
GUARDIANS OF THE ROAD, VICTIMS OF THE AIR: A STUDY ON HEALTH IMPACTS OF TRAFFIC POLLUTION ON UNDIVIDED DAKSHINA KANNADA DISTRICT TRAFFIC POLICE

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ABSTRACT

Air pollution is one of the most severe environmental health risks of the 21st century. With increasing urbanization, vehicular movement, and industrial development, the quality of air, particularly in urban centres, has deteriorated drastically. Among the many professionals affected by outdoor air pollution, traffic police personnel stand out as a highly vulnerable group due to their prolonged and unavoidable exposure to vehicular emissions.

This study focuses on understanding how traffic-related air pollution is affecting the health of traffic police officers in the undivided Dakshina Kannada district, comprising Dakshina Kannada and Udupi. These officers, who serve as the backbone of urban traffic management, are exposed daily to pollutants such as PM_{2.5}, PM₁₀, Nitrogen Dioxide (NO₂), and Sulphur Dioxide (SO₂). These pollutants are primarily emitted by vehicles, especially in densely trafficked zones.

The significance of this study lies in its focus on a specific occupational group that often receives less attention in health-based environmental research. By analysing the health impacts of pollution on traffic personnel, this research aims to generate awareness and advocate for policy changes that can protect their wellbeing.

KEYWORDS: Air Pollution; Human Health; Occupational Health Risk; Questionnaire-Based Survey.

INTRODUCTION

Environmental pollution, especially air pollution, has reached alarming levels globally. Cities are witnessing an exponential increase in pollution levels, mainly due to the growing number of

vehicles, urban infrastructure projects, and limited green cover. India, being one of the fastest-growing economies, faces serious challenges in balancing development with environmental preservation.

Among the various forms of air pollution, vehicular emissions have emerged as a significant contributor to urban air quality degradation. The emission of pollutants such as carbon monoxide, nitrogen oxides, volatile organic compounds, and particulate matter (PM_{2.5} and PM₁₀) has a direct impact on human health. These particles, due to their microscopic size, enter deep into the respiratory system, causing long-term damage.

Scientific studies have shown that prolonged exposure to these pollutants is linked to a wider range of health issues - ranging from eye irritation and respiratory infections to chronic lung diseases, cardiovascular disorders, and even neurological impacts. According to WHO projections, if current trends in pollution continue unchecked, ambient air pollution could contribute to 6 - 9 million premature deaths annually by 2060.

Air Pollutants and Their Health Effects:

The major air pollutants considered in this study include:

- **Particulate Matter (PM_{2.5} and PM₁₀)**

PM_{2.5} refers to particles with a diameter of less than 2.5 micrometres. These are highly dangerous as they can penetrate deep into the lungs and even enter the bloodstream. PM₁₀ includes larger particles but is still harmful, particularly for the respiratory tract. Major sources include vehicle emissions, road dust, and construction activities.

- **Nitrogen Dioxide (NO₂):**

This pollutant is released during the combustion of fossil fuels and is commonly found in high-traffic zones. It can cause inflammation of the airways, reduced lung function, and increased risk of respiratory infections.

- **Sulphur Dioxide (SO₂):**

Emitted mainly by diesel vehicles and industrial processes, SO₂ causes irritation of the eyes, throat, and lungs. It can also trigger asthma and aggravate existing heart diseases. Additionally, SO₂ triggers acid rain.

The cumulative effect of these pollutants is more severe in individuals with long-term exposure—such as traffic police officers who are on duty 6 to 8 hours a day in such environments.

Health Risks to Traffic Police Personnel

Traffic police officers form a critical part of urban functioning. Their responsibilities require them

to stand for long hours on roads and junctions, often during peak traffic hours, making them directly and consistently exposed to polluted air. Despite the evident risks, their health and safety are often neglected. In India, many traffic police officers work without adequate protective gear such as masks or goggles. Prolonged inhalation of vehicular fumes and dust leads to increased vulnerability to respiratory and cardiac issues.

In the coastal districts of Dakshina Kannada and Udupi, the situation is no different. With the rapid expansion of cities like Mangaluru and Udupi town, traffic congestion has intensified. This results in heightened air pollution at major intersections, where traffic police personnel are stationed daily. Local climatic conditions, such as high humidity and temperature, further aggravate the effects of pollution on the human body.

Review of literature

- **Pope et al. (1995)**, in their large-scale study on U.S. adults, concluded that long-term exposure to particulate matter significantly increases the risk of mortality due to respiratory and cardiovascular complications. Their research established that individuals with continuous outdoor exposure, such as traffic police, are at a heightened health risk, reinforcing the urgency for policy intervention and regular health monitoring.
- **The World Health Organization (WHO)**, through its Global Urban Ambient Air Pollution Database (2016), provides global benchmarks for air quality, highlighting how urban traffic is a critical contributor to harmful air pollutant levels. WHO's findings emphasize that traffic police, who often operate at urban intersections, are among the most vulnerable occupational groups due to prolonged outdoor duty.
- **The OECD (2016)** reported the economic consequences of outdoor air pollution, illustrating that pollution not only causes health deterioration but also reduces work efficiency and overall productivity. Their report underlines the importance of local research, like the current study, to drive targeted solutions for high-risk worker groups in specific regions.

