Health related urban well-being and Environmental Justice in Hamburg

City Health Basel, 14.09.2017
Problem definition:

- The project “urban modeling” aims to systematize, describe and model *multi-stressors* on urban health and to analyze whether these stressors are shaped and influenced by special characteristics and processes of the urban system.

Main aspects:

- Stressors and resources
- Structural, social and natural heterogeneity of the city
- Unequal access to "healthy" areas and infrastructures
- Co-occurrence of environmental and social disadvantages in certain areas?
Malte von Szombathy, Jürgen Oßenbrügge, Benjamin Bechtel, Myriam Albrecht

Do environmental stressors impact health in European cities?

“At least one million healthy life years are lost every year because of traffic-related noise in the Western part of Europe.” (WHO 2011)

“54% of Germans feel disturbed or harassed by traffic noise.” (UBA ’14)

Environmental Justice Diagnosis: Waste/Pollution/Environmental stressors are unequally distributed – socially disadvantaged neighborhoods are also environmentally disadvantaged (Maschewski 2001/Soja 2010)
Environmental Justice (unequal emission distribution) is strongly linked to the social "stratification" of urban society, both with vertical (e.g. income level) as well as horizontal (e.g. age or leisure activities) factors.

- **Environmental stressors** (e.g. emissions)
- **Vertical stratification** (e.g. income level)
- **Horizontal stratification** (e.g. age)
- **City morphology** (e.g. parks)
1 Systematic Approaches
- Environmental Justice
- Health-related urban well-being (UrbWellth)

2 Environmental Stressors
- Noise

3 Social Indicators
- Social deprivation and age

4 Built City Environment/Morphology
- Noise modeling and propagation

5 Survey in Hamburg
- Survey areas and methodology
- First results

6 Conclusion and Outlook
1 Health-related urban well-being

Issues of Environmental Justice

Filters: Exposure, Sensitivity & Adaptive Capacity

Health-related urban well-being (UrbWellth)

Stressors

URBAN ENVIRONMENT

Morphology

CITIZENS

Society

Individual

Malte von Szombathely, Jürgen Oßenbrügge, Benjamin Bechtel, Myriam Albrecht

Figure: 2017, M. v. Szombathely et al. 14.09.2017
From model to data

References for research & analyses
- medical studies
- public data sets
- theoretical framework
- sociological studies
- GIS analysis
- WUDAPT analyses
- environmental models & measurements

Figure: 2017, M. v. Szombathely et al.
Slide 7
Three environmental stressors are considered:

1. Temperature (heat stress)
2. Noise (Air pollutants)
3. Harbour and industry

Noise pollution in Hamburg

Legende
- Air traffic noise
  - Lden [DB]
    - 50 - 54
    - > 54 - 59
    - > 59 - 65
    - > 65 - 71
    - > 71 - 75

- Harbour and industry
  - Lden [DB]
    - 50 - 54
    - > 54 - 59
    - > 59 - 65
    - > 65 - 75
    - > 71 - 75

Source: BSU Hamburg
Chart: Myriam Albrecht

14.09.2017
3 Socio-economic Background

Social structure and age distribution in Hamburg 2009

- Höherer Sozialstatus, heterogene Altersstruktur
- Mittlerer bis höherer Sozialstatus, Überalterung
- Mittlerer Sozialstatus, deutliche Überalterung
- Mittlerer Sozialstatus, heterogene Altersstruktur
- Mittlerer bis höherer Sozialstatus, wenig ältere Menschen
- Niedriger Sozialstatus, wenig ältere Menschen
- Niedriger Sozialstatus, heterogene Altersstruktur
- Sehr niedriger Sozialstatus, heterogene Altersstruktur
4 Morphology & noise propagation

Map showing the distribution of height and traffic burden.
5 Selected districts for the survey

Survey Areas
- Nov 2016
- Apr 2017

District Types
- Old Town
- Airport
- Harbor, Business & Industry
- Inner City
- Offices and Residential
- Suburban Areas
- Harbor, Business & Residential
- Transition Areas

Analysis: M. Albrecht, M. v. Szombathely; Data District Types: G. Kaveckis
5 Framework of the survey

Research Questions for Hamburg

- Do unequally distributed stressors correlate with social stratification?
- Can we relate environmental stressors to health effects?
- Does the built city have an effect on the distribution of stressors?

