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Occupational Stress, Health Status, and Quality of Life among Traffic Police Officers in Navi Mumbai: A Cross-Sectional Study

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Abstract: This composite indicator is a measure which outlines quality life and health status of Navi Mumbai traffic police. Traffic workers face a complex working environment of air pollution, persistent noise, heat, ergonomic, and operational stress, with which is related to poor health outcomes. The cross-sectional study will be based on convergent evidence offered by Indians regarding their triangulation of subjective and objective findings of 400 personnel, which will have been estimated. Main measures are spirometry, audiometry, musculoskeletal, mental health screen, and WHOQOL-BREF quality of life tool which is related to onsite exposure monitoring (PM, noise, heat). The estimated health outcome indicates that the pulmonary dysfunction will be high, hearing loss due to noises, musculoskeletal conditions would occur and the quality of life would be compromised. Exposure outcome associations shall be uncovered using analytics to inform a matrix of the locally viable interventions that are based on evidence. The anti-honking imposition, heat control, the duty rotation, the organized personal protection equipment initiative, and the regular health examination are some of the recommendations that could be adopted. The proposed systematic review (assessment plan) aims to assist in the formulation of the policies and occupational risks mitigation, as well as health outcomes of the force based on one-divisional health dashboard.

Keywords: Traffic police / Traffic personnel, Occupational health risks, Noise and air pollution exposure, Musculoskeletal disorders (MSDs), Health-related quality of life (HRQOL).

INTRODUCTION

Police at a busy intersection are subjected over a shift to an unfamiliar collection of risks: tailpipe and resuspension of fine and coarse particles; noisy distrust, impulse-dominant noise; radiated heat; awkward postures and long working hours branded with discomfort; and enforcement stress associated with the erratic driving behaviour of motorists and their pressure to comply. Such conditions (respiratory impairment, noise-induced hearing loss (NIHL) and non-auditory sequelae, musculoskeletal disorders (MSDs), hypertension and metabolic risks, sleep disruption, and decreases in health-related quality of life (HRQOL)) are predicted by international occupational structures. This image is reflected in Indian data on various cities and across cohorts. Comparative testing has revealed a lesser pulmonary function in traffic personnel in Chennai (spirometry deviations which are in accordance with chronic exposure) (Sasikumar et al., 2020). Repeated noise assessments and profile symptoms in Chandigarh indicate the occurrence of non-auditory and auditory burdens to policemen working in busy crossings (Ravindra et al., 2025). Confronted with environmental and physical domains, which have especially detrimental effects, HRQOL is now measured with a domain-specific scale, and WHOQOL-BREF in Kolkata reveals the reality of frontline exposure (Alagesan and Bisoi, 2021). The

psychosocial load of which MSD and cardiometabolic risk would increase is evidenced by operational stressors reported in Bengaluru (Mohiddina et al., 2022)

2) Objectives

Primary objective: The subjective data will be triangulated with the objective data in order to describe the health status (respiratory, auditory, musculoskeletal, cardiometabolic, and mental health) and quality of life (WHOQOL-BREF) of traffic police working in various areas of Navi Mumbai.

Secondary objective: To examine the correlations between the measured exposures (PM, noise, heat), duty factors (length of shift, years of service) and outcomes, and to suggest action priorities (engineering, administrative, PPE, clinical screening) which are locally compatible.

3) Conceptual Approach

In India, it has been shown that: (a) the pulmonary dysfunction in traffic police is due to air pollution (Sasikumar et al., 2020; Kondamudi et al., 2025; Kar et al., 2024), (b) traffic noise leads to NIHL + non-auditory stress (Ravindra et al., 2025; Basu et al., 2022; Das et al., 2023), (c) the causes of MSDs are the erg Homogenised definitions and cross-domain capture of traffic police groups can be done with scoping-review advice in South Asia (Jahan et al.,

2023). This is boosted by the Panvel experience (Relwani et al., 2023) and by the interventions of the type of implementation, which boost self-seeking

behaviour (Joseph et al., 2024).

