CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Reported annoyance from transport noise (ENV_NS_PN1)

DOMAIN

Transport	Environment	Energy	Society	Economy

TOPIC	**Noise**	
IMPACT	**Transport noise emissions** *Reducing the level of noise generated by transport*	**ENV_NS**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Motorized vehicles are a major source of transport-related noise pollution in urban areas. Reducing noise pollution is crucial for public health and well-being, as chronic exposure can lead to increased stress, heart disease, sleep disturbances, and mental health issues. It also affects cognitive function, productivity, and overall quality of life. Beyond health impacts, traffic noise disrupts social interactions, lowers property values, and it can exacerbate social disparities between affluent and lower-income communities. Addressing this issue enhances urban livability and supports sustainable development.

This indicator provides a measure of the perceived annoyance from transport noise in the pilot area. **It is a relevant indicator when the policy action is aimed at reducing the annoyance and the damages to health resulting from the noise generated by urban transport. A successful action is reflected in a LOWER value of the indicator.**

DESCRIPTION

The indicator is a score summarising the level of annoyance reported by a sample of individuals in the pilot area. The indicator is **dimensionless**.

METHOD OF CALCULATION AND INPUTS

The indicator should be computed exogenously, by applying the method described and then coded in the supporting tool.

Method 1

Computing a transport noise annoyance score from responses collected by means of a sample survey

Significance: **0.75**

INPUTS

The following information is needed to compute the indicator:

- **Responses of a sample of individuals to a question regarding the perceived level of annoyance from transport noise.**

A suggested formulation of a question regarding the perceived level of annoyance from transport noise is provided in the Guidelines for surveys which are part of the MUSE Evaluation Framework.

METHOD OF CALCULATION

Assuming that the formulation of the question suggested in the Guidelines for surveys is used, the indicator should be computed **exogenously** according to the following steps:

- **Association of a numeric level to each option of response proposed in the survey.** The suggested formulation of the question includes five different options of response, the associated numeric levels to these options would be as follows:

  Question: When you are at home and windows are open, is transport noise annoying?

Available responses:

a) *Yes, at any time*
b) *Yes, sometimes during the day*
c) *Yes, but only during night hours*
d) *Occasionally*
e) *No*

Numeric levels associated:

a) *Yes, at any time → 5*
b) *Yes, sometimes during the day → 3*
c) *Yes, but only during night hours → 3*
d) *Occasionally → 1*
e) *No → 0*

- **Calculation of the share of individuals reporting a certain level of annoyance** (see equation below)

- **Calculation of the average perceived transport noise annoyance indicator** (see equation below).

EQUATIONS

The share of individuals reporting a certain level of annoyance should be computed as:

$$^{n}NoiseAnnSh = \frac{\sum_i {}^{m}NoiseAnn_i \; where \; m = n}{I}$$

Where:

$^{m}NoiseAnn_i$ = Level of annoyance for transport noise *m* reported by individual *i*.

I = Total number of responses collected.

For example, if a sample of 300 individuals was surveyed and 130 of them reported that transport noise is annoying at any time, $\sum_i {}^{m}NoiseAnn_i \; where \; m = "any \; time"$ would be 130 and the share of those reporting this level of annoyance would be 130 / 300 = 43%

The average perceived transport noise annoyance indicator should be computed as:

$$\boldsymbol{AvPercTrNoise = \sum_{n} (\, {}^{n}NoiseAnnSh * \, {}^{n}NoiseLevScore)}$$

Where:

$^{n}NoiseLevScore$ = Numeric score associated to the level of annoyance *n*.

For example, as mentioned above, the suggested numeric level associated to the transport noise annoying at any time is 5.

ALTERNATIVE INDICATORS

This indicator is based on the annoyance reported by a sample of inhabitants of the pilot area. The significance of this indicator is good, but it still based on qualitative and subjective evaluation, rather than on an objective measure. Nevertheless, the estimation of this indicator can be of limited complexity, especially if a sample survey in the pilot area is already envisaged to collect information needed for other indicators. In that case, adding one question regarding noise would be basically effortless.

An alternative indicator is **ENV_NS_NE1**, which consists of the measured level of noise in some sample locations. Since it is based on observations, this alternative indicator can be more significant than the one described in this factsheet. On the other hand, its calculation can be more complex, as it requires a specific on-site measurement campaign with dedicated equipment and specialised operators for its correct installation.