Objectives of the study

- To assess the level of air pollution caused by traffic in Undivided Dakshina Kannada District.
- To examine the health problems faced by traffic police working in areas with high traffic air pollution.
- To understand the impact of long-term exposure to traffic air pollution on the health and well-being of traffic police.

- Toraiseawarenessaboutthehealthandriskssassociatedwithairpollutionforfrontline workers in high-traffic areas.

Research Methodology

This study uses a **descriptive and analytical research design**, relying on both primary and secondary data to derive conclusions.

Primary Data: Gathered through a **structured questionnaire** distributed to 157 traffic police personnel. The questionnaire included both multiple-choice and open-ended questions, covering physical health symptoms, work hours, lifestyle patterns, protective habits, and mental health concerns.

SecondaryData: Sourcedfromcrediblereportsandpublicationsfrom **WHO,OECD**,academic journals, and government air quality indexes.

SamplingTechnique:

A **convenience sampling** method was adopted, targeting officers actively working in outdoor locationswithfrequenttrafficcongestion.Theselectionensuredinclusionofpersonnelwithactual exposure to vehicular pollution.

Samplesize

Thestudyincludesasamplesizeof157respondents,comprisingtrafficpoliceofficersworkingin various urban traffic intersections and high-pollution zones in Dakshina Kannada and Udupi districts.

Data Analysis

TableNo.1: Demographic Profil eand Working Hours of Respondents

Variable	Category	No. of Respondents	(%)
Age(Years)	30 &Below	35	22.3
	31–40	57	36.3
	41–50	35	22.3
	51–60	30	19.1
Gender	Male	115	73.2
	Female	42	26.8
Average Daily WorkingHours	Lessthan4	16	10.2
	4 -6 Hours	35	22.3
	6 -8 Hours	57	36.3
	Morethan 8	49	31.2
Total	157	157	100.0

The demographic profile of the respondents indicates that the largest proportion of traffic police personnel (36.3%) belongstothe31-40yearsagegroup,suggestingthatmost

respondents are in their active working years. Gender-wise, the sample is predominantly male, with 73.2% male respondents and 26.8% female respondents, reflecting comparatively lower female participation.

Regarding average daily working hours, the majority of respondents (36.3%) work between 6 and 8 hours per day, which corresponds to standard duty schedules. However, a substantial proportion (31.2%) reported working more than 8 hours daily, highlighting the prevalence of extended work shifts. Meanwhile, 22.3% work 4-6 hours and 10.2% work less than 4 hours per day. Overall, the findings suggest that a considerable number of traffic police personnel are exposed to prolonged working hours, which may have implications for their occupational health and well-being.

Table No.2: Opinion of Respondents on Air Quality Distribution in Work Environment

Particulars	No. of Respondents	%
Very Poor	31	19.7
Poor	45	28.7
Average	65	41.4
Good	13	8.3
Excellent	3	1.9
Total	157	100

Only 10.2% believed their workplace had Good or Excellent air. This implies that nearly half the respondents perceive air quality at their duty posts as substandard, reinforcing the risk of occupational exposure to pollutants. It indicates a need for improved environmental conditions or protective infrastructure.

Table No.3: Frequency of Exposure to High Traffic Areas.

Particulars	No. of Respondents	%
Daily	121	77.1
Occasionally	36	22.9
Total	157	100

An overwhelming 77.1% of respondents reported daily exposure to traffic-heavy locations. Only 22.9% indicated occasional deployment. The regular exposure to vehicular emissions, dust, and noise suggests continuous environmental stress — a core factor in long-term health degradation, especially respiratory and psychological impacts.

TableNo.4:CommonHealthIssuesofRespondentsduetoTrafficPollutionExposure

HealthIssue	No. of Respondents	%
EyeIrritation	89	56.7
Skin Irritation	85	54.1
Coughing	79	50.3
BreathingDifficulty	76	48.4
Throat Irritation	75	47.8
Headache	72	45.9
Nausea	40	25.5
Fatigue	26	16.6
LegPainDueToLong Standing	6	3.8
GeneralLegPain	1	0.6

The most frequently reported symptoms due to pollution exposure include: Eye irritation (56.7%), Skin irritation (54.1%), Coughing (50.3%), Breathing difficulty (48.4%), Throat irritation (47.8%), Headaches (45.9%). Less common but notable issues were nausea (25.5%), fatigue (16.6%), and leg pain from prolonged standing. The dominance of respiratory and sensory discomforts reinforces pollution's direct effect on the health of personnel.

TableNo.5:Frequency of Experiencing Head achesor Migraines.

Particulars	No. of Respondents	%
Yes	111	70.7
No	46	29.3
Total	157	100

70.7% of respondents confirmed they regularly suffer from headaches or migraines. This high prevalence likely stems from extended exposure to pollutants, stressful work environments, and lack of rest. The recurring nature of this complaint demands attention from both medical and administrative authorities.

