

Health Risk of Auto Rickshaw Drivers around Silencer of Heavy Vehicles

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Abstract: The objective of this study is to find the cause and effect of Vehicle pollution on the Auto Rickshaw Drivers (ARD) of the city during traffic jam and conjunction..This study focuses up on the implicit relation between alternative occurrences of traffic jam and amount of toxic pollution inhaled by ARD in the city and its relation to diseases .The survey viewed that the health of city AR Drivers has been worsening gradually subsequent up on concentrated heavy and fine of air pollution dust which linger and floating on city atmosphere and fell in as victims of many illness. The survey on 118 AR drives of city and same number AR drivers of Rural area reveals the truth that prevalence of heart diseases and other pollution related innless is significant in city drivers and viewed that this is depend on factors particularly such as growth in the number of times Auto rickshaw come in closer to silencer of other heavy vehicle in a day and service period of driver in the city and average time spent in city and age factor of drivers and increasing inhalations dust smog due to night service . The survey found that 85 %of Drivers has been suffers badly from the health issue like Cardiovascular diseases (CVDs, respiratory problems, asthma, hypertension, blood pleasure and myocardial infarction and no action is still taken to protect their health .The earning, throughout the life is insufficient to meet health cost imposed by automobile exhaustion and which has been depositing, gradually more and more on the lungs and heart auto-rickshaws drivers who are under no alternative, compelled to inhaled various pollution emissions including ozone, particulate matter, acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde. The diesel exhaust induced diseases such as Systemic arterial hypertension (HTN) and restrictive type of lungs diseases covers major portion of ARD and bus drivers, Traffic Policemen and Street venders who spent most time in city. Among them ARD of city undergoes severe health issue due to prevalence regular traffic congestion under which toxic automobile exhaustion like CO₂ and carbon monoxide are close to nose bound to do the duty

Key Words: Systemic arterial hypertension (HTN 2 Cardiovascular diseases (CVDs 3 ARD of city. 4 Pollution Related diseases

I. Methods

Random selected 118 ARD of Kozhikode city and Rural Area of Cheruvannur, Kolathara, Feroke with not less than five years of service are analyzed in non medical and non clinical variable. Data's are collected through personal conversation and casual talk during travels. The selected age group was ranging in between 20-70 and noted in my diary after it. Two Group is selected. **The first** Group selected were 118 Auto rickshaw drivers who had been driving auto rickshaws of open cabin type for more than 5 years and for more than 10 hours daily in Kozhikode city area where there is alternative and frequent traffic jam and conjunction . **Second** group of another 118 ARDS who were running auto rickshaw in Rural and semi urban Area where there were no regular traffic conjunction and jam and those who are working in offices for 5 hours or more and minimally exposed to traffic pollution was also selected as a control. To study impact of traffic conjunction and traffic jam on health of Auto drivers, results arrived so is compared with those of ARD in rural area. The first segment is known as **strong exhaust impact group of vehicle pollution** in which silencer of heavy vehicle, through which toxic emission come in, stand closer to ARD .The second segments is known as **weak impact exhaust group** where silencers of heavy vehicles come closer to ARD in least number of times in a day. It is ARD of rural area

To achieve result more accurate, only Non smoking ARDs studied .The study was purely cross-sectional. It took two years from 2013 April to 2015 April .The objective is to compare depth of vehicle exhaustion on the health of ARD in Kozhikode city with those of ARDs in rural area where there is no regular traffic jam. This is to measure depth of diseases rate among ARD of city where SPM and RSPM levels is exceed ambient air quality standard (200 and 100 µg/m³, 24 hour value) at all stations .This is to study the impact of traffic jam on health of City ARD . The emphasis were given to those ARD who are jammed under Traffic congestion for at least 15 minutes daily who is forced to come under close to silencer of Large Vehicles such heavy lorry and Buss many times in a day and they have no alternative than to inhale toxic pollution directly from silencer. Separate sample taken of ARD took night duty and day duty only and night and day duty simultaneously

