Study on urban healthcare consumption in northern France.

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Introduction

- **Disparities in terms of care consumption**
  - In France, consumption of antibiotics is very high
  - In the Nord-Pas de Calais region (northern France), the rate of use of medicines for alcohol addiction higher than in the other French regions

- **In Lille, an Health Observatory**
  - works with local agencies like the state health insurer
  - provides information to the decision-makers and practitioners
  - improves health policies

- **Aims**: Characterize care consumption in the various districts of Lille
  - Describe care consumption district-by-district
  - Perform a typology of districts
Material and methods: data (1/2)

- Supplied by the state health insurer of Lille (CPAM)
- For each inhabitant ➔ all the reimbursements for 2004 and 2005
- 154533 beneficiaries
- Inhabitants spread across 12 districts
- Information about:
  - Sociodemographic data (age, gender…)
  - Overall health:
    - Consumption of medicines
    - Health care services: general practitioners (GP), specialists
  - Dental Treatment:
    - Dentist
    - Orthodontist
    - Prosthesist
  - Specific medicine classes
    - Narcotics
    - Tranquillizers
    - Medicines for alcohol addiction
Material and methods : data (2/2)

List of the supplied variables :

➢ General practitioners (GP) and specialists :
  • Number of consultations
  • Number of visits
  • Number of consulted practitioners

➢ For dentist, orthodontist, prosthesisist
  • Total cost
  • Amount reimbursed
  • Number of consultations

➢ For medicines
  • Total cost
  • Number of boxes
  • Number of prescriptions

Data analysed : Overall consumption of medicines, antibiotics, specific medicine classes
Material and methods: indicators (1/4)

Data aggregated by district:

- For the numerical variables: mean level of care consumption
  
  Example: For the number of consultations with a GP mean number of consultations at the district level

- For binary variables: percentage of persons having accessed to a given type of care
  
  Example: Percentage of persons within the district having at least one reimbursement of dental treatment.

39 indicators
Material and methods: indicators (2/4)

- Some indicators are redundant

- Aims: select the most relevant indicators

- Method:
  3 principal component analysis (PCA) performed on 3 groups of variables:

  - dental treatment (dentist, prosthesis, orthodontist)
  - overall health (GP, specialist, medicines, antibiotics)
  - specific medicine classes (narcotic, tranquillizer, medicines for alcohol addiction)
Material and Methods: indicators (3/4)

- Correlation circle for dental treatment (dentist, orthodontic, prosthesisist):

- Before PCA: 9 indicators
- Only one indicator selected in each subgroup of variables.
- After PCA: 3 indicators selected

- Total cost
- Reimbursed dentist' fees
- Number of consultations
- Total cost for orthodontist
- Total cost for prosthesisist
Material and Methods: indicators (4/4)

- 20 indicators selected for the following analysis

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Percentage of persons within a district</th>
<th>Mean per person within a district</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental treatment</td>
<td>Dentist, Prothesis, Orthodontics</td>
<td>Consultation</td>
<td>Total cost</td>
</tr>
<tr>
<td>Overall health</td>
<td>GP, Specialist</td>
<td>Consultation</td>
<td>Number of consultations</td>
</tr>
<tr>
<td></td>
<td>Medicines, Antibiotics</td>
<td>Prescription</td>
<td>Number of prescriptions</td>
</tr>
<tr>
<td>Specific medicine classes</td>
<td>Tranquillizer, Narcotic, Alcohol addiction</td>
<td>Prescription</td>
<td>Number of prescriptions</td>
</tr>
</tbody>
</table>

MIE 2006 - Maastricht

MIE 2008 - Goteborg
Methods : Statistical analysis (1/2)

- **Univariate analysis : Radar charts**
  - Indicators transformed into a z-score $\left( \frac{\text{Indicator Value} - \text{Mean}}{\text{Std}} \right)$
  - Z-scores values for the overall population always equal to 0.

- **Bivariate analysis : Comparison of each district to the overall population of Lille.**
  - For numerical indicators : T-Test
  - For binary indicators : Chi-square test

- **Multivariable analysis : typology of the districts**
  - Hierarchical Cluster Analysis (HCA)
  - Factorial Discriminant Analysis (FDA)
Methods : Statistical analysis (2/2)  
- Cluster analysis -

- Group together districts in which the inhabitants displayed similar behaviour in terms of care and medicines consumption
  - hierarchical cluster analysis (HCA) to identify the clusters

- Check the quality of cluster separation
  - factorial discriminant analysis (FDA)

- Identify the characteristics of the clusters:
  - Mean values of the indicators calculated for each cluster
  - Analysis of variance (ANOVA) on the 20 indicators to determine which best separate the clusters
  - Radar charts with the most relevant indicators
Results : District analysis

Results for the district of Lille Sud

- Radar chart for overall health

<table>
<thead>
<tr>
<th></th>
<th>Overall population</th>
<th>Lille Sud</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>11.07</td>
<td>11.96</td>
<td>S*</td>
</tr>
<tr>
<td>% GP</td>
<td>77.70%</td>
<td>82.63%</td>
<td>S*</td>
</tr>
<tr>
<td>specialist</td>
<td>1.92</td>
<td>1.68</td>
<td>S*</td>
</tr>
<tr>
<td>% specialist</td>
<td>51.31%</td>
<td>42.38%</td>
<td>S*</td>
</tr>
<tr>
<td>medicines</td>
<td>18.39</td>
<td>18.24</td>
<td>NS</td>
</tr>
<tr>
<td>% medicines</td>
<td>80.83%</td>
<td>84.77%</td>
<td>S*</td>
</tr>
<tr>
<td>antibiotics</td>
<td>2.92</td>
<td>3.18</td>
<td>S*</td>
</tr>
<tr>
<td>% antibiotics</td>
<td>53.81%</td>
<td>59.16%</td>
<td>S*</td>
</tr>
</tbody>
</table>

* p < 0.05

- Radar chart for dental treatment

<table>
<thead>
<tr>
<th></th>
<th>Overall population</th>
<th>Lille Sud</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>dentist</td>
<td>421.64</td>
<td>374.83</td>
<td>S*</td>
</tr>
<tr>
<td>% dentist</td>
<td>44.26%</td>
<td>44.08%</td>
<td>NS</td>
</tr>
<tr>
<td>prosthesis</td>
<td>836.56</td>
<td>668.06</td>
<td>S*</td>
</tr>
<tr>
<td>% prosthesis</td>
<td>12.04%</td>
<td>12.45%</td>
<td>NS</td>
</tr>
<tr>
<td>orthodontist</td>
<td>843.12</td>
<td>774.20</td>
<td>NS</td>
</tr>
<tr>
<td>% orthodontist</td>
<td>1.44%</td>
<td>1.91%</td>
<td>S*</td>
</tr>
</tbody>
</table>

* p < 0.05
Results: Typology of districts (1/2)

- The 12 districts of Lille distributed into three clusters
- Among the 20 indicators, 10 indicators selected to characterize them (ANOVA)
Typology of districts using cluster analysis (2/2)

- Characteristic of the 3 clusters according to the main indicators
3 clusters identified ⇔ 3 different behaviours in terms of health care.
Conclusion (2/2)

- **Limitation by the nature of the data:**
  - Only urban health care (not hospitalization)
  - Reimbursed prescription does not mean that the medicine is taken.
  - Self-medication not taken into account.

- **An objective overview of the disparities to:**
  - Inform all the decision-makers of the needs in health care
  - Help them to set up an information and detection campaign

- **Further analysis:**
  - Correlation between the clusters and the socio-economic profiles.