34 - SOCIOECONOMIC DETERMINANTS AND SPATIAL ANALYSIS OF ISCHEMIC HEART DISEASE MORTALITY RATE IN FOZ DO IGUAÇU, PARANA, IN 2010.

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ABSTRACT

Ischemic heart disease (IHD) are among the leading causes of death in the world and Brazil is one of the developing countries where occurs more deaths from this cause. Studies indicate that socioeconomic features are related to incidence of IHD. This study aimed to analyze the spatial distribution of cases of death from IHD that occurred in 2010 in the city of Foz do Iguaçu-PR, correlating it with variables related to income and literacy. This is an ecological study, based on analysis of secondary and retrospective data where the units were its 320 urban census sectors. The analysis demonstrated that the specific mortality rate (SMR) ranged from 0 to >258 deaths per 100,000 inhabitants. The Moran Global analysis identified significant positive spatial autocorrelation of the census sectors according to SMR by IHD, meaning that census sectors with high and low SMR were not randomly distributed. There was a significant positive correlation of variables 'literacy of responsible' and 'per capita income by household' (progressively from 1 to 10 minimum wages). For the variable 'per capita income from ½ to 1 minimum wages' there was no significant correlation. It is concluded that there are census sectors with high SMR by IHD in Foz do Iguaçu, especially in Northern, East and West districts of the city and were primarily related to the medium and higher income population and higher literacy rates, consisting of regions and populations where educational measures of health promotion and lifestyle change incentives, such as physical exercise, should be encouraged aiming at preventing IHD.

Keywords: Geographic mapping, heart diseases, border areas.

INTRODUCTION

Ischemic heart disease (IHD) are among the leading causes of death in the world along with stroke, chronic obstructive pulmonary disease and lung cancer (LOZANO et al., 2012).

Mortality data related to IHD published by the World Health Organization (WHO) and the United Nations show that among developing countries in 2010, Brazil presented the second largest number of deaths from IHD (99,955 deaths) behind Russia (597,921 deaths) (NOWBAR et al., 2014).

In Brazil, in the period of 1990 and 2009, there was a decrease in mortality from IHD in both sexes and most age groups (MANSUR; FAVARATO, 2012). Even observing a decrease in the mortality rates, there was an inter-regional variation in the country with North and Northeast regions showing an increase in mortality rates and the South and Southeast regions showing a decrease (GAUI et al., 2016).

Cardiovascular diseases are often reported as a health problem in industrialized countries, however, it also have a major impact in developing countries, which account for about 30% of all registered deaths (GAZIANO et al., 2010).

The increase of prevalence of IHD in developing countries are due to greater public exposure to risk factors such as lack of physical activity, obesity, abdominal obesity, smoking, alcoholism, hypertension, dyslipidemia, poor eating habits and diabetes. These factors, when associated, increase the person's chance of developing cardiovascular disease. With the development of these countries, presenting middle income, there are changes in population's lifestyle and behavior, accelerated with industrialization, urbanization and globalization (INSTITUTE OF MEDICINE, 2010). The potentially devastating effects of these changes are magnified by an adverse economic impact on nations and families in which poverty can be both cause and consequence of chronic diseases (INSTITUTE OF MEDICINE, 2010).

One of the characteristics of developing regions is the progressive population aging, and as consequence, chronic diseases prevalence increase, including cardiovascular disease (CVD) which have a prominent place. And even with the decrease in mortality rates from these causes, the observed lifestyle changes have led to an increase in risk factors for these populations, which combined with aging, results in the increased prevalence and incidence of CVD, especially the DIC (MORAES; FREITAS, 2012).

Today it is known that the lifestyle of an individual is directly related to the development and progression of heart diseases. Modern epidemiologists see the inclusion of environmental factors and population's behavior as factors influencing disease occurrence, in addition to socioeconomic development and urbanization process and its impacts are beginning to be taken into consideration. So the socioeconomic characteristics of the population such as age, sex, education and income constitute risk factors to be considered (SOARES; BIRTH, 2010).

The sociodemographic characteristics related to where the community resides may add information that may be useful in the development of public policies that foster improvements in quality of care provided to the population. Starting from this premise, this paper aim to analyze the spatial distribution of specific death rate by IHD in the city of Foz do Iguaçu-PR, in 2010, and its relationship with socioeconomic variables.

