

# DESIGNING RELEVANT STUDY ZONES FOR ECOLOGICAL STUDIES: THE PAISARC+ PROJECT

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**Background and Aims:** Spatial boundaries constructed from population census data or for other administrative purposes do not necessarily match to the neighborhood contours that define a community. This in turn may hamper the relevant testing of epidemiologic hypotheses in ecological studies.

Our aim was to design the appropriate areal unit for testing the neighborhood influences on the relationship between ambient air pollution and 2 short-term health outcomes, that is, asthma exacerbation and onset of myocardial infarction, on a very small scale ecological basis.

**Methods:** Using GIS (Geographic Information System) tools and concepts, we designed and applied five approaches for census-block population disaggregation, in cells of 250 x250 m (a common spatial unit to explore contextual variables available at different scales). Homogeneous neighbourhoods were constructed according to our Deprivation Neighbourhood Measure (The NDM is calculated from 27 relevant variables grouped into 3 domains -socio-economic feature; social cohesion and public resources). AZTool software (David Martin, University of Southampton, UK) was used to then re-aggregate cells into a new, both hypothesis-driven and data-driven, areal unit. Three criteria were considered: (i) output zone homogeneity as regards neighborhood context characterization, (ii) population target size, (iii) shape compactness. We tested several relative weighing combinations of these parameters.

**Results:** The original 1608 (at 250mx250m) cells were aggregated into 220 non-linear neighbourhoods including 2000 persons, and similar as regards neighborhood context (intra-area correlation = 0.58).

**Conclusion:** Our approach allows to design on a relevant basis, a very small scale spatial unit, to be used in further case-crossover studies, as indicated in the objectives.

**Keywords:**

MAUP; Zone design; Neighbourhood; Ecological study