II. Back Ground of Previous Study

Air pollution has remained a major health concern and causing towards three fourth of cause of death. In the past decades, several studies highlighted the contribution of ambient air pollution to excess morbidity and mortality (Schwartz, 2001, Le et al., 2010). But no important contribution has been made for the amazing fall in the life expectancy of ARD of city in comparison with Rural. Similarly traffic police and street vendors in city suffered from deadly diseases in compared to other professionals. Diesel and petrol-powered internal combustion engines emit high numbers of ultrafine or nano particles (UFP, particles <100 nm) [Oberdorster and Utell, 2002] and may contribute to adverse respiratory and cardiovascular effects of particulate matter (Oberdorster et al., 2004). But fail to finger point the fact conceived behind increasing pollution linked illness and death among ARD of city than any counterpart. Out of 932 male non smoking resident in the Kolkata city, 82 were auto drivers But severe reduced lung function(48.8%)and hypertension(36.6%) were identified among auto drivers and traffic policemen(Nature Environment and Wild Life Society). Forced vital capacity (FVC), forced expiratory volume (FEV1), FEV1/FVC%, and peak expiratory flow rate (PEFR) of 100 auto rickshaw drivers were less compared with 100 healthy, non drivers, working in offices in Pune city. This is found among ARD of open carbine and those who spend more than 8 hours in traffic congestion. They found no particular reason for increasing health issue among ARD of city. Same phenomenon was found among ARD of Hyderabad, Chennai, and Bangalore city. The intention of my survey is to connect unsearched un researched area of increasing Traffic Jam with increasing pollution generated diseases among city ARD. The study that Drivers of non air conditioned vehicles are affected more than air-conditioned vehicle drivers (Jones AY, Lam PK, and Dean E 7). Several studies have shown a deterioration of ventilatory lung function in people who are constantly exposed to air pollution (Gauderman WJ, McConnell R, Gilliland F Wjst M, Reitmeir P, Dold S, Wulff A, Nicolai 8,9) did never points to impact of Silencer exposed situation faced by city ARD. Professional drivers e.g. auto rickshaw drivers, taxi drivers etc, who spend a lot of time in the traffic are at higher risk to respiratory diseases. .

III. Traffic Generated Pollution Impact during Traffic Jam

The component and density of City vehicle pollution determines the health of ARD drivers and Traffic policemen. The maximum level of RSPM at residential area reached to 190 $\mu\text{g}/\text{m}^3$ as compared to the normal being 100 $\mu\text{g}/\text{m}^3$ and the maximum level approached by NO_x was 336 $\mu\text{g}/\text{m}^3$ as compared to normal value of 80 $\mu\text{g}/\text{m}^3$ are absolute incorrect in respect of Vehicles Air Pollution Around Silencer of heavy vehicle. Around these area, these values are 100% to 400% higher as compared to maximal permissible levels. The volume of air pollution during traffic jam and congestions around those particular spot has been recorded 1200 to 1400 time's than permissible level. This is due to burning of diesel or petrol in the halt time and it is more concentrated exhaustion of toxic gasses which make the halted zone dangerous region of vehicle exhaustion Particulate matter less than 10 μm in size (PM10), Particulate matter less than 2.5 μm in size (PM2.5), Oxides of sulfur (SO_x), Oxides of nitrogen (NO_x), Ozone (O₃), Lead (Pb), Carbon monoxide (CO) comprise bulk of the traffic pollution (Reference 3). The smog occurs because of air pollution and endanger ARD of city who render service in the night. The atmospheric pollutants or gases from automobiles exhausting (sulphur dioxide (SO₂) and nitrogen oxides (NO_x) has found to be mixed with particulate matter and float over air down to earth. The ARD who render service in night have to inhale this toxic mixture and fall in to victims of Pollution related illness. Our amble survey shows that ARD of city service fall in to asthma, breathing issue within two years of service while regular service in day time do take three to five years to have such health issue

IV. Results

We conducted non medical and non clinical survey vide verbal question among the 118 city based ARD who completed not less than 5 years of service. The informal survey reveal that 85 % of ARD of ten years of profession has been suffers from any one pollution induced health issue such as cardiac diseases, asthma, etc and having treatment and certain have stopped profession because of advent diseases even before reaching 55 years of age. The most important result of survey is unfolding of most threatening impact of Silencer of heavy vehicle through which toxic emission releases, on the health of ARD of city who most of time has to halt near to the silencer and have inhale exhaustion it is called Silencer Nose Closeness Impact (CNCI).

The first -Strong CNCI Group Table (I) consist of Six of ARD in the city circle in the age 20- 25 having not less than 5 years of service were found no diseases. In spite of these group suffers largely out of traffic jam created pollution inhalation, we fund, to amazing us, no impact of pollution induced diseases among Adult and teen age Drivers. We convinced this is because of increasing pollution and toxic accommodation capacity among them with immediate negative adverse impact. An ARD of city have to halt an average of 15 minutes near the silencer of heavy vehicle and swallows great deal of toxic emission. This is not in the case of ARD of rural where CNCI is weak. In the weak CNCI Group table (II), an average of only 2 to 4 minutes of

CNC Impact has to be undergone. For estimation of CNC impact in a year, as for our convenience, we assume only 300 working days in a year after deducting holidays

Similarly for the **Second group ARD** of city (age of 26-30,)out of seven drivers who already completed no less than 10 years of service were found no diseases except ordinary illness. No serious diseases were found except one asthma patient among the weak CNC impact group despite they have bound to Halt around dangerous region of silencer of heavy vehicles

Things are changed in **the third age group** of 31-35 with 12 years of service in which there 10 drivers. Out of them 2 were suffers out of asthma and one of them with Chronic obstructive pulmonary disease (COPD) prepared for surgery .The pollution related disease among third group were 33.3% and OPCD patient were 10% . In this group 10 drivers for average12 years of service are compelled to pass through the Critical Area of Vehicle Pollution of CNC for 15 minutes in a day and 4500minutes or 900 hours in the service period and on account of surpassing younger age, pollution is absorbed and cause harm full impact on organs. The growth of heart diseases and various VPID were 7.69 and 15.38% respectively

