



**HEALTH EFFECTS OF AIRCRAFT NOISE FROM
URBAN AIRPORTS ON RESIDENTS AND WORKERS:
CURRENT HYGIENIC CHALLENGES AND
PROSPECTS FOR PREVENTIVE RISK
MANAGEMENT**

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ABSTRACT

This review summarizes current evidence on health effects of aircraft noise among residents living near urban airports and workers of airside and ground services. WHO and ICAO documents, PubMed/MEDLINE publications, and official legal sources of the Republic of Uzbekistan were analyzed. Rapid growth of tourism and air traffic, airport infrastructure development, and adoption of Law No. O'RQ-1171 in 2026 increase the public-health relevance of aircraft noise in Uzbekistan. International studies associate aircraft noise with annoyance, sleep disturbance, hypertension, cardiovascular outcomes, and selected cognitive effects in children. Noise-induced hearing loss remains a major occupational hazard for airport workers. Integrated exposure assessment using contemporary acoustic indicators, noise mapping, and clinical-functional monitoring may improve preventive management for both nearby communities and occupational groups.

Introduction. The urbanization of the 21st century, the expansion of transport infrastructure and the increase in population mobility are increasing the impact of physical factors on health in the urban environment. In the modern hygienic concept, noise is considered not only as an acoustic discomfort or a factor affecting the auditory analyzer, but also as a chronic environmental stressor affecting sleep, the autonomic nervous system, the cardiovascular system,



the psych emotional state and cognitive functions [1, 12–15]. WHO recommends reducing long-term exposure to aviation noise to below 45 dB Lden, and nighttime exposure to below 40 dB Lnight [1].

Aviation noise differs from other transport noise by its frequency, high maximum levels and repetitive take-off and landing cycles. Therefore, in its hygienic assessment, indicators such as Lden, Lnight, LAmax, SEL and the number of noise events are important in addition to LAeq. The ICAO Balanced Approach concept recommends reducing noise at source, rational planning of land resources around airports, the harmonious application of noise-reducing flight procedures and, where necessary, operational restrictions [2, 25].

This problem is currently particularly urgent for Uzbekistan. The Presidential Decree No. PF-87 of May 15, 2025, set major target indicators for the further development of tourism as a strategic sector of the economy, such as 15.8 million foreign tourist trips and 40 million domestic tourist trips [6]. In 2025, 11.7 million foreign citizens visited Uzbekistan for tourist purposes, which is 46.8% more than in 2024. In January-June 2026, the country's airports served 8.15 million passengers and 64,831 flights were operated; the number of international flights increased by 12% [7].

Aviation infrastructure is also expanding. The new Tashkent International Airport is planned to be built on an area of 1,310 hectares in 2026–2030, and is expected to serve 20 million passengers initially and 46 million in the future. The new Bukhara International Airport project envisages the construction of a new airfield and terminal infrastructure to serve domestic and international flights [8]. These developments make scientifically based assessment of acoustic exposure of the population living near airports and airport workers an integral health component of transport policy.

The Law of the Republic of Uzbekistan No. O'RQ-1171 “On Protection of the Population from the Harmful Effects of Noise”, adopted on September 9, 2026, established the legal framework for the establishment of permissible noise levels, harmful effects, territorial assessment and noise maps [3]. This new legal approach increases the practical importance of systematic monitoring of airport noise from an environmental and occupational health perspective.

MATERIALS AND METHODS

The article was prepared as a literature review. PubMed/MEDLINE and major scientific publishing platforms were searched for epidemiological studies, cohort and cross-sectional studies, systematic reviews, meta-analyses, and studies on occupational noise in airport workers published in 2000–2026. The keywords “aircraft noise”, “airport noise”, “Lden”, “Lnight”, “sleep disturbance”, “annoyance”, “hypertension”, “cardiovascular disease”, “cognition”, “airport workers”, “occupational noise” and “noise-induced hearing loss” were used in the search. Official documents of WHO and ICAO, laws and regulations of the Republic of Uzbekistan in the LexUZ database, as well as official statistical data on tourism and airport



infrastructure were analyzed. Sources that were directly relevant to the questions of this review, methodologically sound, and covered health outcomes were prioritized.

RESULTS AND DISCUSSION

The general legal framework for ensuring sanitary and epidemiological well-being in the Republic of Uzbekistan is enshrined in Law No. ORQ-393 [4]. The Air Code stipulates the need to take into account the impact of aircraft noise and other harmful physical factors when locating airfields and airports, as well as residential and other facilities near them [5]. Law No. ORQ-1171 specifically regulates the problem of noise and provides for preventive mechanisms such as territorial assessment of the harmful effects of noise and the creation of noise maps [3].

