HEALTH STATUS QUANTITATIVE ANALYSIS—THE CASE OF THE LISBON METROPOLITAN AREA

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1.1. Objectives/Research hypotheses

Objectives

• Understand the factors that influence the health status of populations living in the municipalities of the Lisbon Metropolitan Area

• Compare the results obtained by two different quantitative methodologies, MAESP and PCA together with cluster analysis.

Research hypotheses

• The determinants of health most important to study the health of the resident population in the Lisbon Metropolitan Area are socio-economic factors

• The use of quantitative methodology is immaterial, the results are the same and the factors determining the results are the same in both methodologies
1.2. Starting Questions

- What are the most important health determinants of health status of the LMA population?
- Are there any differences in the results after applying the two quantitative methodologies?
1.3. Analysis Model

Determinants
- Health status
- Health determinants

Dimensions
- Health
- Demography
- Supply and demand of health services
- Socio-economic

Methodology
- MAESP
- Principal Component Analysis

Most important factors for LMA
Differences in applying distinct quantitative methodologies
1. Data normalization and definition of utilities with multi-attribute utility theory. Extreme values were determined, maximum value 100 and minimum value 0.

2. Attribution of different weights to each variable, applying each utility value to the weight defined for the variable
1. Selection of variables representative of health determinants

2. Factor Analysis (PCA)

3. Cluster Analysis

4. Cartography production (ArcGis)
2. Theoretical introduction: health


It is not possible to attain a definition of health only through pure medical models as "medicine deals with disease and not health" (Brüssow, H., 2013).

In 1946, WHO formulated that health is achieved by a complete well-being on the physical, mental and social levels.

The "Ottawa Charter" defined health as "the ability of an individual to achieve his aspirations and needs and deal with the environment" (1986).
2. Theoretical introduction: health

Eight “fundamental conditions and resources” for health: “peace, shelter, education, food, income, a stable ecosystem, sustainable resources and social justice and equitability.” This is because the “political, environmental, economic, social, cultural, behavioral and biological factors may favor or be harmful to health” (WHO, 1986, pp.1).

It is therefore clear that there is a cause/effect relationship between the factors and health. Briz (2012) dubs this relationship “coaction of causality”.

We must understand that the factors that determine health are derived from the basic features and activities of the population (Briz, 2012).
Each health determinant can be analyzed individually, but when examined in isolation they are insufficient to describe the individual health status (Portrait, Lindeboom and Deeg, 2001).

It can be said that they are social, economic, cultural and environmental factors, mostly outside the health sector, but responsible for health maintenance or installation of disease in the individual (Bonita, Beaglehole and Kjellström, 2010).

Health determinants are not all encompassed in health sector, on the contrary, the majority of them (at least 70%) is outside of the health sector (George, 2011).

Although it is easy to understand why they influence the health status, the weight that each health determinant has on the overall computation is difficult to assess.
3.1. Case Study: Lisbon Metropolitan Area

Source: https://www.google.pt/search?q=area+metropolitana+de+lisboa&espv=2&biw=1360&bih=667&source=lnms&tbm=isch&ved=0ahUKEwjal4aw49HMgAhWBCSwKHd2Dr0Q_AUIBigB#imgrc=q2ju7oGGZ9qi2M
3.1. Case Study: Lisbon Metropolitan Area

• Composed by 18 municipalities

• 2,821,000 inhabitants (Census 2011)

• Approximately ¼ of Portugal’s population

• 36% of national GDP
3.1.1. Indicators

**Health dimension**
- Perinatal deaths
- Quinquennial rate of infant mortality
- Mortality rate by cause
- Crude death rate

**Demography dimension**
- Population over 65 years old
- Population under 15 years old

**Dimension of supply and use of health services**
- Medical specialists per 1000 inhabitants
- General Practitioners / General Health and Family Physicians in CSP per 100,000 inhabitants
3.1.1. Indicators

Dimension of supply and use of health services (cont.)

• Hospital beds per 1,000 inhabitants
• Consultations in primary health care per 1,000 inhabitants
• Hospital visits per 1,000 inhabitants

Socio-economic dimension

• Population with over 4 years of schooling, aged over 15 years
• Unemployment rate
• Income – Municipality Purchasing Power Percentage
• Proportion of resident population with higher education
3.2.1. Example of health indicators

- **Five-year rate of infant mortality**
  - Per 1000:
    - 1.9 - 2.8
    - 2.9 - 3.9
    - 4 - 5.1
    - 5.2 - 6.2

- **Incidence of tuberculosis**
  - Per 100 000:
    - 7.2 - 11.5
    - 11.6 - 20.8
    - 20.9 - 30.1
    - 30.2 - 39.4
    - 39.5 - 44.9
3.2.1. Example of demographic indicators
3.2.1. Example of health care supply indicators
3.2.1. Example of indicators of use of health services

- Hospital consultations
  - Per 1000
  - 283.1 - 707.7
  - 707.8 - 1525.1
  - 1525.2 - 2342.5
  - 2342.6 - 2838.1

- Primary health care consultations
  - Per 1000
  - 1.6 - 1.7
  - 1.8 - 2.1
  - 2.2 - 2.5
  - 2.6 - 2.9
  - 3 - 3.1

Sources: DGS, IGES/IIASA, VIPS, ISPA, ITP, DGS, ICRP, DAS, DGS, SIPP/NS, INE, LNOB, IAC, PPS/AND, INE, INL, IGES, DGS, DGS.
3.2.1. Example of socio-economic indicators
MAESP
3.2. MAESP

- Created by Vaz et al. (1994)
- Especially to assess health in Trás-os-Montes and Alto Douro
- Applied in Região Centro (Santana, 1998) and Portugal (Santana et al, 2003)
- This version was adapted and uses 38 variables
## 3.2. MAESP results

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<tr>
<th>2011</th>
<th>health indicators</th>
<th>demographic indicators</th>
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3.2. MAESP
### 3.3. PCA

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<th>Variables</th>
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3.3. PCA

<table>
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<th>Factor</th>
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</table>
3.3. PCA

Dendrogram using Average Linkage (Between Groups)

Rescaled Distance Cluster Combine
3.3. PCA results

**Cluster 1**
Contains only one municipality characterized by a very aged population, crude death rate above average, very high yields and very qualified population. It consists of Lisbon.

**Cluster 2**
This cluster has two municipalities, it is characterized by good results regarding hospital treatment, with a number of hospital beds and hospital visits per capita higher than average. It comprises the municipalities of Odivelas and Loures.

**Cluster 3**
Includes only one municipality characterized by its very young population and low income presented. It consists of Alcochete.

**Cluster 4**
Contains eight municipalities located on the south bank of the Tagus. It is characterized by a high overall mortality rate, a very aged population, and also low income. It consists of Almada, Seixa, Barreiro, Moita, Montijo, Sesimbra, Setúbal and Palmela.

**Cluster 5**
Has six municipalities, Oeiras, Cascais, Amadora, Sintra, Mafra and Vila Franca de Xira. In common, they have an aging population and a high utilization of health care.
4. Conclusion
4. Conclusions

• Homogeneous region in most health determinants, with the preponderance of demographic and economic factors

• The methods used have different uses - MAESP ranks municipalities, and APC and Cluster Analysis together explain the causes of the observed reality and group municipalities by relations
References