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# NOISE POLLUTION AND ITS IMPACT ON HUMAN HEALTH IN SOUTHEAST ASIA WITH A COMPARATIVE PERSPECTIVE ON PAKISTAN

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## Abstract

*Noise pollution has become a major environmental and public health problem in Southeast Asia as urbanization races forward with population growth. With the increasing urbanization, noise sources such as construction sites, trains, airports and urban transportation systems, factories and workshops have mushroomed all over the place. Additionally, social or cultural activities are another major cause of noise pollution. Even low levels of noise may hurt our health, especially repeated noise. Tinnitus and hearing loss are the main consequences of noise-induced auditory pathology. The non-auditory effects of noise include heart problems, sleep problems and cognitive impairments; People become increasingly stressed out with a general deterioration in their quality of life. In Southeast Asia, noise pollution is measured using sound level meters, community surveys, and geographic information systems for noise mapping. The research concludes that many urban areas habitually exceed the World Health Organization's recommended limit. Urban developments are often made on the basis of major routes, which do not of themselves cut noise exposure, and national environmental requirements are still occasionally observed. This paper will use a summary of compiled information in peer-reviewed articles, government releases, and international guidelines to evaluate the level of noise pollution, health consequences, and legislation and regulations governing the Southeast Asian nations. Evidence-based perspective is provided by including comparative tables summarizing the urban noise levels, the health effects as well as the national regulatory standards. It has been seen in the findings that there is a critical necessity of integrated urban planning, greater observance of noise boundaries, awareness creation and specific measures and interventions to reduce the impact of noise pollution and to safeguard human health in Southeast Asia.*

## Introduction

Noise pollution refers to any undesired or destructive sound produced by human beings and this is one of the most rapidly increasing environmental health concerns throughout the world. Noise pollution is not well recognized compared to other types of visible pollution like air and water contamination due to its physiological, psychological and social effects which are severe. Along with the auditory consequences, such as tinnitus and the noise-induced hearing loss (NIHL), non-auditory consequences of long-term high noise exposure have been described as sleep disorders, increased stress levels, cardiovascular disease, poor cognitive performance, and a reduced quality of life, on the whole (Basner et al., 2014; WHO, 2018).

Noise pollution is a non-visible environmental health problem that impacts on millions of

people worldwide. The World Health Organization, 2024 defines noise pollution to be any undesirable or detrimental sound that has impact on human activity, environment or health. Contrary to air or water pollution, noise cannot be touched, but still, it has some effects that can be measured.

Its cumulative effects are often underestimated, particularly in densely populated and rapidly urbanizing regions like Southeast Asia. Southeast Asian cities which are home to more than 670 million people, are experiencing rapid urbanization and industrial development. Major cities like Bangkok (Thailand), Jakarta (Indonesia), Manila (Philippines), Kuala Lumpur (Malaysia), and Ho Chi Minh City (Vietnam) are experiencing increased noise levels due to heavy traffic, poor urban planning, industrial activity, construction projects, airports, and social or cultural events (Lwin et al., 2020; Chong et al., 2019).

Recent studies indicate that noise levels in many of these cities frequently exceed the WHO recommended limits of 55 dB (A) for residential areas and 40 dB (A) at night (Lim et al., 2021). For example, peak noise levels during peak hours can exceed 100 dB (A), which is widely considered harmful to hearing and non-hearing health (Nguyen et al.2020). Noise levels rush hours may exceed a100 dB (A). Jakarta's central business district typically ranges between 80 and 90 dB (A).

**Demographic Pressure and Urbanization**

Urban traffic is the main contributor to increasing noise levels in Southeast Asia. Factors such as high motorization, frequent honking, poorly maintained vehicles and poor traffic management systems further worsen the problem (World Bank, 2023). Excessive vehicle density, rapid urban expansion and poor city design are the main causes of environments in which noise exposure regularly exceeds permissible limits. For example, studies show that traffic noise levels in city centers frequently range from 85 to 95 dB (Nadeem & Asim, 2022). The daytime equivalent continuous noise levels (Leq) on major arterial routes range from 75 to 90 dB. Industrial zones and construction sites contribute to prolonged exposure to high decibel levels, reaching 87–90 dB (Quader et al., 2024). The WHO recommends maximum limits of 55 dB for daily exposure and 40 dB for night-time exposure; thus, these numbers are concerning. Because residential areas in Southeast Asian megacities frequently intersect with commercial, industrial, and traffic zones, population density increases exposure.