Survey topics

- Living conditions and residential area
- Mobility lifestyle
- Health
- Harassment due to environmental stressors

Interview methodology

- Combined written and oral survey
- 24 study areas in different districts, each approx. 280 households (6,500 in total)
- 1,081 returning surveys in total
5 Basic description of the sample

**Gender**
- Female: 39%
- Male: 59%
- Other/Do not: 2%

**Education (graduation)**
- (still) without school graduation: 50.1%
- Basic school education (Volks- und Hauptschulabschluss): 11.4%
- Advanced school education (Realschulabschluss/Mittl. Reife): 7.7%
- School education below A Levels + apprenticeship: 11.4%
- High School Graduation or A Levels: 11.4%
- High School Graduation + apprenticeship: 3.2%
- Technical school or academy: 3.2%
- University degree: 5.6%

**Age classes**
- Up to 24: 16%
- 25-34: 19%
- 35-44: 13%
- 45-54: 12%
- 55-64: 16%
- 65-74: 3%
- From 75: 4%
- No information: 2%

**Income (in € net/month)**
- Under 500: 2%
- 500-1000: 8%
- 1000-1500: 10%
- 1500-2000: 11%
- 2000-2500: 15%
- 2500-3000: 14%
- 3000-3500: 9%
- 3500-4000: 9%
- 4000-4500: 7%
- 4500-5000: 4%
- More than 5000: 3%
- K.A.: 2%

Source: Own Survey

Malte von Szombathely, Jürgen Oßenbrügge, Benjamin Bechtel, Myriam Albrecht
### 5 Preliminary results

#### Correlation of distributed stressors with social stratification?

<table>
<thead>
<tr>
<th>Rating neighborhood</th>
<th>Lden (average noise prop. from model)</th>
<th>Rating noise day</th>
<th>Rating noise weekend</th>
<th>Rating street noise</th>
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#### Can we relate environmental stressors to health effects?

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<th>Lden (noise prop. from model)</th>
<th>Age</th>
<th>Income</th>
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</table>
6 Conclusion and Outlook

What are specific urban factors that impact urban health?

- Environmental stressors: temperature, noise and air quality
- Socioeconomic background & horizontal stratification: e.g. social status and age
- Built City: Effect of the urban morphology
  - Access to infrastructure: public transport, cycling infrastructure, parks

→ Criteria of Vulnerability of urban societies

What can be achieved with such research on urban health?

- Multi stressors shall be described based on the model
- New dimensions of urban inequality can be uncovered.
- The criteria for a "healthy city society" – based on our conceptional model – might extend beyond the usual considerations?
Gehl, Jan (2010): Leben zwischen Häusern, Berlin: jovis Verlag
Thank you for your attention
Bewertung des Wohnumfelds (nur 2016)

Bewertung Wohnumfeld

- > 1.00 - 1.81
- > 1.81 - 2.20
- > 2.20 - 2.60
- > 2.60

1 = sehr gut
2 = gut
3 = eher gut
4 = eher schlecht
5 = schlecht
6 = sehr schlecht
4 Rail and Subway Infrastructure, Hamburg
Cluster analysis for environmental stressors
Original survey areas (GPs) based on clusters

Quadrants:
Noise / Temperature
- noisy / average
- noisy / warm
- average / average
- average / warm
- silent / cool
- silent / warm
- airport noise/ average
- industry noise / warm

District Types
- Old Town
- Inner City
- Transition Areas
- Suburban Areas
- Offices and Residential
- High Rise Residential
- Airport
- Harbor, Business & Residential
- Harbor, Business & Industry
## Survey areas – working table

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<th>Bereich</th>
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<th>Gezählt</th>
<th>Differenz</th>
<th>Konfektioniert</th>
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Pilot survey

- Distributed online (Facebook mainly)
- Part of a master thesis (Lena Bernhardi)
- 161 participants all over Hamburg
- Survey period: October 2016
Pilot survey – bike usage

Distance to City Centre

Bike Usage

- No
- Yes

Source: L. Bernhardi
What disturbs you most in your living environment?

Variables

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<th>Variables</th>
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<tr>
<td>Air quality</td>
<td>.375*</td>
</tr>
<tr>
<td>Public places &amp; spaces</td>
<td>.493*</td>
</tr>
<tr>
<td>Seating</td>
<td>.419*</td>
</tr>
<tr>
<td>Social contacts</td>
<td>.510*</td>
</tr>
</tbody>
</table>

Source: L. Bernhardi

Slide 25
14.09.2017