SanQvaM No. 0008-20 establishes general noise standards for residential and populated areas, but its scope does not cover noise generated by take-off, landing of aircraft and helicopters, as well as engine testing at the airport [9]. Aviation noise is specifically assessed in terms of urban planning within the framework of SHNQ 2.07.01-23 [10]. SanQvaN No. 0111-26 for airport employees establishes hygienic standards for noise and other physical factors in the workplace [11]. These documents indicate the need for a separate, but interrelated, preventive approach for the population and employees.

Noise nuisance and sleep disturbance among the population. Noise annoyance is one of the most consistently studied subjective effects of aircraft noise. A systematic review conducted for WHO confirmed the exposure–annoyance relationship for aircraft noise; individual noise sensitivity and socio-non-acoustic factors also play an important role [12].

Sleep disturbance is a biologically important consequence of nocturnal aircraft noise. A meta-analysis by Smith et al. demonstrated an exposure–response relationship between nocturnal traffic noise and sleep disturbance [13]. The HYENA project found a short-term increase in arterial blood pressure during nocturnal aircraft noise events [17]. This suggests that autonomic responses may occur even when noise is not consciously perceived during sleep.

Arterial hypertension and cardiovascular risk. Evidence for the cardiovascular effects of aircraft noise has been developed in several epidemiological studies. The HYENA study found an association between night-time aircraft noise and arterial hypertension in 4,861 individuals living near major European airports [16]. A longitudinal study around Stockholm-Arlanda Airport also showed an association between high long-term exposure and the development of hypertension [18].

High levels of aircraft noise have been associated with ischemic heart disease, stroke, and cardiovascular hospitalization in large studies [19]. A 2025 cardiac MRI study using UK Biobank data showed an association between high levels of aircraft noise, particularly at night, and adverse subclinical changes in left ventricular structure and function [20]. Confounders such as air pollution, smoking, body weight, and socioeconomic status should be controlled for when assessing noise exposure [14, 15].



Children and other sensitive groups. Children are one of the most sensitive groups to environmental noise. In the RANCH multicenter study, chronic aircraft noise exposure was associated with poorer reading comprehension in children attending schools near airports [21]. Therefore, sensitive sites such as schools, preschools, and healthcare facilities should be given special consideration when planning areas around airports. Although the evidence on psych emotional health is less consistent than for cardiovascular and sleep outcomes, high levels of noise exposure may have an impact on quality of life and mood [12].

Occupational noise hazards for airport workers. Airport workers are exposed to noise at higher intensities and closer to the source than the general population. Apron, maintenance, baggage handling, fueling, and airport operations workers are at high risk. The best documented consequence for this population is noise-induced hearing loss (NIHL) [22, 23].

A study combining noise mapping, individual exposure and audiometry at Muscat International Airport showed a significant prevalence of NIHL [22]. Aircraft maintenance personnel were reported to have daily equivalent noise levels of 70–91 dB(A), with peak levels reaching 119 dB(A) [23]. Modern prevention should not be limited to earplugs or earmuffs, but should include engineering controls, individual dosimetry, periodic audiometry, staff training and testing of the effectiveness of protective equipment [24].

Priorities for preventive management. Prevention in protecting the population should begin with reducing noise at source. ICAO standards and the Balanced Approach concept see technological modernization, rational use of land resources, optimization of flight procedures and, if necessary, operational restrictions as complementary measures [2, 25]. It is of practical importance to create noise maps around the airport, monitor night-time noise loads, protect sensitive objects from high-exposure zones, and improve the sound insulation of building facades.

In the professional environment, technical reduction of noise sources, rational organization of the work process and the correct selection of individual protective equipment should be used together [11, 24]. Personal noise dosimetry, periodic audiometry and monitoring of health indicators in high-exposure groups allow for early detection of occupational hazards. The presence of norms for noise impact assessment and mapping in Law No. ORQ-1171 creates an important legal basis for improving the national acoustic monitoring system [3].

Conclusion. Aviation noise is an important physical factor that can affect the health of the population and workers at urban airports. Current scientific evidence most consistently shows its association with noise annoyance and sleep disturbance; evidence for arterial hypertension and cardiovascular risk is also increasingly strong [12–20]. Some cognitive effects in children [21], and NIHL in airport workers are considered an important form of occupational hazard [22–24]. The expansion of tourism and aviation infrastructure in Uzbekistan and the legal consolidation of territorial assessment and mapping of the harmful effects of noise by Law No. ORQ-1171 make monitoring of airport noise based on modern hygienic criteria relevant. Assessment of



acoustic exposure for the population and workers in accordance with objective health indicators, noise reduction at source, and the use of differential preventive measures are priority areas for improving the sanitary and hygienic safety of urban airports.

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