**Sources of noise pollution:**

Urban sprawl, mixed land use, and laidback zoning enforcement all contribute to populations' long-term exposure to chronic noise, which can be harmful to their health. In Southeast Asia, human activity is the main cause of noise pollution. Among the important contributors are: Cars, buses, motorcycles and horns are the main causes of noise in urban areas (Sarker et al., 2023). Factories and construction sites, which are often located near residential areas, emit high-intensity noise (Munir et al., 2021). Background noise is significantly amplified, often above 100 dB, by loudspeakers used at religious ceremonies, political events and festivals. Aircraft corridors and airports provide high-intensity, localized noise. When combined, these sources provide complex urban noise profiles that are particularly harmful to cardiovascular health, cognitive functions and sleep. These profiles are characterized by intermittent peaks scattered over continuous low-level noise.

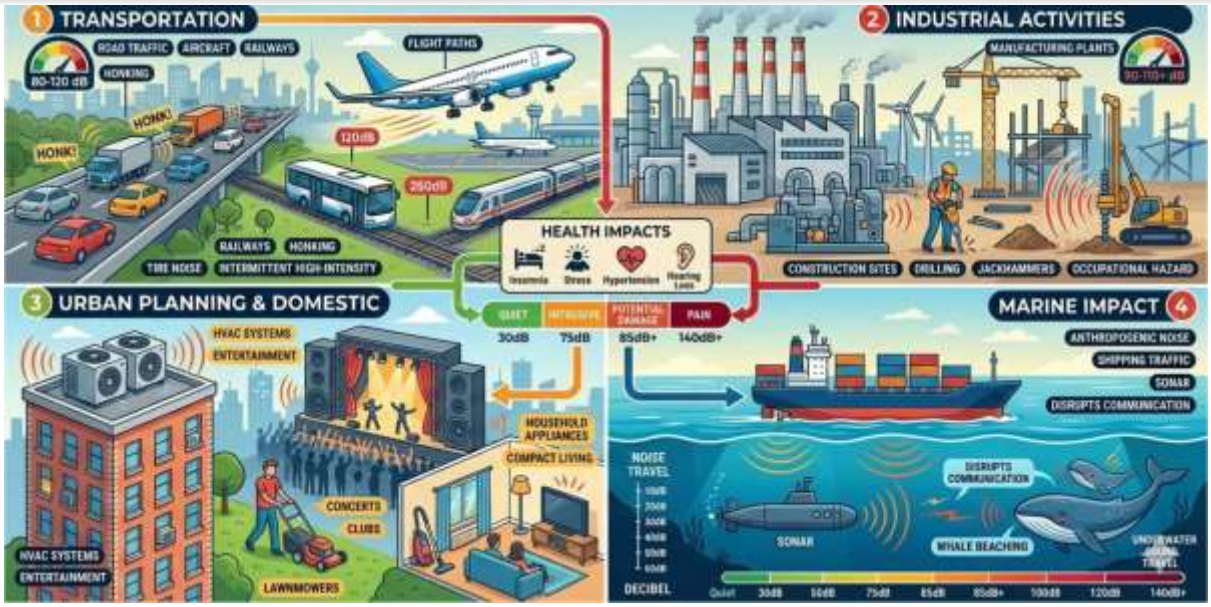


**Fig.01. Major sources of Noise pollution**

**Regulation and Policy Framework**

International standards exist, although Southeast Asia's adherence to them varies. India: limitations for commercial, residential, industrial, and quiet zones are set by the Noise Pollution (Regulation and Control) Rules, 2000. Pakistan: The Environmental Protection Act of 1997 contains noise control rules, although they are poorly implemented (Nadeem & Asim, 2022). Exposure in residential areas is made worse by inadequate urban planning, low public awareness, and a lack of real-time monitoring. High blood pressure, cardiovascular morbidity, sleep issues, stress-related illnesses, and diminished cognitive performance in youngsters have all been connected to prolonged exposure. Increase in noise pollution is a socio-developmental and public health issue because school-going children in metropolitan areas with unending traffic noise have limited attention and learning efficiency (Nguyen et al., 2020; Basner et al., 2014).