METHODS

Ecological, descriptive and analytical study, conducted utilizing spatial distribution analysis, based on secondary and retrospective data of deaths from ischemic heart disease (IHD) occurred in 2010, in the city of Foz do Iguaçu-PR, whose units of

analysis were their 320 urban census sectors.

Data of IHD mortality (International Disease Classification codes: I20 to I25), in 2010, were obtained from the Epidemiological Surveillance Department of the municipality of Foz do Iguaçu-PR.

Socioeconomic and demographic variables aggregated by census sector for the 2010 census and the map with georeferenced cartographic base of Foz do Iguaçu, in shapefile (SHP), were obtained in the public database of the Brazilian Institute of Geography and Statistics (IBGE), in the electronic address http://www.ibge.gov.br.

The variables selected for the study were the dependent variable 'specific mortality rate' (SMR) by IHD that is the amount of deaths, in 2010, due to IHD per 100,000 inhabitants considering the population of individuals over the age of 40 years old, by census sector and the independent variables were 'per capita household income' and 'Literacy of the head of the family'.

The data were georeferenced using the free software QGIS version 2.4.0 and spatial analysis of SMR by IHD by census sectors performed using free software Geoda 0.9.5-ITM (Spatial Analysis Laboratory, University of Illinois at Urbana Champaign, Urbana, USA). In the exploratory analysis of spatial data, the spatial autocorrelation of the data were evaluated through the Global Moran Index (I), analysis of Local Indicators of Spatial Association (LISA) was performed to identify spatial patterns and characterization of clusters according to the SMR by IHD and the bivariate Global Moran Analysis was applied to identify the related socioeconomic variables.

For data description, the census sectors were described considering their location according to the health districts division of Foz do Iguaçu: North (N), Northeast (NE), East (E), West (W) and South (S), as indicated in Map 1. The Ethics Committee on Human Research of UNIOESTE approved this research (approval number 1,254,840 of October 1, 2015).

Map 1. The five health districts of Foz do Iguaçu, considering the urban area, 2016: North (N), Northeast (NE), East (E), West (W) and South (S).

RESULTS AND DISCUSSION

In 2010, in Foz do Iguaçu, there were 62 deaths from IHD. The specific mortality rate (SMR) ranged from 0 to >258 deaths per 100,000 inhabitants (Figure 1). From a total of 320 urban census sectors in the city of Foz do Iguaçu, nine census sectors presented SMR >258 deaths/100,000 hab., 3 located in the North region, four in the West and 2 in the Eastern region of the city (Figure 1) .

These rates can be considered high, since, in Parana, in 2010, for the same age group the average SMR by IHD was 156.4 deaths per 100,000 inhabitants (DATASUS, 2016).

A recent study showed a decline in death rates from cardiovascular disease in Brazil from 1980 to 2012, the same was not true for IHD mortality rates from 2007 to 2012, which remained constant (MANSUR, FAVARATO, 2016). According to the authors, this is due to the interaction of various factors, including diabetes, smoking, dyslipidemia and difficult access to treatment (MANSUR, FAVARATO, 2016).

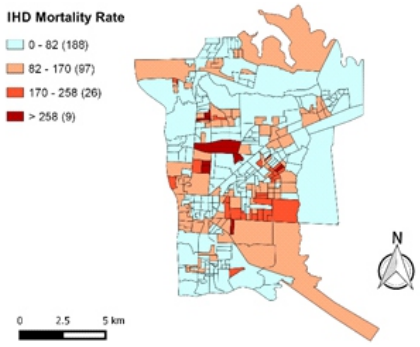

FIGURA 1. Spatial distribution of specific death rate by ischemic heart disease, by census sectors, in 2010, in Foz do Iguaçu, Paraná.

The Moran Global analysis identified significant positive spatial autocorrelation (p = 0.001) of the census sectors according to TME by IHD, meaning that census sectors with high and low SMR are not randomly distributed (Figure 2).

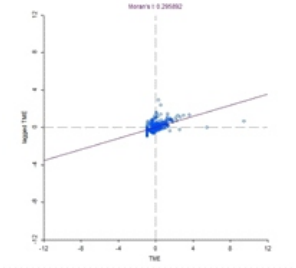

FIGURE 2. Univariate Global Moran scatter diagram according to specific mortality rate by IHD, by census sector, in 2010, in Foz do Iguaçu, PR.

As shown in Figure 3, through the analysis of SMR by IHD through Local Indicators of Spatial Association (LISA) method, 80 census sectors were identified involved in the significant cluster formation. Being 26 census sectors in high-high type clusters, 47 census sectors in low-low clusters, 7 census sectors in low-high clusters and no census sector were involved in the formation of high-low type cluster.

