Safety of the elderly in smart city

Jacek Szołtysek
Grażyna Trzpiot

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Agenda

- Smart city
- Seniors in cities
  - Safety of seniors (social safety, health, digital, economic etc.)
- Conclusions
% of population living in cities

1950
2000
2050

By 2050, 7 people out of 10 will live in cities

Today we count 23 Megacities over the world with over 10 million people

#1 Tokyo 36 Million +
#2 Delhi
#3 Seoul
Smart city – conceptual trends

Technology

- Highlighting the possibilities of the Internet of Things (IoT) and the technologies that we have available

Contemplative

- "A city where technologies are interconnected and developed. A place that provides a nationalized life experience, transferring it to a whole new level. It is also a city whose managers have the ability to optimize growth, improve the budget and pro-active planning. "
+70% Evolution of the Municipal Solid Waste (MSW) produced by cities 2010 and 2025

8 Number of days drivers waste each year because of road congestion

75% Urban areas account for 75% of the world’s overall energy consumption

60% Urban areas consume 60% of the global drinkable water reserves

80% Urban areas are responsible for 80% of global GHG emissions
Smart city

A city that is adaptive, proactive and agile, using opportunities, decoding data, analyzing them and using what is currently accumulated in big data.
Smart Cities come as a solution to the above challenges, helping to optimize our resources and achieve sustainability while preserving and even improving the urban quality of life.

- **Smart Economy**
- **Smart Governance**
- **Smart Mobility**
- **Smart People**
- **Smart Environment**
- **Smart Living**
Seniors in cities

- Lifespan
- Education

QoL

- Health
- Income

- Mobility
- Safety
Seniors in cities/lifespan

Współczynnik starości demograficznej wybranych miast w 2011 r.
Old age ratio by chosen cities in 2011

- share of population at age 65 and more in total population
Seniors in cities/lifespan

Indeks starości demograficznej wybranych miast w 2011 r.
Aging index by chosen cities in 2011

- number of population at age 65 and more per 100 population at age 0-14
Seniors in cities/lifespan

Współczynnik obciążenia demograficznego osobami starszymi wybranych miast w 2011 r.

Dependency ratio by elderly by chosen cities in 2011

- number of population at age 65 and more per 100 population at age 15-64
Seniors in cities

- The phenomenon of the aging of the Polish population is more strongly felt in urban areas than in rural areas.
- From year to year, the development of this process is observed in the examined cities of Poland.
- In selected cities:
  - the most advanced aging process is visible in Katowice.
  - with turn, the dynamics of this type is characterized by a markedly smaller phenomenon in Warsaw, where one could observe the short-term rejuvenation of this city's society.
Seniors in cities/education

Population aged 50 years and more by education level – Males in 2011

Tertiary | Post-secondary | Secondary | Basic vocational | Lower | Primary | Incomplete primary | Unknown
--- | --- | --- | --- | --- | --- | --- | ---
wyższe | policealne | średnie | zawodowe | gimnazjalne | podstawowe | nieukończone | nieustalone

% 40

50-54
55-59
60-64
65-69
70-74
75-79
80-84
85 i więcej
Seniors in cities/education

Population aged 50 years and more by education level – Females in 2011

Tertiary | Post-secondary | Secondary | Basic vocational | Lowers secondary | Primary | Incomplete primary | Unknown

wyższe | policealne | średnie | zawodowe | gimnazjalne | podstawowe | nieukończone podstawowe | nieustalone
Seniors in cities/income

Share of households of pensioners in cities by number of inhabitants 2006-2011

%  

- poniżej 20 tys.
- 20-99 tys.
- 100-199 tys.
- 200-499 tys.
- powyżej 500. tys.

źródło: Opracowanie własne na podstawie: GUS badanie budżetów gospodarstw domowych dla lat 2000-2011

Uniwersytet Ekonomiczny w Katowicach
Seniors in cities/income

Fraction of poor households of older people by age group 2002-2010

Žródło: Opracowanie własne na podstawie: GUS badanie budżetów gospodarstw domowych dla lat 2000-2011
Seniors in cities/health

The PolSenior study shows that over a third of older people require help in everyday activities, and 12% of people over 87 need constant care.

PolSenior indicates that the need to help other people in connection with the limitation of independence is correlated the share of those in need is:

- at the age of 65–69 – 14,5%,
- at the age of 70–74 – 19,1%,
- at the age of 74–79 – 31,5%.

Since the age of 80, human addiction to the environment has been increasing very fast.
Seniors in cities/health

Almost every fifth senior who participated in the PolSenior study lives alone. This is the case, although the vast majority of them, as many as 93%, have living children.

Only 8% of respondents are families created by a single elderly person and her children. Senior couples who live with children are over 14%, while less than 1% of seniors live with their grandchildren.