In fact, industrial exposure to occupational health poses risks to health especially to drivers, traffic policemen and other manufacturing employees who are exposed to high levels of decibel over a long period of time. Noise exposure has an impact on non-auditory and auditory systems: Prolonged exposure longer than 85 dB may lead to tinnitus, hyperacusis, and hearing loss (WHO, 2024). The long-term effect of noise increases heart rate, hypertension, and ischemic heart disease development due to the effect of stress on physiological mechanisms (Quader et al., 2024). Headache, memory loss, insomnia, and loss of focus are some of the common symptoms. Sleep problems, and loss of concentration. There are anxiety, irritation, and mood problems related to prolonged exposure (Munir et al., 2021).

It has been demonstrated that older individuals are at higher risk of getting cardiovascular disease, and children exposed to high levels of noise in urban environments achieve low academic results (WHO, 2024). Results confirm that noise pollution is not merely an inconvenience, but also a grave health hazard, especially in areas where it is highly experienced and where there is laxity in terms of regulation.

**Comparative perspective in Pakistan.**

Noise levels in the major cities of Pakistan, e.g., Karachi, Lahore, or Rawalpindi are frequently in excess of 100 dB (A) during peak hours because of the congestion in traffic, the rapid urban sprawl, and the presence of industries and constructions (Muzaffar et al., 2025; Kalim et al, 2014). Noise in the environment is an issue that prevails in both south and Southeast Asia, as surveys in Rawalpindi and Lahore revealed that the noise level in residential and commercial areas was significantly higher than the national and WHO recommendations. The workers and the elders in the transport or industrial sector, as

well as children, are some of the vulnerable populations that are more susceptible in both sectors. Nonetheless, the level of health outcomes and exposure to noise can vary depending on the level of public awareness, city planning and the implementation of regulatory policies (Muzaffar et al., 2025).

Although most Southeast Asian countries have adopted noise limits, their implementation varies, and cumulative noise exposure is often overlooked in urban design. Similar to this, Pakistan has put in place noise control regulations under the Pakistan Environmental Protection Act, although implementation is still restricted and monitoring data is still hard to come by. The lack of comparative studies makes it difficult to accurately measure geographic disparities and health outcomes (Kalim et al., 2014; WHO, 2018). There is an urgent need to use integrated planning in the urban areas, enforce noise laws more stringently, and to implement specific health interventions to the populace to reduce the impact of noise pollution in the congested areas of Southeast Asia by making comparisons with Pakistan.

**Table 01. Comparison of Urban Noise Levels in Southeast Asia**

| City | Country | Major Sources | Average Daytime Noise (dB(A)) | WHO Recommended Limit (dB(A)) | Reference |
|---|---|---|---|---|---|
| Bangkok | Thailand | Traffic, construction, commercial zones | 72–85 | 55 | Lwin et al., 2020 |
| Jakarta | Indonesia | Traffic, industrial, markets | 80–90 | 55 | Nguyen et al., 2020 |
| Manila | Philippines | Traffic, construction, airports | 75–88 | 55 | Lim et al., 2021 |
| Kuala Lumpur | Malaysia | Traffic, construction, industry | 70–82 | 55 | Chong et al., 2019 |
| Ho Chi Minh City | Vietnam | Traffic, industrial, social events | 68–84 | 55 | Nguyen et al., 2020 |
| Karachi | Pakistan | Traffic, industrial zones, construction | 75–95 | 55 | Muzaffar et al., 2025 |
| Lahore | Pakistan | Traffic, industrial zones, construction | 78–100 | 55 | Muzaffar et al., 2025 |
| Rawalpindi | Pakistan | Traffic, markets, institutional areas | 70–105 | 55 | Kalim et al., 2014 |