The high-high clusters were located mainly in the North (6 census sectors), East (12 census sectors), and West (8 census sectors) regions of the municipality. Moreover, the low-low type clusters were located scattered in all districts. Cluster of low-high type were located mainly in the North (3 census sectors), West (3 census sectors) and Eastern (1 census sector) regions (Figure 3).

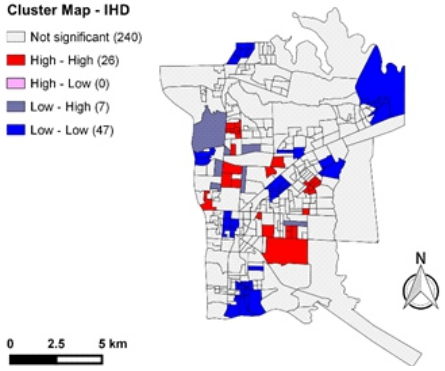

FIGURE 3. Local Indicator of Spatial Association (LISA) analysis and identification of clusters according to SMR by IHD, according to census sectors, in 2010, in Foz do Iguaçu, Paraná: high-high clusters (red), low-low clusters (dark blue) and low-high clusters (light blue).

In bivariate Global Moran analysis performed with the variable 'per capita income per household', it was found that the SMR by IHD showed no significant correlation with the variable 'permanent households with nominal per capita income of ½ to 1 minimum wage' (Figures 4A).

In contrast, the SMR by IHD showed a significant positive correlation with the variables 'permanent households with nominal per capita income of 1 to 2 minimum wages' to 'permanent households with nominal per capita income of 5 to 10 minimum wages' (Figures 4B and 4E) (Figure 4). Meaning that higher per capita income of the surveyed population, according to census sector, are associated with greater SMR by IHD.

The variable 'Literacy of the head of the family' showed a significant positive correlation (p = 0.05) with SMR by IHD (Figure 4F). Indicating that higher proportion of literates in the studied population, according to census sector, are associated with greater SMR by IHD.

These findings are opposed to data from other studies. SHITANI et al. (2007) evaluated 224 Brazilian municipalities and was not found correlation between IHD and per capita income and an inverse relationship between education and SMR by IHD was found. These data indicate that each population has characteristics and risk factors specific to their condition making them susceptible to IHD and the data from this study indicate that income and literacy are related to the IHD mortality rate in population of Foz do Iguaçu, Paraná. Other socio-economic indicators may be involved and these will be the focus of future research.

