

Poster 41

Spatial dependence of body mass index and exposure to night-time noise in the Geneva urban area
Andrea Salmi, Jérôme Chenal, Idris Guessous, Stéphane Joost

in GeoMed conference 2017

https://infoscience.epfl.ch/record/231875/files/Geomed%202017_BOOK.pdf?version=1

Obesity is a public health challenge worldwide: by 2025 the global prevalence could reach 18% in men and 21% in women (NCD-RisC 2016). High body-mass index (BMI) is an important risk factor for diabetes, cardiovascular disease and cancer (NCD-RisC 2016). The increase of noise from traffic can be considered a contributory cause (Mueller et al 2017). Exposure to high noise levels may be associated with high BMI in the population (Christensen et al 2016) or in population subgroups (Ofstedal et al 2015). Reasons are that a high noise level may discourage physical activity and boost energy intake (Parrish&Teske 2016) with a consequent weight gain, but also that sleep disorders may in turn cause metabolic troubles favouring obesity (Miedema&Vos 2007). While high values of BMI may be clustered and spatially dependent in dense urban areas (Joost et al. 2016), the spatial co-dependence of high BMI and noise values has not clearly been shown yet.

In this study, we calculated the night-noise mean (SonBase 2014, compatible with the EU Environmental Noise Directive) for the 5 classes obtained after computation of Local Indicators of Spatial Association (LISA; Anselin et al 1995) on the BMI of the participants in the Bus Santé study, a cohort managed by the Geneva University Hospitals (N=15'544; Guessous et al 2014). We expected the mean of dBs to be significantly higher in the group showing spatial dependence of high BMI values (high-high class).

We ran an ANOVA and multiple T-tests to compare the dB means between LISA clusters. The approach was applied to the participants of the whole State Geneva cohort, and to a reduced set of individuals living in the urban environment of the municipality of Geneva only. With a significance level of 95%, 45% of participants belong to LISA clusters in the State and downtown Geneva. In the latter area, a low-low BMI cluster on the left bank of the river is characterized by a mean of 51.7 dB, and a high-high cluster on the right bank by a mean of 49.5 dB. Using the whole State data, the same clusters are observed and show respectively 48.7 dB (low-low) and 46.3 dB (high-high). The 5 clusters obtained show significantly different night-noise means. Our study confirms the existence of spatially dependent BMI clusters on the two scales investigated, but our hypothesis is rejected as it does not show a significantly higher night-noise level in high-high BMI clusters than in the other classes. Socioeconomic factors mainly explain the results obtained.

References

- 01 Anselin (1995) DOI:10.1111/j.1538-4632.1995.tb00338.x.
- 02 Ofstedal et al. (2015) DOI:10.1016/j.envres.2015.01.011
- 03 Miedema & Vos (2007) DOI:10.1207/s15402010bsm0501_1
- 04 Joost et al. (2016) DOI:10.1136/bmjopen-2015-010145
- 05 Guessous et al. (2014) DOI:10.1038/nutd.2014.8
- 06 Sonbase (2014) <https://www.bafu.admin.ch/bafu/fr/home/themes/bruit/etat/banque-de-donnees-sig-sonbase.html>
- Parrish & Teske (2017) DOI:10.1002/oby.21703
- 07 NCD Risk Factor Collaboration (2016) DOI:10.1016/S0140-6736(16)30054-X
- 08 Mueller et al. (2017) DOI:10.1289/EHP220