Table 01 provides a comparative analysis of average daily noise levels dB (A)) in major urban areas in Southeast Asia and Pakistan, highlighting the primary sources of noise, measured levels, and WHO-recommended limits. All the cities in the table have a greater daytime noise level of 55 dB (A) of residential zones which means that noise pollution is a substantial environmental and population health problem in the two areas (WHO, 2018). Bangkok (72 to 85 dB(A)), Jakarta (80 to 90 dB(A)) and Ho Chi Minh City (68 to 84 dB(A)) are rated as the top worst cities in Southeast Asia because of traffic, construction and industrial activities (Lwin et al., 2020).In Southeast Asian cities, social and cultural events like festivals intensify brief noise spikes, but in Pakistan, regular car honking and crowd noise prolong high noise exposure (Chong et al., 2019; Muzaffar et al., 2025). Even higher peak levels are found in Pakistani cities like Lahore (78-100 dB (A)) and Rawalpindi (70-105 dB (A)). In summary, the information in Table 1 shows that urban noise pollution is a significant problem in Southeast Asia and Pakistan. Despite minor differences in magnitude and sources, all cities exceed recommended safety levels. In order to protect human health, this emphasizes the urgent need for noise mitigation techniques, improved urban planning, regulatory

enforcement, and public awareness campaigns (WHO, 2018; Muzaffar et al., 2025).

**Effects of Noise Pollution on Human Health**

Noise pollution is an environmental stressor that affects humans directly through the auditory system and indirectly through physiological and psychological processes. The effects of exposure depend on its intensity, duration, frequency, and timing; chronic exposure poses the greatest risks. In urban and industrial environments, millions of people in Pakistan and Southeast Asia are subjected to potentially hazardous sound levels (Basner et al., 2014; WHO, 2018).

The most noticeable and measurable effects of prolonged exposure to noise are auditory. They can result in either temporary or permanent hearing loss because they mainly harm the cochlea and auditory nerve (Basner et al., 2014). Noise-induced hearing loss (NIHL) is brought on by prolonged exposure to sound levels more than 85 dB. In Southeast Asian cities like, Bangkok and Manila traffic, construction, and industrial zones are the main causes of urban noise. As a result, residents and staff have reported NIHL cases (Nguyen et al., 2020; Lwin et al., 2020). In Pakistan, towns like Lahore and Rawalpindi, peak daytime noise levels surpass 100 dB (A), greatly increasing the risk of irreversible hearing damage, particularly among populations exposed to traffic and industrial workers. (Kalim et al., 2014; Muzaffar et al., 2025).

The feeling of buzzing in the ears is a common indicator of prolonged exposure to loud noises. People who live in high-traffic areas and work in industrial areas often suffer from tinnitus, which negatively affects their quality of life, mental health and ability to concentrate. (Basner et al., 2014; Nguyen et al., 2020). Even a brief exposure to high decibel levels might result in temporary hearing loss. Due to the cumulative effects of repeated exposure, urban populations are particularly vulnerable.Furthermore, exposure to noise can have non-auditory health effects that are sometimes less evident but can be just as debilitating. Functional and emotional issues are caused by sleep disturbances brought on by urban noise, especially intermittent or overnight traffic and industrial noises. Poor sleep quality is a common complaint in Ho Chi Minh City, Manila and Karachi that negatively impacts learning, work productivity and overall health (Lim et al., 2021; Muzaffar et al., 2025). Stress-induced sympathetic nervous system activation and increased cortisol levels are part of the physiological mechanism (Basner et al., 2014). Research indicates that the primary causes of elevated blood pressure in Southeast Asian cities are airport noise and traffic. (Nguyen and others, 2020). According to Kalim et al. (2014), prolonged exposure to noise levels above 90–100 dB (A) is linked to higher incidence of hypertension and cardiovascular morbidity in

Children are the most vulnerable to learning and cognitive impairments. Studies have shown that long term exposure to noise in schools near high traffic or industrial areas reduces the attention span of children, affects their memory and overall reduces the learning effectiveness. Cases of Bangkok, Ho Chi Minh City, and Lahore indicate that there are measurable negative effects on test scores and classroom engagement because of the dangers of ambient noise on development (Nguyen et al., 2020; Muzaffar et al., 2025). Stress and Anxiety: Noise is one of the known psychosocial stress factors. Prolonged exposure may lead to increased levels of cortisol, irritation, anxiety, and worsening of the quality of life. The residents of the Southeast Asian cities usually complain that they are annoyed, distracted, and mentally exhausted because of traffic, construction, and loud social events (Basner et al., 2014). The same tendencies can be observed in the case of Pakistan, where the problem is often intensified by the presence of dense urban structures and the lack of compliance with the noise regulations (Kalim et al., 2014).