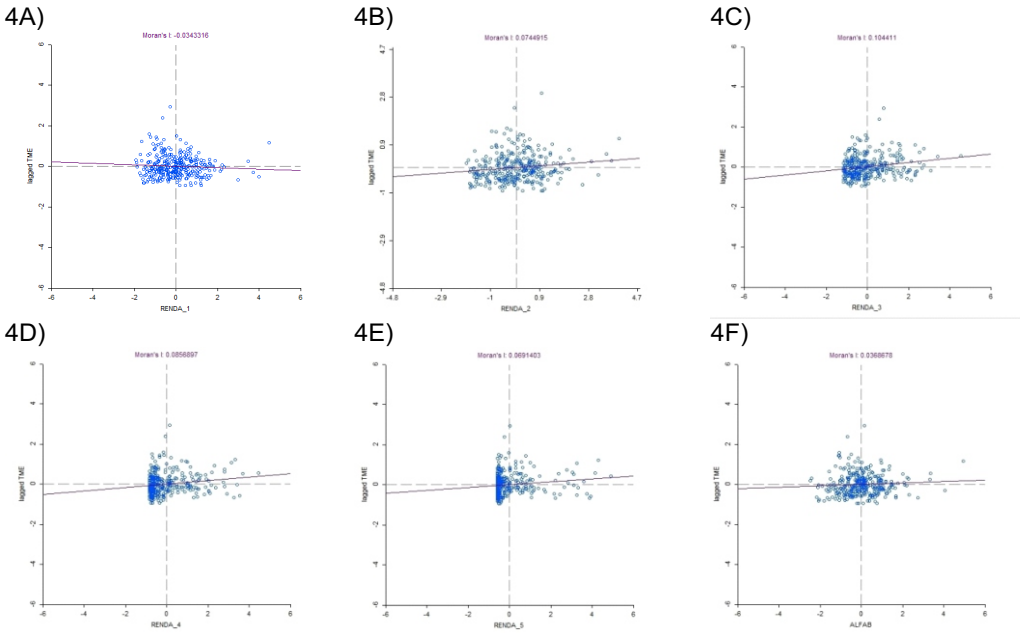

FIGURE 4. Bivariate Global Moran scatter diagram of SMR by IHD and socioeconomic indicators, in 2010, in Foz do Iguaçu, according to census sectors: A) Per capita income of ½ to 1 minimum wage; B) Per capita income of 1 to 2 minimum wages; C) Per capita income of 2 to 3 minimum wages; D) Per capita income of 3 to 5 minimum wages; E) Per capita income of 5 to 10 minimum wages; F) Literacy of the head of the family.

CONCLUSION

In Foz do Iguaçu, in 2010, census sectors were identified with high and worrying rates of specific mortality rates due to

ischemic heart disease, mainly located in the Northern, East and West districts of the city, and were mainly related to population with medium and high income and higher rates of literacy. This regions and populations need to receive educational measures to promote health and incentives lifestyle change, such as physical exercise, that should be encouraged, aiming at the prevention of ischemic heart disease.

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SOCIOECONOMIC DETERMINANTS AND SPATIAL ANALYSIS OF ISCHEMIC HEART DISEASE MORTALITY RATE IN FOZ DO IGUAÇU, PARANA, IN 2010.

ABSTRACT

Ischemic heart disease (IHD) are among the leading causes of death in the world and Brazil is one of the developing countries where occurs more deaths from this cause. Studies indicate that socioeconomic features are related to incidence of IHD. This study aimed to analyze the spatial distribution of cases of death from IHD that occurred in 2010 in the city of Foz do Iguaçu-PR, correlating it with variables related to income and literacy. This is an ecological study, based on analysis of secondary and retrospective data where the units were its 320 urban census sectors. The analysis demonstrated that the specific mortality rate (SMR) ranged from 0 to >258 deaths per 100,000 inhabitants. The Moran Global analysis identified significant positive spatial autocorrelation of the census sectors according to SMR by IHD, meaning that census sectors with high and low SMR were not randomly distributed. There was a significant positive correlation of variables 'literacy of responsible' and 'per capita income by household' (progressively from 1 to 10 minimum wages). For the variable 'per capita income from ½ to 1 minimum wages' there was no significant correlation. It is concluded that there are census sectors with high SMR by IHD in Foz do Iguaçu, especially in Northern, East and West districts of the city and were primarily related to the medium and higher income population and higher literacy rates, consisting of regions and populations where educational measures of health promotion and lifestyle change incentives, such as physical exercise, should be encouraged aiming at preventing IHD.

Keywords: Geographic mapping, heart diseases, border areas.

DÉTERMINATION SOCIOÉCONOMIQUE ET ANALYSE DU TAUX SPATIAL DE MORTALITÉ DE MALADIES CARDIAQUES ISCHEMIQUES Á FOZ DO IGUAÇU, PARANA, EN 2010.

RÉSUMÉ

Les Cardiopathies ischémiques (CI) sont parmi les principales causes de décès dans le monde et Brésil est l'un des pays en développement où il y a plus de décès par cette cause. Des études indiquent que caractéristiques socio-économiques sont liées à l'incidence des CI. Cette étude visait à analyser la répartition spatiale des cas de décès par CI qui ont eu lieu en 2010 dans la ville de Foz do Iguaçu-PR, en corrélation avec des variables liées au revenu et à l'alphabétisation. Ceci est une étude écologique, basée sur l'analyse des données secondaires et rétrospectives dont les unités d'analyse étaient ses 320 secteurs de recensement urbains. Les analyses ont démontré que le taux de mortalité spécifique (TMS) allait de 0 à >258 décès pour 100.000 habitants. L'analyse Moran Global a identifié une autocorrélation spatiale positive significative des secteurs de recensement selon la TMS par CI, ce qui signifie que les secteurs de recensement avec haut et bas TMS ne sont pas répartis au hasard. Il y avait une corrélation positive significative des variables « alphabétisation du responsable » et «revenu par habitant du ménage» (progressivement de 1 à 10 salaires minimums). Pour le variable «revenu de ½ à 1» il n'y avait pas de corrélation significative. On conclut qu'il y a des secteurs de recensement à forte TMS par CI à Foz do Iguaçu, en particulier dans les districts du nord, est et ouest de la ville, et qui sont principalement liés à la population de revenu moyen et un revenu plus élevé et de taux d'alphabétisation plus élevé, composé de régions et les populations où des mesures éducatives de promotion de la santé et de changement de mode de vie, telles que l'exercice physique, doivent être encouragés visant à empêcher les CI.