4) What to Measure in Navi Mumbai (and Why)

Table 1. Domains, instruments, and why they matter (with Indian evidence)

| Domain | Primary instrument/measure | Why it matters (evidence) |
|------------------------|---|--|
| Quality of life | WHOQOL-BREF (4 domains) | Traffic police report lower environmental/physical HRQOL in Kolkata cohorts—relevant to urban noise/pollution context (Alagesan & Bisoi, 2021). |
| Respiratory health | Spirometry (FEV ₁ , FVC, FEV ₁ /FVC; ATS/ERS quality); symptom prompts | Chennai and Puducherry cohorts show PFT deviations attributable to chronic traffic exposure; symptoms triangulate subclinical loss (Sasikumar et al., 2020; Kondamudi et al., 2025). |
| Hearing and noise | Pure-tone audiometry (0.5–8 kHz); tinnitus/speech-in-noise screening; post-level LAeq/Lmax dosimetry | Indian policemen exposed to daily high LAeq show NIHL risk and non-auditory effects; awareness at intersections remains variable (Ravindra et al., 2025; Basu et al., 2022; Das et al., 2023). |
| MSDs | Nordic Musculoskeletal Questionnaire (12-month, 7-day) | Occupational stress and static standing predict neck/low-back/knee complaints; ergonomic mitigation needed (Dey et al., 2023). |
| Mental health & sleep | PHQ-9, GAD-7, brief sleep/insomnia screens | Operational stress documented in Bengaluru may track with symptoms and QOL (Mohiddina et al., 2022). |
| Vitals & metabolic | BP (triplicate average), BMI, WC; random glucose | Non-auditory noise and stress can elevate BP; central adiposity compounds risk (Ravindra et al., 2025; Mohiddina et al., 2022). |
| Exposures | Portable PM _{2.5} /PM ₁₀ (rotating sub-sample) + station data; noise dosimetry; spot heat index | Measured PM and noise align with morbidity in Indian cohorts; heat and shift duration modify risk (Kar et al., 2024; Das et al., 2023; Ravindra et al., 2025). |
| Occupational practices | PPE availability/adherence audit (N95, earplugs); duty hours; years of service; break structure | Behavior change and training have improved health-seeking and could lift PPE use (Joseph et al., 2024). |

(Source: Self-developed)

ANTICIPATED HEALTH PROFILE FOR NAVI MUMBAI (SYNTHESIS)

5.1 Respiratory health

Cross-sectional studies of the Indian residents also indicate that the spirometry indices of traffic workers are lower than those of the controls and this could be attributed to long-term exposures to PM and other in-air co-pollutants (Sasikumar et al., 2020). Puducherry data are the clinical characteristics and alterations in PFT that are useable conformably to sustained exposure to irritants (Kondamudi et al., 2025). The air pollution of Kolkata, which is situated in the city, displays a mechanistic appearance of plausibility and the usefulness of correlation of measured tendencies in the pollutants with the symptoms in the traffic Police (Kar et al., 2024).

Access strategy: station/time-matched PM and usual spirometry and symptom prompts; model prevalence ratios on the exposure quartile, with age, smoking, and BMI controlled.

5.2 Hearing and noise

Some of the effects of threshold shifts and tinnitus (audiological) and stress and sleep disturbance (non-audiological) are daily high exposures to LAeq (Ravindra et al., 2025). Occupational NIHL is a huge burden among Indians, as has been indicated in a meta-analysis (Basu et al., 2022). Multicity observations with preequilibrium awareness of the noise risk have high and unmitigated LAeq/Lmax intersections (Das et al., 2023). It is inevitable that the likely NIHL

(3-6 kHz notch) and tinnitus-inducing chronic noises in the horn-filled streets and reflective street canyons of the City of Mumbai will become even higher in the posts that happen to become long and continuous.

Access strategy: dosimetry (LAeq/Lmax) after a shift of representative length; audiometry/tympanometry after every year; record of PPE (earplugs/earmuffs) availability and use.

5.3 Musculoskeletal and psychosocial health

Standing, directing traffic with raised arms, and long-term activities under heat and strain are some of the causes of MSDs in the neck, lower back, and knees (Dey et al., 2023). Bengaluru police have well-selected operational stressors that include crowd control, erratic driver behaviour, and weather (Mohiddina et al., 2022). These stressors can exacerbate MSD and mental-health symptoms and negatively affect sleep as well as indirectly negatively affect cardiometabolic risks.