The groups that are more prone to the adverse impacts of noise pollution are the following: High-level noise exposure during the day and at night adversely influences cognitive development and school performance particularly in schools situated along a road or industrial zone. Prolonged noise exposure increases the susceptibility of elderly people to cardiovascular disease, sleeps and stress-related disorders. In the case of factory, traffic and industrial area workers, the risk of developing auditory and non-auditory health problems increases when subjected to levels of 85-105 dB

(A) of noise intensity over an extended duration (Chong et al., 2019; Kalim et al., 2014).

Southeast Asia: The exposure to noise is minimized (although it is usually high) with the assistance of traffic control, the planning of urban areas, and partial regulatory enforcement. Even cities such as Kuala Lumpur or Ho Chi Minh City are almost never over 90 dB(A) on a day-to-day basis, but temporary peaks are experienced during festivals or rush hours (Lim et al., 2021). In Pakistan, Peak levels are often over 100 dB (A) and noise laws are not strictly followed in high traffic places. The sources of non-auditory health risks and those of auditory health risks are worsened by constant exposure and urban planning (Muzaffar et al., 2025; Kalim et al., 2014). Health Effects to the populace. This is where policy intervention is urgently required due to the widespread ignorance of the WHO noise regulations in Pakistan and Southeast Asia. Some of the mitigation measures include:

**Table 02: Effect of Urban Noise on Health in Southeast Asia**

| Region / City | Auditory Effects | Non-Auditory Effects | Vulnerable Populations | Reference |
|---|---|---|---|---|
| Bangkok, Thailand | Noise-induced hearing loss (NIHL), tinnitus | Sleep disturbances, stress, cardiovascular strain | Children, elderly, traffic-exposed workers | Lwin et al., 2020; Basner et al., 2014 |
| Jakarta, Indonesia | Tinnitus, mild hearing impairment | Cognitive impairment, hypertension, annoyance | School children, industrial workers | Nguyen et al., 2020; Basner et al., 2014 |
| Manila, Philippines | NIHL | Sleep disruption, anxiety, reduced work productivity | Children, elderly | Lim et al., 2021; Basner et al., 2014 |
| Kuala Lumpur, Malaysia | Temporary threshold shifts, mild hearing loss | Stress, sleep disturbance, hypertension | Residents near traffic corridors | Chong et al., 2019; WHO, 2018 |
| Ho Chi Minh City, Vietnam | Tinnitus | Sleep disturbances, stress, cognitive issues | Children, office workers | Nguyen et al., 2020; Basner et al., 2014 |
| Karachi, Pakistan | NIHL, tinnitus | Sleep disruption, hypertension, stress, reduced concentration | Children, elderly, traffic/industrial workers | Muzaffar et al., 2025; Kalim et al., 2014 |
| Lahore, Pakistan | Hearing impairment, tinnitus | Cardiovascular effects, sleep disturbances, stress, cognitive impairments | School children, industrial workers | Muzaffar et al., 2025; Kalim et al., 2014 |
| Rawalpindi, Pakistan | Mild to moderate hearing loss | Stress, anxiety, hypertension, sleep disruption | Residents near busy roads, children, elderly | Kalim et al. |

Making schools and hospitals in noisy places soundproof. Industrial noise regulations are respected upheld. Public awareness Campaigns on the health risks associated with noise exposure Therefore, in addition to being an environmental problem, persistent urban noise has an impact on people's mental, emotional, and physical health. In summary, research indicates that there is significant health risks associated with urban noise pollution in Pakistan and Southeast Asia. To sum up research indicates that there is significant health risks

associated with urban noise pollution in Pakistan and Southeast Asia. Auditory and non-auditory effects lead to reduced quality of life and increased public health burden. Both auditory and non-auditory effects result in a reduced quality of life and an increased burden on public health. Vulnerable groups, particularly children, the elderly and employees exposed at work, require targeted interventions. Especially children, the elderly, and employees who are exposed at work, require targeted interventions. Mitigation strategies should include traffic management, industrial noise control, urban planning, and public awareness in order to reduce the detrimental health effects of long-term noise exposure (Basner et al., 2014; Kalim, Aslam and Masood, 2014; Lim, Tan and Ho, 2021).

