

Science for Environment Policy

Health ratings for urban environments provided by new software

New software has been developed to rate the health risks of different activities in the urban environment, for example, cycling or driving in different areas of a city. 'CENSE' is based on a variety of different pollutants and environmental health hazards encountered in urban environments and may provide a useful tool for urban planning and improving residents' quality of life, its developers say.

Individuals living in [urban environments](#) can be exposed to environmental factors, such as [air](#) and [noise](#) pollution, which may have severe effects on [health](#). However, people are often exposed to a range of different health hazards simultaneously and it can be difficult for decision makers to understand the overall risk and effectively mitigate its effects.

CENSE is the first software capable of assessing combined exposure to environmental health stressors in outdoor urban settings for individuals. It produces easy-to-understand ratings of combined exposure levels for different activities, such as driving, cycling and walking along a particular urban route.

Results are displayed as symbols on a colour-graded scale. For example, cycling a particular route might be classified as 'unhealthy' for the individual, owing to stressors such as air pollution and this is displayed as a cycling symbol at the red end of the scale. By contrast, reduced exposure levels inside vehicles driving the same route might be classified as 'very good' – displayed as a driving symbol at the green end of the same scale.

To produce the ratings, the researchers used two key indicators. The first, the combined exposure indicator, integrates exposure to a variety of pollutants including hydrocarbons, fine particles, noise and radiation. The second, the combined exposure and dose indicator, considers personal exposures based on activities, accounting for the duration of each activity. This indicator also takes into account breathing volumes based on the effort level of the activity.

In this way it becomes possible to compare the exposure of two people – one cycling for ten minutes and another standing outside for an hour – in the same environment, although currently the approach does not allow for balancing the negative effects of higher exposure during heavy exercise against the physiological benefits of exercise.

The researchers tested their software using information about city centre exposures in Thessaloniki, Greece. Their results show that cycling fast in the city centre is safe for around 20 minutes, but by 27 minutes it becomes 'barely acceptable' in health terms. However, driving a car in heavy traffic for 45 minutes is rated 'very good' for the motorist. The study therefore highlights the fact that while driving may protect the individual motorist from pollution, it affects the health of other road users. These negative effects can only be reduced by collective efforts to reduce car use.

According to the researchers, the approach may be useful for informing urban planning and improving citizens' quality of life – for instance, by suggesting which streets would make healthier routes for cycle paths. However, the evidence that CENSE relies on is still developing. For some pollutants or stressors, it is uncertain at what level exposure becomes unhealthy and whether pollutants become more harmful when combined with others.

In addition, to account for some stressors having a greater influence on health than others, the researchers applied subjective weightings based on the advice of experts. Therefore, CENSE results are only as accurate as our current understanding of the health effects of pollutants within the urban environment.



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