Loneliness affects the health of older people. Nearly 1/3 of them have permanent symptoms of depression.
Seniors in cities/mobility

In Poland
1. The tendency and the ability to move are decreasing with age
2. In the field of obligatory displacement nowadays - overcoming routes: Home - store (supply of products)
   Home - health center / pharmacy
   Home - centers of worship (cemetery / church)
   Home - place of performing other functions (eg. care)

In Western Europe:
   Mobility of seniors includes performing everyday activities (shopping, taking care of health, paying bills), walking (walking with children, dog, etc.), entertainment (mental: cinema, theater, TV, reading books, listening to the radio, playing cards and physical: gymnastics, trips, garden work)
Seniors in cities/mobility

Departures of older people (65+) for more than 5 days

- Yes: 79.20%
- No: 20.80%
- Holiday: 89.00%

Source: Own elaboration based on: GUS budget study of household budgets for years 2000-2011

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Seniors in cities - safety

- Housing, public transport and public space (parks, cinemas, theater, etc.) forming the physical surroundings of a senior
- Social participation (how seniors engage in the life of a city), respect and social integration (how they are perceived by others), civic activity and employment (opportunities for voluntary and professional work) that create a social environment for a senior
- Communication and information as well as environmental support and health care are elements influencing the lives of older people,

WHO, 2015
Senior safety model

For the needs of our research, taking into account the above formulated based on published sources, we have created a senior safety model, consisting of three modules:

I - Health issues - individual health and possibilities of its improvement in the scope of medical and pharmaceutical support

II - Safety of the senior's environment - place of residence and features of the natural environment (this module also touches on personal safety)

III - Personal safety in the city space
Variables X10-X13 determine the quality of the city space in this public space.
Senior safety model

- We will use the taxonomic approach, setting a taxonomic measure of city security, this is a measure of the linear order
- Taxonomic metric development measures allow for the substitution of a direct description by many diagnostic features with one aggregate size - a synthetic variable
- The diagnostic variables are divided into:
  - stimulants - these are those features whose higher value indicates a higher level of development,
  - destimulants - for them the decrease in value indicates a higher level of development,
  - nominants - where the desired level of the tested feature is in a certain range
## Senior safety model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>Emission of dust pollution / per capita in t</td>
</tr>
<tr>
<td>X2</td>
<td>Emission of gas pollution / per capita in t</td>
</tr>
<tr>
<td>X3</td>
<td>Pollution retained in dust reduction devices / in %</td>
</tr>
<tr>
<td>X4</td>
<td>Pollution retained in gas reduction devices / in %</td>
</tr>
<tr>
<td>X5</td>
<td>Area with special natural values legally protected / per inhabitant in %</td>
</tr>
<tr>
<td>X6</td>
<td>Outlays on nature protection / per inhabitant in PLN</td>
</tr>
<tr>
<td>X7</td>
<td>Crimes against health and life / inhabitant</td>
</tr>
<tr>
<td>X8</td>
<td>Beds in hospitals / inhabitant</td>
</tr>
<tr>
<td>X9</td>
<td>Number of pharmacies / inhabitant</td>
</tr>
<tr>
<td>X10</td>
<td>Population density</td>
</tr>
<tr>
<td>X11</td>
<td>Population</td>
</tr>
<tr>
<td>X12</td>
<td>Population at working age/ Total population</td>
</tr>
<tr>
<td>X13</td>
<td>Number of permanent marketplaces / inhabitant</td>
</tr>
</tbody>
</table>

6 cities: Katowice, Kraków, Warszawa, Poznań, Gdańsk i Wrocław

Destimulants: X1, X2, X7
Taksonomiczna miara bezpieczeństwa miast (TMBM)
Taxonomic measure of city security

1. Normalizacja wartości cech/Normalization of the values of features

\[ z_{ij} = \frac{x_{ij} - x_j}{S_j} \]

2. Wybranie wzorca i obliczenie odległości od wzorca/Selecting the pattern and calculating the distance from the standard

\[ d_i = \sqrt{\frac{\sum_{j=1}^{m} (z_{ij} - z_{0j})^2}{m}} \]

3. Unormowanie odległości/Norming the distance

\[ d_0 = \bar{d} + 2S_d \]

4. 

\[ TMBM_i = 1 - \frac{d_i}{d_o} \]

\[ TMBM \in [0, 1] \]
<table>
<thead>
<tr>
<th>Miasto/City</th>
<th>2015</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Katowice</td>
<td>0,079</td>
<td>6</td>
</tr>
<tr>
<td>Kraków</td>
<td>0,153</td>
<td>5</td>
</tr>
<tr>
<td>Warszawa</td>
<td>0,353</td>
<td>2</td>
</tr>
<tr>
<td>Poznań</td>
<td>0,432</td>
<td>1</td>
</tr>
<tr>
<td>Gdańsk</td>
<td>0,280</td>
<td>3</td>
</tr>
<tr>
<td>Wrocław</td>
<td>0,249</td>
<td>4</td>
</tr>
</tbody>
</table>
Conclusions

Senior's safety

- can be presented as aggregate measures - this is due to the multifaceted nature of security as a perceptible state (subjective safety) and the measurement of specific urban phenomena
- presented model it consists of elements of the habitat safety (external health and personal safety), city space security (mainly public spaces) and individual health (and in principle, securing this health with the potential of medical services and access to pharmaceutical points).
- system is determined not only by the editorial works and beliefs of the authors of this publication, but also by available statistical data
Conclusions

- As a result of the conducted research, it was found that real assessment of cities in terms of safety for the elderly is possible.
- The largest cities for research were chosen while maintaining some common criteria.
- The selected set of variables can be extended and modified to create more adequate descriptions of changing urban living conditions for seniors.
- The research methodology used is flexible and universal in nature.
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Thank you for your attention

Prof. dr hab. Jacek Szołtysek
Head of Department of Social Logistics
E-mail: szoltysek@ue.katowice.pl

Prof. dr hab. Grażyna Trzpiot
Head of Department of
Demography and Economic Statistics
E-mail: trzpiot@ue.katowice.pl