Long-term exposure to urban noise results in tinnitus, NIHL, and temporary threshold changes in every city. Peak levels above 85 dB (A) significantly raise the risk of hearing damage (Basner et al., 2014). Heart problems, sleep difficulties, cognitive decline, and psychological stress are highly prevalent in every location. Children's cognitive development is especially harmed by noisy classroom settings (Nguyen et al., 2020; Muzaffar et al., 2025). Children, the elderly, and workers who have been exposed at work are the most vulnerable groups because they may experience developmental delays and long-term health effects (Table 02).

**Regional Insights:**

Although peak noise levels in Southeast Asian cities have significantly decreased as a result of better traffic management, they are still greater than WHO limits, which have a detrimental effect on public health. Higher peak levels (up to 105 dB (A)), longer durations, and insufficient law enforcement all raise health hazards in Pakistani cities (Kalim et al., 2014).

**Table 03. Evaluation of Noise in Southeast Asia**

| Region / City | Method | Measurement Device / Tool | Findings | Reference |
|---|---|---|---|---|
| Bangkok, Thailand | Field + survey | Class 1 SLM, ISO 1996 | 72–85 dB(A); traffic main source | Lwin et al., 2020; Basner et al., 2014 |
| Jakarta, Indonesia | GIS + field | GIS mapping, SLM | 80–90 dB(A); residential areas > WHO limits | Nguyen et al., 2020 |
| Kuala Lumpur, Malaysia | Field measurement | Handheld SLM | 70–82 dB(A); industrial zones high | Chong et al., 2019 |
| Ho Chi Minh City, Vietnam | Field + survey | SLM, ISO annoyance scale | 68–84 dB(A); sleep disruption common | Nguyen et al., 2020 |
| Lahore, Pakistan | Field + GIS | SLM, GIS mapping | 78–100 dB(A); traffic & commercial areas exceed WHO limits | Muzaffar et al., 2025 |
| Karachi, Pakistan | Spot measurement | Handheld SLM | 72–95 dB(A); high exposure near highways | Kalim et al., 2014 |
| Rawalpindi, Pakistan | Field measurement | SLM | 70–105 dB(A); commercial streets exceed safe limits | Kalim et al., 2014 |

**Methods for quantifying and assessing Noise:**

Standardized tools and methods are widely used in Southeast Asia. Survey-based methods, modelling-based evaluations, and direct field measurements are the three main categories of noise measuring methodologies. A-weighted decibels dB (A), which indicate human hearing sensitivity, are recorded using sound level meters (SLMs) or dosimeters (Kalim et al., 2014; Muzaffar et al., 2025). On-site measurements can be conducted continuously (24-hour monitoring) or at peak hours (Lwin et al., 2020). For instance, they found that the commercial

and traffic-heavy sections of Lahore had average daytime noise levels between 78 and 100 dB (A).

**Indicators of Noise Assessment**

The average noise level over a specified period of time is. Known as Equivalent Continuous Sound Level, or LAeq (Basner et al., 2014). Lmax Lmin is the maximum and minimum sound levels (Lwin et al., 2020). Lden (day-evening-night level): it is a weighted level, which considers the sensitivity during the evening and night (WHO, 2018). (Day Evening Night Level): The weight is adjusted to the evening and night sensitivity (WHO, 2018). Noise Dose (ND): Percentage of permissible time, ND is a common term of occupational monitoring (Kalim et al., 2014).