Access strategy: Nordic questionnaire and area-specific mapping; PHQ-9/GAD-7 and brief sleep screen; and related to shift length, heat index and micro-break deficiency.

5.4 Quality of life

It has the implication that environmental and physical neighbourhoods are most impacted among traffic officers (Alagesan & Bisoi, 2021). The lacking of environmental domains in Navi Mumbai would remain probable when the noise, pollution, and heat arise in conjunction; the fatigue and MSB burden would be likely to be supplemented with the physical domain scores.

Access strategy: WHOQOL-BREF scores domain by junction category and PPE adherence; test dose-response by PM/noise quartiles.

6) Analytic Plan for Navi Mumbai

Stratified cluster sampling of crossbreeds can be carried out in a 4-5-month time frame wherein a cross-sectional survey of the city can be conducted. Target n is close to 400 thus being sufficiently accurate on necessary prevalence estimates. Analyses will include (1) prevalence with 95% CIs (2) exposure-outcome relationships with Poisson models and robust variance (log-binomial when stable) that give prevalence ratios (3) linear relationships of NIHL domains of the WHOQOL-BREF (4) sensitivity tests without recent respiratory infections and NIHL to audiometric-notch-confirmed cases. The plan adheres to methodological trends that are applicable to Indian traffic-police research (Sasikumar et al., 2020; Jahan et al., 2023; Ravindra et al., 2025; Basu et al., 2022).

7) Risk-Outcome Map and Suggested Indicators

Table 2. Navi Mumbai risk-outcome linkage with example indicators

| Hazard/exposure | Expected outcome(s) | Example indicators to track | Core sources |
|--|--|--|--|
| PM _{2.5} /PM ₁₀ (traffic plumes) | Abnormal PFT; cough/wheeze; dyspnoea | Duty-period PM averages; FEV ₁ /FVC; symptoms | Sasikumar et al., 2020; Kondamudi et al., 2025; Kar et al., 2024 |
| Chronic high LAeq/Lmax | NIHL (3–6 kHz notch), tinnitus; stress, sleep disturbance; ↑BP | LAeq/Lmax by shift; audiometry; tinnitus screen; BP | Ravindra et al., 2025; Basu et al., 2022; Das et al., 2023 |
| Heat + long static standing | MSDs; fatigue; reduced QOL | Nordic MSD regions; WHOQOL-BREF physical domain | Dey et al., 2023; Alagesan & Bisoi, 2021 |
| Operational stressors | Anxiety/depression; poor sleep; ↓QOL | PHQ-9/GAD-7; sleep score; WHOQOL-BREF psych/social | Mohiddina et al., 2022; Alagesan & Bisoi, 2021 |
| Poor PPE access/adherence | Higher symptom burden; lower QOL | N95/earplug availability & use; workshop exposure | Joseph et al., 2024 |

(Source: Self-developed)

8) Practical Access (Measurement) Plan for Navi Mumbai

Sampling and sites; add giant circles, including Vashi, Nerul, CBD-Belapur, Kharghar, Airoli, Panvel, and sort the intersections in terms of traffic volume and structure (open or canyon like). Optimize position portable monitors that allow rotation of tests of PM and noise by stratum of duty, at fixed-station AQ in circumstances in which no data

is provided (Kar et al., 2024; Das et al., 2023).

Field flow, symptoms, QOL, mental health, MSD, shift/tenure/PPE (1) Consents and questionnaires. (2) Vitals and anthropometry. (3) Spirometry (ATS/ERS quality control). Audiometry/tympanometry (a) with an empty room (or a van on wheels). (5) Site-per-subset exposure Logging. (6) Post-survey debriefing, risk education and referral of the abnormal tests – that also cultivate the sense of health-seeking efficacy, as noted in the Bhubaneswar workshops (Joseph et al., 2024).

Data and analysis, develop dashboards to indicate division-level prevalence, exposure distributions, and WHOQOL-BREF domain scores; simulate dose-response at interest levels of 4 exposure quartiles and 10 tenure bands; and carry out high-risk posts to specific interventions.

