HDI and some cancers is studied, and investigating this relationship can lead to a more accurate understanding of cancer and its risk factors distribution [31], and it is also suggested to be used for other cancers. Although nutritional and communicable diseases are common causes of death in countries with a low HDI, it is anticipated that by 2030, one common cause of death in these countries will be noncommunicable diseases such as cancer [32]. Because awareness about nasopharynx cancer incidence and mortality can be useful for health programs and research activities, and considering the possible role of the HDI, this study was conducted with the aim of evaluating the incidence and mortality of nasopharynx carcinoma and its relationship with the development index and its components in Asia in 2012.

## 2. Materials and methods

We conducted an ecologic study in Asia to assess the correlation between age-specific incidence and mortality rate (ASR) with HDI and its components, which include the following: life expectancy at birth, mean years of schooling, and gross national income (GNI) per capita. The ASR data of all Asian countries for the year 2012 were obtained from the global cancer project (available at <http://globocan.iarc.fr/Default.aspx>) [33], and the HDI data was based on the Human Development Report 2013 [34], which contains information about HDI and its components for every country in the world in 2012.

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