TableNo.6:ExperienceofFatigueandLowEnergyofRespondentsAtWork

Particulars	No. Of Respondents	%
Yes	117	74.5
No	40	25.5
Total	157	100

A significant 74.5% of respondents reported experiencing fatigue or low energy during work. This suggests that the majority of traffic police personnel are dealing with exhaustion, likely due to factors such as: Prolonged exposure to pollution, long working hours, Lack of rest or, inadequate breaks. Only 25.5% did not report fatigue, indicating that energy-related health issues are

widespread and should be addressed through workplace wellness initiatives, better scheduling, and access to protective infrastructure.

TableNo.7: Measures to Protect Respondents Health at Work.

Measures Taken to Protect Health at Work	No. of Respondents	%
Wearing Mask	75	47.8
Using Eye Drops	38	24.2
Taking Vitamins or Supplements	24	15.5
Avoiding Peak Traffic Hours	14	8.9
Drinking Waters, Juice Etc.,	1	0.6
Using Sun Glass	3	1.8
Nothing	1	0
I Have Not Taken Any from the Above List	1	0.6

Nearly 88% of officers reported using at least one preventive health practice at work: Wearing masks, using eye drops, taking supplements, However, protective strategies like avoiding peak hours or hydration routines were less emphasized. This indicates growing awareness, but also reflects the need for more institutional training on preventive care.

Hypothesis Testing

Hypothesis01

H₀: There is no significant association between the frequency of exposure to high traffic area on long term negative health impacts.

H_a: There is a significant association between the frequency of exposure to high traffic area on long term negative health impacts.

TableNo.8:

χ^2 Tests			
	Value	df	P
χ^2	21.2	3	<.001
N	157		

It is observed that the p value is lesser than 0.05. Hence, the null hypothesis is rejected. Therefore, it is inferred that there is significant association between the frequency of exposure to high traffic area on long term negative health impacts.

Hypothesis02

H₀: There is no significant relationship between the age of traffic police and stress related sleep disturbance experiences.

H_a: There is a significant relationship between the age of traffic police and stress related sleep disturbance experiences.

TableNo.9

χ^2 Tests			
	Value	df	P
χ^2	7.29	12	0.838
N	157		

It is observed that the p value is greater than 0.05. Hence, we fail to reject the null hypothesis. Therefore, it is inferred that there is no significant relationship between the age of traffic police and stress related sleep disturbance experiences.

Hypothesis03

H₀: There is no significant difference between experience of anxiety due to the exposure to traffic pollution among male and female traffic police.

H_a: There is a significant difference between experience of anxiety due to the exposure to traffic pollution among male and female traffic police.

TableNo.10:

χ^2 Tests			
	Value	df	P
χ^2	5.18	4	0.269
N	157		

It is observed that the p value is greater than 0.05. Hence, we fail to reject the null hypothesis. Therefore, it is inferred that there is no significant difference between experience of anxiety due to the exposure to traffic pollution among male and female traffic police.

Findings

➤ Over 77% of the respondents are posted daily in high-traffic zones, making prolonged exposure to pollutants like PM_{2.5} and PM₁₀ inevitable. This regular contact with harmful emissions significantly raises their risk of developing respiratory and cardiovascular

problems over time.

- A majority of participants reported Eye Irritation, Skin Problems, Coughing, and Breathing Difficulties. These are not isolated complaints but widespread symptoms affecting day-to-day functioning and quality of life.
- The data also showed high levels of Anxiety Sleep Disturbances, revealing that pollution isn't just a physical issue - it's affecting the psychological well-being of officers as well.
- Although nearly 88% of respondents take at least one precaution (like wearing masks or using eye drops), the lack of proper equipment, formal training, or enforcement means these practices aren't standardized or effective across the board.

SUGGESTIONS

To address the challenges identified, the following suggestions are made.

- Introduce high-quality N95/anti-pollution masks, anti-glare glasses, and uniforms with breathable but protective materials. Make their use mandatory through department policies and regular audits.
- Launch confidential counselling services or stress-relief programs to help officers manage anxiety, sleep disorders, and burnout, which were reported by over 70% of respondents.
- Introduce a rotation system where officers are shifted between low-pollution and high-pollution zones. Limit high-traffic duty hours to avoid prolonged exposure without rest.
- Create clear communication channels, suggestion boxes, and regular feedback sessions to bridge this gap.

CONCLUSION

The traffic police personnel of Dakshina Kannada and Udupi play an indispensable role in maintaining order and safety on our roads. Yet, their daily reality is marked by exposure to harmful pollutants, physical fatigue, and emotional strain — often without the attention or resources they deserve.

This study not only highlights the **serious health implications** they face but also shows a clear **willingness among officers to adapt and improve**. They are ready to take care of their health - what they need is structured support, proper tools, and systemic backing. As cities grow and traffic continues to increase, safeguarding those who manage our roads becomes not just a moral responsibility but a civic necessity. Protecting our protectors is the first step toward building healthier cities and safer futures.

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