

Correlation between urban noise and non-infectious diseases in the population

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The widespread introduction into industry of heavy duty machines and equipment is accompanied by an increase in the noise background in industry and also a rise in its intensity in everyday life and in the streets of a large city.

Long term noise, by weakening the functional state of the central nervous system, reduces the resistance of the body and promotes the development of serious disease processes - neurotic states, hypertension or hypotension disease, stomach and duodenal ulcers, gastritis, colitis, occupational loss of hearing and deafness [1, 4, 5, 8].

A large scale study of the population living in a noisy part of a city with a noise level of 70-90 phon, 81-85 dB, has shown that neuroses are 3 times more frequent, hypertonic and hypotonic diseases 1.4 times, inflammatory diseases of the organ of hearing 18.3 times [3, 5], and hypertonic disease, and cardiovascular neuroses 2.3 times than in people living in a quiet part of the city.

Despite the many studies of the action of acoustic irritants on humans, we have not found in the available literature a single work devoted to the effect of noise on other non-infectious diseases. On this basis, we set ourselves the task of studying the correlation between the outside (transport, enterprise) and inside noise, the equivalent sound level in dBA and non-infectious diseases. Correlation, as is well known, is a cause-effect

relationship and can be of considerable help in studying the effect of noise on the given diseases.

Measurements of the external and internal noise were made twice a year - in autumn-winter (September) and in spring-summer (March) at 10 points in a contaminated area of a city. The intensity of the outside noise was 67.9-75 dBA and of the inside - 53.9-57.8 dBA.

The morbidity was studied in accordance with the instructions [6] and recommendations [7]. The scope of the studies was described in a previous paper [2].

The correlation coefficient was determined by means of a study of the connections between the yearly average level of the external and also the internal noise and the yearly average values of non-infectious diseases over 14 years (1982-1995).

It was established that the correlation between the outside noise and diseases of the blood and circulatory organs in children was 0.82 ($p < 0.01$), diseases of the eye - 0.81 ($p < 0.01$), diseases of the upper respiratory tracts - 0.76 ($p < 0.01$), other diseases of the respiratory organs - 0.64 ($p < 0.02$), middle otitis and mastoiditis, diseases of the ear and the mastoid process - 0.75 ($p < 0.01$), diseases of other branches of the alimentary system - 0.71 ($p < 0.01$), diseases of the urinogenital system - 0.53 ($p < 0.05$), diseases of the skin and subcutis - 0.82 ($p < 0.01$), and the total

morbidity - 0.76 ($p < 0.01$). The only exception was the nosological group of rheumatism in the active phase and rheumatic diseases of the heart, for which the correlation with outside noise was only 0.14 ($p > 0.11$), i.e. was clearly insignificant.

The correlation between the inside noise and the indicated diseases varied in the range from 0.01 to 0.17 and from 0.01 to -0.25 ($p > 0.1$), i.e. was insignificant.

An analogous picture was found in adults. The correlation between the outside noise and malignant tumours was 0.89 ($p < 0.01$), disease of the blood and circulatory organs - 0.77 ($p < 0.01$), disease of the eye - 0.75 ($p < 0.01$), other diseases of the respiratory organs - 0.62 ($p < 0.01$), middle otitis, mastoiditis, diseases of the ear and the mastoid process - 0.92 ($p < 0.01$), hypertonic disease - 0.79 ($p < 0.01$), ischemic heart disease - 0.62 ($p < 0.02$), diseases of other branches of the alimentary system - 0.72 ($p < 0.01$), diseases of the urinogenital system - 0.54 ($p < 0.01$), and total morbidity - 0.72 ($p < 0.01$).

The correlation between the outside noise and diseases of the endocrine system, the upper respiratory pathways, rheumatism in the active phase, chronic rheumatic diseases of the heart, diseases of the skin and subcutis were not significant in adults and had values of 0.03, 0.24, 0.28 and 0.24 ($p > 0.1$).

The correlation between the inside noise and rheumatism and rheumatic diseases of the heart, diseases of the skin and subcutis were significant and had values of 0.76 ($p < 0.01$) and 0.62 ($p < 0.02$).

The correlation between the inside noise and the remaining non-infectious diseases varied in the limits from 0.03 to 0.47 ($p > 0.1$) and from 0.02 to 0.09 ($p > 0.1$), i.e. were not significant.

Noise acts mainly on the central nervous system and then only on the

receptors of Corti's organ [5, 8, 9]. The existence of high correlation coefficients between outside noise and non-infectious diseases indicates that the latter arise as a result of the action of a set of anthropogenic agents of the external environment (noise, air, water and meteorological factors) on the central nervous system and peripheral organs.