Mots-clés: cartographie géographique, les maladies cardiaques, les zones frontalières.

DETERMINACIÓN SOCIOECONÓMICA Y ANÁLISIS ESPACIAL DE LA TASA DE MORTALIDAD DE ENFERMEDADES ISQUÉMICAS EN FOZ DE IGUAZÚ, PARANÁ, EN EL 2010.

RESUMEN

La cardiopatía isquémica (CI) es una de las principales causas de muerte en el mundo y Brasil es uno de los principales países en vías de desarrollo en el que se registran más muertes por esta causa. Los estudios indican que las características socioeconómicas están relacionadas con la incidencia de CI. Este estudio tuvo como objetivo analizar la distribución espacial de los casos de muertes por CI que ocurrieron en 2010 en Foz do Iguaçu-PR, en correlación con las variables relacionadas con la renta y la alfabetización. Se trata de un estudio ecológico, basado en el análisis de datos

secundarios y retrospectivos cuyas unidades de análisis fueron sus 320 sectores del censo urbano. Los análisis demostraron que la tasa de mortalidad especifica (TME) varió de 0 a >258 muertes por cada 100.000 habitantes. El análisis Global de Moran identificó autocorrelación espacial positiva significativa de las secciones censales de acuerdo con la TME por CI, lo que significa que las secciones censales de alta y baja TME no fueron asignadas al azar. Hubo una correlación positiva significativa de las variables 'alfabetización del responsable' y 'renta per cápita por el domicilio' " (progresivamente desde 1 hasta 10 salarios mínimos). Para la variable 'ingreso de ½ a 1' salarios mínimos' no hubo correlación significativa. Se concluye que hay secciones censales con alta TME por CI en Foz de Iguazú, especialmente en los distritos del Norte, Este y Oeste de la ciudad, y estaban principalmente relacionadas con la población con medianos y altos ingresos y las tasas más altas de alfabetización, constituidas por las regiones y poblaciones donde las medidas educativas de promoción de la salud y el cambio de estilo de vida, como el ejercicio físico, deben ser alentados y dirigidos a la prevención de la CI.

Palabras clave: Mapeo geográfico, cardiopatías, áreas fronterizas.

DETERMINANTES SÓCIOECONÔMICOS E ANÁLISE ESPACIAL DA TAXA DE MORTALIDADE DE DOENÇAS ISQUEMICAS DO CORAÇÃO EM FOZ DO IGUAÇU, PARANÁ, EM 2010.

RESUMO

As doenças isquêmicas do coração (DIC) estão entre as principais causas de morte no mundo, e o Brasil é um dos países em desenvolvimento em que ocorrem mais óbitos por esta causa. Estudos indicam que características socioeconômicas estão relacionadas a incidência de DIC. Este estudo objetivou analisar a distribuição espacial dos casos de óbito por DIC ocorridas em 2010, no município de Foz do Iguaçu-PR, correlacionando-a com variáveis relacionadas a renda e alfabetização. Trata-se de um estudo ecológico, baseado em dados secundários e retrospectivos, cujas unidades de análises foram os seus 320 setores censitários urbanos. As análises demostraram que a TME variou de 0 a >258 óbitos por 100.000 habitantes. A análise Global de Moran identificou autocorrelação espacial positiva significativa dos setores censitários segundo a TME por DIC, significando que os setores censitários com alta e baixa TME não se encontravam distribuídos aleatoriamente. Houve correlação positiva significativa das variáveis 'alfabetização do responsável' e 'renda per capita por domicílio' (progressivamente de 1 a 10 salários mínimos). Para a variável 'renda de ½ a 1 salários mínimos' não houve correlação significativa. Conclui-se que há setores censitários com elevadas TME por DIC, em Foz do Iguaçu, principalmente nos distritos Norte, Leste e Oeste do município, estando relacionados principalmente a populações de média e alta renda e taxas de alfabetização mais elevadas, consistindo em regiões e populações onde medidas educativas de promoção da saúde, e incentivo de mudança do estilo de vida, como realização de atividade física, deve ser estimulada visando a prevenção de DIC.

Palavras-chaves: Mapeamento geográfico, cardiopatias, áreas de fronteira.