**Table 04: Methods for Southeast Asia and Pakistan to Reduce Noise**

| Strategy Type | Example | Implementation in Southeast Asia | Implementation in Pakistan | References |
|---|---|---|---|---|
| Traffic Noise Control | Low-noise road surfaces, vehicle silencers | Kuala Lumpur, Bangkok – enforced in main roads and highways | Limited; mostly highway projects in Lahore | Lim et al., 2021; Lwin et al., 2020 |
| Industrial Noise Control | Acoustic barriers, machinery soundproofing | Ho Chi Minh City – industrial zones with barriers | Minimal; mostly voluntary in Lahore/Rawalpindi | Nguyen et al., 2020; Kalim et al., 2014 |
| Urban Planning | Zoning, quiet zones near hospitals/schools | Jakarta – zoning separates residential & industrial | Limited; urban sprawl complicates zoning | Muzaffar et al., 2025; WHO, 2018 |
| Behavioral Measures | Public awareness, anti-honking campaigns | Bangkok & Kuala Lumpur – awareness campaigns in urban centers | Few campaigns; awareness low | Basner et al., 2014; Kalim et al., 2014 |
| Regulatory Enforcement | Noise standards & monitoring | Singapore – strict noise regulations with active monitoring | Pakistan – NEQS exist, enforcement limited | WHO, 2018; Muzaffar et al., 2025 |

**Noise Evaluation and Measurement**

To determine potential health hazards, urban noise assessment considers the intensity of sound in the environment, and the distribution of sound across urban areas (Basner et al., 2014; WHO, 2018). Less noisy surfaces can be installed on roads to reduce noise. Speed limits and the control of the flow of traffic reduce peak noise exposure in residential areas (Lim et al., 2021; Chong et al., 2019). The levels of noise at the factory can be lowered by using aacoustic barriers and soundproofing equipment. Operate in closed equipment and conduct periodic maintenance to avoid the unexpected surging noise (Nguyen et al., 2020).

Indoor exposures to noises are lessened by insulated walls, double-glazed windows, and noise barriers in highways. According to Basner et al. (2014), sound barriers along highways reduce the exposure of noise indoors. Cities and trees provide a natural source of noise absorbency (WHO, 2018). Zoning laws: Residential areas should not be located near streets and industrial zones because in this way people are exposed to less noise of high intensity (Muzaffar et al., 2025). It is important to create peaceful areas around schools, hospitals and elderly care centers.

Ring roads, bypasses, and one-way systems may be implemented to decrease localized noise and

traffic congestion (Lwin et al., 2020). The level of car traffic and overall noise is reduced through the use of public transportation and non-motor transport. Exposure can be mitigated by educating the population about the dangers of noise and enhancing noise-reducing behaviours like reducing recreational noise, avoiding honking, etc. (Kalim et al., 2014). Noise cancelling headphones or Earplugs would also assist in protecting the ears in noisy surroundings.

**Rules and Guidelines**

It is imperative to enforce noise limits at night and during the day in accordance with the national or the WHO rules (WHO, 2018). As an example, the Commercial, industrial, and residential locations are required to have acceptable levels of noise in the National Environmental Quality Standards (NEQS) in Pakistan.

The compliance is ensured by regular reporting and development of urban noise monitoring networks. Violations are punished and this encourages businesses, transit agencies, and individuals to comply with the rules

According to the studies on the noise pollution in Pakistan and Southeast Asia, transportation, urbanization, industry and the impact on the health of people are closely related. Both auditory and non-auditory health effects were observed in each city being studied, as it is consistent with the international research on exposure to urban noise (Basner et al., 2014).

**Impacts on Health**

The daily noise in Southeast Asian cities, including Bangkok, Jakarta, Kuala Lumpur, and Ho Chi Minh City, was mainly the commercial activity, industrial zones, and vehicle traffic and was between 68 and 90 dB(A), on average, during the day (Lwin et al., 2020; Nguyen et al., 2020). The Pakistani cities such as Lahore, Karachi and Rawalpindi registered higher levels of 78-105 dB (A). These indices reflect high population density, heavy traffic and poor enforcement of the environmental laws (Muzaffar et al., 2025; Kalim et al., 2014). Such measurements usually surpass the WHO-suggested thresholds, and both short-term and long-term health outcomes may occur (WHO, 2018).

