



The burden of infectious diseases in the Brazilian Southern state of Santa Catarina



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Summary Infectious diseases are still significant causes of deaths in Brazil. The objective of this study was to estimate the burden of selected infectious diseases in the Brazilian Southern state of Santa Catarina in 2011. An ecological study was conducted. The infectious diseases included were HIV/AIDS, tuberculosis, hepatitis B, hepatitis C, Chagas disease, diarrheal diseases and other infectious diseases. Data were collected from official health information systems. Disability Adjusted Life Years (DALY) were estimated by the sum of Years of Life Lost (YLL) and Years Lived with Disability (YLD). 45,237.33 DALYs were estimated, with a rate of 685.46 DALYs per 100,000 population. 92.9% was due to YLL and 7.1% to YLD. Men and the age range of 0–4 years presented higher burden. The highest burden was attributed to HIV/AIDS. There was a high concentration of burden rates in the coast regions of the state. It could be concluded that more than 90% of the burden was attributed to the early mortality component. The highest burden was observed among men, children under 5 years of age and at the coast regions of the state. The highest levels of burden were due to HIV/AIDS.

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Introduction

The number of deaths from infectious diseases is still significant in Brazil [1]. In addition to classic health indicators, such as general and proportional mortality and incidence and prevalence ratios, the estimation of other measures that are focused on the burden of infectious diseases is useful for understanding their impact on Brazilian society [2].

The epidemiological measure Disability-Adjusted Life Years (DALY) estimates the sum of the number of Years Lived with Disability (YLD) and the number of Years of Life Lost (YLL) due to different diseases or health conditions [3]. In Brazil, the use of this measure is scarce and limited to a few instances [2,4–6].

The 1998–2002 National Brazilian GBD study estimated more than 37 million DALYs, which represented 232 DALYs per 1000 population. Approximately 23% of the DALYs and 30% of YLLs were due to infectious, parasitic, maternal and perinatal, and nutritional diseases. HIV-related diseases were a substantial cause of burden, representing almost 2% of the DALYs in both men and women and ranking 20th in causes of DALYs in Brazil and 18th in Brazil's southern region [1].

In Santa Catarina in 2009, tuberculosis caused 92.25 DALYs per 100,000 population, of which 78.8% could be attributed to YLL. The highest rates were observed in men in the 30–59 age group, with an unbalanced distribution between the state's regions [4]. The burden of AIDS in Santa Catarina was estimated at 20,310 DALYs for 2009, a rate of 331 DALYs per 100,000 population [2]. The burden of hepatitis C was estimated at 65,832 DALYs for the same year, with a rate of 1075.9 DALYs per 100,000 population. The YLD accounted for 96.1% of the DALYs. The largest burden occurred in men in the 45–59 and 30–44 age ranges. The regions of Santa Catarina that represented the highest burdens were the *Meio Oeste* with 3024.8 DALYs per 100,000 population and *Sul* with 1212.2 DALYs per 100,000 population [7]. Preliminary data from a time-series study on the trend rates of the burden of hepatitis B in Santa Catarina from 2005 to 2010 showed a non-significant drop of 3.4% per year (95% CI –12.1; 6.2) [8].

Although burden of disease studies are important, they rely on the estimation of a health indicator that is still not available in the Brazilian Public Health System, neither at the national nor at the state or local levels. Determining the scores for this indicator may help direct epidemiological investigations, which in turn may directly influence the management of the public's health. Innovative public policies and interventions could

be based not only on mortality data but also on the disability caused by diseases. The aim of this study was to describe the burden of infectious diseases in a Brazilian southern state in 2011.

Methods

Santa Catarina has a population of approximately 6 million people. It has the highest United Nations Human Development Index (HDI) in the South region and ranked third in HDI among all 26 Brazilian states.

An epidemiological study with an ecological design was conducted covering all nine regions of Santa Catarina state. The study was based on methodology from the GBD study for the world proposed by Murray et al. [9]. The infectious diseases included were HIV/AIDS, tuberculosis, hepatitis B, hepatitis C, Chagas disease, diarrheal diseases, encephalitis, schistosomiasis, malaria, meningitis, tetanus, syphilis and other sexually transmitted diseases as well as a group composed of other infectious diseases (including dengue fever, hantavirus, leprosy and others). The criteria for inclusion were: infectious diseases that require notification to health authorities when diagnosed (enforced by federal or state law) and infectious diseases that have presented cases of death in 2011. This study was based on public data collected from official health information systems. These data are in the public domain and do not compromise the Code of Ethics in Research involving human subjects.

Calculation of YLD

YLD was estimated by multiplying the weight of the disease by its duration using the reported cases. The value of the time lived with a non-fatal health condition is known as the disability weight [3].

A systematic literature search was conducted to identify sources that provided data on the prevalence or incidence of the selected infectious diseases in Santa Catarina. The search used the terms “(prevalence OR incidence OR epidemiology) AND ('disease name' OR transmitting agent OR causal agent of the disease)” in the MEDLINE and LILACS (Literature in the Health Sciences in Latin America and the Caribbean) databases. No population-based studies on the prevalence or incidence of infectious diseases were found in the last 5 years.

Therefore, data from the Brazilian National Diseases Notification System (named *Sinan*) were used to calculate the YLD. The reported cases that were

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