

Citizen perception regarding the nuisance caused by odorous gases in urban and industrialized region

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Effective odor management requires integrating community feedback with seasonal monitoring to protect vulnerable groups. While quantifying odorant gases and analyzing chemical compositions are essential, citizen perception plays a critical role in understanding exposure-response effects. This study investigates the perception of odorous gases among residents of an industrialized urban area, analyzing the correlation between reported annoyance levels and specific emission sources.

The research was based on face-to-face surveys conducted in two phases reflecting seasonal meteorological patterns: winter (dominated by southerly winds) and summer (dominated by northeasterly winds). The sample consisted of 505 respondents in 2019 and 400 in 2022. Hierarchical Cluster Analysis (a multivariate statistical technique using Ward's linkage and Euclidean distance) was employed to identify natural groups and profiles of perception. Variables included odor perception, source recognition, annoyance scale (1 to 10), local, frequency perception, and sociodemographic factors.

The analysis identified five distinct clusters based on annoyance levels and emission sources: C1 and C2 exhibited high annoyance linked to industrial emissions in winter and sewage pumping stations in summer, respectively, with demographic variations in gender and age. C3 presented cumulative annoyance from both sources, significantly correlating with rhinitis, lower education, and domestic occupations. Conversely, C4 showed moderate annoyance and the use of physical mitigation despite source ambiguity, while C5 reported high annoyance without an identifiable source, suggesting psychological stress or unmeasured variables. Statistical evidence confirms that annoyance levels are directly dictated by the specific emission source, while seasonal shifts in prevailing winds drive the temporal variation in exposure. The study concludes that odor perception in industrialized urban areas is a fragmented phenomenon dictated by the intersection of geographical location, seasonal atmospheric dynamics, and individual vulnerability. Environmental policies and local regulations must move beyond purely technical emission metrics to integrate community feedback and account for seasonal geographical variations to achieve effective odor control.

Key-words: Odor Annoyance, Community Perception, Industrialized Urban Areas, Atmospheric Dispersion, Environmental Management