All cities cited all auditory effects, including tinnitus, noise-induced hearing loss (NIHL), and temporary threshold shifts, especially in the populations affected by long-term exposure to high-intensity noise (Basner et al., 2014). Other non-auditory effects were stress, irritation, heart problems, sleeping disturbance, and cognitive impairment (Muzaffar et al., 2025; Nguyen et al., 2020). The vulnerable groups that were noted to be more susceptible such as children, the elderly, and workers who had occupational exposure necessitated the need of targeted interventions. (Kalim et al., 2014).

**Mitigation Strategies Effectiveness**

Southeast Asian cities can reduce exposure by implementing urban planning, public education, traffic management and a well-structured regulatory system, among other things (Lim et al., 2021; Lwin et al., 2020). As Muzaffar et al. (2025) and Kalim et al. (2014) claim, the number of mitigation methods in Pakistan is still limited, society does not pay much attention to noise issues, and such legislation as NEQS is not actively practiced. The level of awareness of the population about the problem of noise is low. Examples of multi-layered strategies that are more prolific in reducing exposure and related health issues are technology solutions and regulatory enforcement (Basner et al., 2014; OMS, 2018). 2014; WHO, 2018).

**Policy Implications**

Noise assessments should be considered in urban planning, and these include the use of buffer zones, green belts, and quiet areas around the hospitals and schools (Muzaffar et al., 2025). To enforce noise limits and encourage behavioral changes, it is required to implement public participation and continuous monitoring networks (Chong et al., 2019). There is no information regarding the relationship between noise exposure and long-term health effects in Pakistani cities, although the Southeast Asian region has a small yet increasing number of longitudinal data (Nguyen et al., 2020). Future researches should consider the joint impacts of noise and air pollution, which in most cases are

comorbid in cities and pose serious threats to the health of people.

**Combining Health, Evaluation, and Mitigation**

Public health initiatives have a good basis in the noise assessment methods (field measurement, GIS modeling, and surveys) (Basner et al., 2014; OMS, 2018). Connecting the noises recorded with the health outcomes, policymakers are able to prioritize high-risk locations and groups, undertake technological, planning, and behavioral interventions, and measure the measure performance. On top of enhancing the quality of life and minimizing negative consequences on mental and cardiovascular health, effective control of noise can support sustainable urban development. Harmful effects on mental and cardiovascular health, effective control of noise can support sustainable urban development.

**Conclusion**

Among the major findings in Southeast Asia are the conclusion that the measured noise levels in the urban areas are continually high and above WHO standards, and Pakistani cities 78-105 dB (A) tend to be much higher than the South East Asian average 68-90 dB ()). The effects of long-term exposure to environmental noise are both auditory (noise-induced hearing loss, tinnitus) and non-auditory like sleep disturbances, cardiovascular issues, cognitive impairment, stress, and annoyance (Basner et al., 2014; WHO, 2018). Children, the elderly, and those working in places where they receive exposure are also vulnerable, and are disproportionately affected (Muzaffar et al., 2025). Extensive noise measurements based on surveys, GIS modelling, and field measurements offer precise information to determine the high-risk areas and populations (Nguyen et al., 2020; Basner et al., 2014). The mitigation plans in Southeast Asian cities are mostly better than those in Pakistan, which are outdated, lack enforcement, and general recognition among the populations (Lim et al., 2021; Muzaffar et al., 2025). To mitigate exposure and protect people health, combination of technology, urban planning, behavioral and regulatory interventions is needed in the form of multi-layered approaches.

The paper suggests the following measures to the legislators, public health professionals and the urban planners. Impose the noise levels that are appropriate to residential, commercial and industrial zones. These include creating zoning regulations to avoid residential zones and the crowded, noisy industrial zones. Settling of quiet areas, acoustics and vegetable strips around hospitals, schools and other elderly care facilities (Muzaffar et al., 2025). Encourage industrial soundproofing and sound barriers in order to mitigate emissions (Lim et al., 2021; Nguyen et al., 2020). In the process of enlightening the populace on the dangers of noise, encourage behavioral modifications like honking less and wearing earplugs in places of high noise (Kalim et al., 2014). Carry out long-term research on the impact of noise on health especially in Pakistan. Compare the effect of noise and air pollution, which frequently happen in urban areas.

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