Chronic acoustic exposure causes the following stages of changes in the functional state of the nerve cells of the cortex, subcortical and truncal formations of the brain and the body as a whole: stress, temporary over-stress and chronic over-stress [9]. It may be assumed that ecological factors (anthropogenic agents of the atmospheric basin, drinking water and meteorological factors) in the action on humans together with noise cause similar stages. The ecological stress stage can be considered as an adaptation of the body to the action of the external factors, manifested in a mobilization of the reserve forces and compensatory possibilities of the indicated sections of the brain and body as a whole (increase in non-specific and specific resistance) and the temporary over-stress stage as periodic weakening of the adaptive reactions of the body. The chronic over-stress stage is apparently equivalent to neurotic states with disturbances of the functions of the peripheral organs (blood and circulatory organs, chronic and stable increase or decrease of blood pressure, stomach and duodenal ulcers and so on).

Conclusion

A high coefficient of correlation has been found between the outside noise and non-infectious diseases, indicating a cause-effect relationship between them. On this basis, there is a need for timely repair of transport roads, redirection of the traffic flow and the building of bypass roads around cities.

References

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Germans v. Swiss

Frank Elbe, the new German ambassador to Bern, does not believe the long-running dispute over Zurich airport will sour relations between the two neighbours. The two nations have been at loggerheads since the Swiss parliament rejected a controversial air transport accord in March this year. The deal is aimed at cutting by a third the number of flights approaching Zurich airport over southern Germany where residents have complained of noise pollution. Germany retaliated by imposing tougher flight restrictions, but has agreed to delay implementing them until for now. Elbe was asked "How would you characterise the relationship between Switzerland and Germany?" He answered "Outstanding – though it is equally true that most people don't realise how important and how close this relationship is. Switzerland ranks ninth on our list of trading partners – making it more important in terms of foreign trade than Japan, for example. And Germany is Switzerland's most important trading partner – even ahead of the United States. Working together at a regional level is also becoming more important as a means of contributing to stability and security in Europe. Mr Elbe was asked whether the dispute over Zurich airport and noise pollution was souring relations between the two countries at a political level? He responded "No, I don't think so. But of course I have to recognise that this situation concerns the interests of people in Zurich as much as those living in the south-western part of Germany."

noise notes

Minneapolis – St. Paul: we've done enough, says Northwest Airlines

A top Northwest Airlines executive explained recently why the airline does not want to expand a noise-abatement programme around the Minneapolis-St. Paul International Airport. The carrier, he said, places a higher priority on preserving jobs at Northwest and adequately staffing security checkpoints at airports. "We've done more than our fair share with respect to the \$7 billion we've invested in new aircraft" that are less noisy than the 727s and DC-10-40s that have been retired, Northwest President Doug Steenland said in an interview. Said Northwest CEO Richard Anderson: "We have operated very responsibly with respect to the whole issue of noise insulation at the Minneapolis-St. Paul airport." Anderson, in a separate interview, said it would be a "major policy shift" to begin insulating homes exposed to noise that falls under the long-standing 65-decibel standard. U.S. Sen. Mark Dayton, D-Minn., vociferously criticised Northwest for working with a conference committee to block plans by the Metropolitan Airports Commission (MAC) to insulate homes that fall within an average 60-to 64 decibel range. On the Senate floor, Dayton accused Northwest of a "sneaky, slimy and sordid shenanigan" in the way it lobbied for a measure inserted into a House-Senate conference committee report. Currently, there is a federal standard for providing funds for soundproofing near airports. That threshold is an average of 65 decibels in takeoff and landing paths. The MAC operates the airport, where Northwest leases 81 percent of the gates. The agency has spent more than \$208 million to reduce noise in more than 7,200 houses exposed to an average of 65 decibels. Funding for the project has come from multiple sources, including federal grants, surcharges on airline tickets and fees paid by airlines. Anderson stressed that Northwest supported the programme, which included installing new windows and taking other steps to buffer airport noise. "Every church and school within the 65 [decibel range] has been insulated," Anderson said. In addition, he said, Northwest recently agreed to back noise insulation efforts on entire blocks, even when some houses fell outside the 65-decibel standard. "We have the new north-south runway that is going to cost \$400 million to \$500 million and is going to take a significant amount of noise off of south Minneapolis," Anderson said. It is within that context that Northwest wants Minneapolis-St. Paul airport revenue to be used for purposes other than expanding the noise insulation programme, Steenland said. Northwest is the largest tenant at the airport. The House-Senate conference committee was working on a Federal Aviation Administration bill and was the target for the controversial noise programme language because the FAA has the power to approve federal funds for noise abatement.

Helicopter tourism warning

An environmentalist has warned against starting tourism helicopter flights to the top of Phu Kradung National Park, in Thailand saying it will create noise pollution and affect wild animals. Surapol Duangkhae, secretary-general of the Wildlife Fund Thailand (WFT), said the service would also violate the aviation law which prohibited aircraft from landing in national parks. The noise from helicopters would force elephants to leave their natural habitat, he said. His remarks follow a proposal by a private tour firm, Eco Tour Flying Services, to fly tourists to the top of the national park. The firm plans to use twin-engine, eight-seater helicopters to take tourists twice daily on a 15-minute flight. Approval has not yet been granted.