9) Policy and Program Actions for Navi Mumbai

Table 3. Action matrix (what to do, who leads, and why)

| Action | Lead & partners | Rationale and evidence |
|--|--|---|
| Anti-honking enforcement & signal timing at hotspots; enforce “no-horn” hours near sensitive posts | Traffic Dept + RTO + civic body | Reduces LAeq peaks that drive NIHL/non-auditory stress (Ravindra et al., 2025; Basu et al., 2022; Das et al., 2023). |
| Shaded posts / heat mitigation (canopies, misting fans), micro-breaks, hydration | Traffic Dept + Municipal Corp | Mitigates heat and static-standing fatigue contributing to MSDs and QOL decline (Dey et al., 2023; Alagesan & Bisoi, 2021). |
| Duty rotation across high/low exposure junctions; predictable breaks | Traffic Dept | Lowers cumulative dose for PM/noise; addresses operational stress (Relwani et al., 2023; Mohiddina et al., 2022). |
| PPE program: Fit-tested N95 and earplugs/earmuffs, on-post storage and replacement | Traffic Dept + Occupational Health | Directly addresses inhalation and noise dose; improves self-efficacy when paired with training (Joseph et al., 2024). |
| Annual screening: spirometry, audiometry, BP, BMI/WC, glucose; referral pathways | Occupational Health + tie-ups with hospitals | Aligns to observed morbidity in Indian cohorts; enables early intervention (Sasikumar et al., 2020; Ravindra et al., 2025; Kondamudi et al., 2025). |
| Behavioral workshops (stress, sleep, PPE use, help-seeking) | Occupational Health + Psychology | Demonstrated gains in health-seeking among police (Joseph et al., 2024); likely to lift QOL domains. |

(Source: Self-developed)

10) Limitations and Strengths of This Assessment

It is a synthesis and access plan rather than a real epidemiologic survey of Navi Mumbai; one will require field data to find actual local prevalence. Cross-sectional designs may mistake associations (healthy-worker effect, seasonality) and falsely infer their omnipresence. Measurement error is also an issue of portable exposure sampling, which can be reduced by employing time-matching to posts on stations and rotating devices (Kar et al., 2024). The self-report measures (MSD, mental health, sleep) are vulnerable to recall bias and social desirability bias; the bias is reduced by using validated scales and comparing the scale with objective measures (Dey et al., 2023; Mohiddina et al., 2022). Despite such constraints, the plan is also informed by local Panel evidence (Relwani et al., 2023).

11) Expected Findings and How to Use Them

Following respiratory patterns in Chandigarh noise outcomes, QOL in Kolkata, and operational-stress traces in Bengaluru, it can be anticipated that Navi Mumbai can anticipate:

- high rates of PFT abnormalities at high-exposure posts (Sasikumar et al., 2020; Kondamudi et al., 2025),
- quantity of NIHL and tinnitus risk associated with LAeq-linked dose-response (Ravindra et al., 2025; Basu et al., 2022),
- were found to have high MSD impact in neck/lumbar/knee regions (Dey et al., 2023),
- domain-specific QOL decreases (Alagesan & Bisoi, 2021), and
- The modifiable determinants include PPE compliance, shift rotation, coloured posts, and behavioural trainings that can enhance the results (Joseph et al., 2024; Relwani et al., 2023).
- Dashboards at the division level need to know to make specific engineering fixes to the worst posts, schedule/rotation policies, and procurement (N95s, ear protection). A longitudinal registry can be fed with annual screening data to measure programme

effectiveness at a certain point in time.

CONCLUSION

A multi-system health burden induced by chronic exposure to traffic-related air pollution, heavy urban noise, heat, ergonomic strain, and operational stress is plausible in traffic police (Navi Mumbai). A systematic access plan, WHOQOL-BREF, validated symptom and mental-health instruments, spirometry, audiometry, rotating exposure measures, and feasible analytics should be able to provide a concise view of the health status and intrinsic quality of living by division and junction category. Jihad is justified and has practical levers: both anti-honking and signal-timing at high-traffic locations, mitigating the heat and rest breaks; proven-by-fit PPE with on-post logistics; and annual screening and referral to and behaviour-change workshops to improve health-seeking are detailed by the Indian literature. A combination of these steps will help reduce risk, enhance QOL, and institutionalize the health of occupational workers in Navi Mumbai who continue their work to keep the city moving.

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