.In the weak CNC impact Group things were changed0.For them there are 120 hours of CNC impact in the entire service, against 900 hours earlier . In this weak CNC impact Class , there are one asthma and one heart patient were seen indicating that heart diseases rate is fallen from 10 to 7.69 % in the weak CNC impact group because CNC Impact is only three minutes per day instead of 15 minutes latter

The fourth age Group (36-40) is consisting of 12 ARD and all of them have 15 years of service. In it 4 of them were suffers from Asthma and two of them were COPD. For this Group Pollution Induced Diseases (PID) chronic asthma and COPD- 53.33% and COPD is 16.66%.Hwever in the Weak CNC impact group, asthma patients was fall to 2 instead of 4 earlier and rate of heart patents growth is also fall from16.66 to 11.11 %.The CNC impact fall from 1200 to only 180 hours is the cause of change

The fifth class of strong CNC impact Group covers 18 Drivers in the age of 41 to 45 having total service of 16 years in which 5were found as asthma patient and 3 Heart Diseases (16.66)and 9 other PID .Total PID is 53.33% However, at the same time, in weak CNC impact group, the heart diseases were fall to10 instead of 16.66%..The great influential factor for this diminishes in PID rate of the ARD of rural area is indentified as reduction of impact of CNC from 1200 in to 195 hours.

The sixth (strong CNC impact class) (46-50) covers 20 ARD with service of 18 years .In this Group, number of Asthma and COPD patient were 7 and 5 respectively. COPD is 25% of total ARD. Due to strong impact of CNC, the PID were raise from 50 % to 55%. At the same time, PID were26.66 % only in the weak CNC impact group indicating fall in the CNC impact and heart diseases were fall to 20% from 25 in strong group. . For this class, about 5400 minutes(1350 hours) worth of CNC impact occurred in the whole service period

But things were changes tin total for weak CNC impact group only 26.66% vehicle pollution related patients were found against 55% in the strong CNC group

Seventh class (51-60) is consisting of 25 ARD with total service of 25 years in which 7 were Asthma patient and 6 COPD and HTN patients (24%).The other PID were grown to 80%. In the weak CNC impact Group, the heart diseases were 16% .

Eight class (61-70) is consist of only 20workers in which 10 were asthma patient and 7 Heart and HTN patient

Table (1) shows Strong Impact of CNC Effect on the Auto Rickshaw Drivers of Kozhikode City

Age Classification	No ARD In the city	Service Time Completed In city service	Ave rage No. Of Working Days In A day	VPID			CNC Imp act In Years (300) FIXED DAYS	Ave Rage Imp act From CNC PE-DAY	CNC Imp act In Minutes Column 8 x Column 9	Total CNC Impact In Hours Column 3x Column 10/60 second	% of diseases In Each category Of VPID	
				As tma	Heart Dise ases	Other VPID					Heart Diseases In %	Other VPID In %
1	2	3	4	5	6	7	8	9	10	11	12	13
20-25		5	10	-	-	-	300	15	4500	375	-	
26-30	7	10	12	-	-	-	300	15	4500	750	-	20
31-35	10	12	12	2	1	5	300	15	4500	900	10	33.33
36-40	12	15	14	4	2	8	300	16	4800	1200	16.66	53.33
41-45	18	16	12	5	3	9	300	15	4500	1200	16.66	50
46-50	20	18	10	7	5	11	300	15	5400	1350	25	55
51-60	25	20	9	7	6	16	300	18	5400	1800	24	80
61-70	20	15	7	10	7	17	300	18	5400	1350	35	85
TOTAL		118										

Notes. VPID (vehicle Pollution Induced Disease --- CNC. Impact. Closeness of Nose to Silencer

Table (1) shows WEAK Impact of CNC Effect on the Auto Rickshaw Drivers of Kozhikode City Relation between Vehicle Induced Diseases among ARD in RURAL CIRCLE and Impact of CNC

Age Classification	No ARD In the City In RURAL CIRCLE	Service Time Completed In city Service IN RURAL CIRCLE	Average No. Of Working Hours In A day	VPID			CNC Impact in Years (300) FIXED DAYS	Average Impact From CNC PER-DAY In minutes	CNC Impact In Minutes Column 8 x Column 9	Total CNC Impact In Hours Column 3x Column 10/60 second	% of diseases In Each category Of VPID	
				Asthma	Heart Diseases	Other VPID					Heart Diseases In %	Other VPID In %
1	2	3	4	5	6	7	8	9	10	11	12	13
20-25	4	5	8	-	-	-	300	2	600	50	-	
26-30	10	6	9	1	-	-	300	3	900	90	-	
31-35	13	8	11	1	1	2	300	3	900	120	7.69	
36-40	18	9	10	2	2	5	300	4	1200	180	11.11	
41-45	20	13	12	3	2	4	300	3	900	195	10	
46-50	15	15	9	3	3	4	300	4	1200	300	20	
51-60	25	17	9	5	4	6	300	5	1500	340	16	
61-70	20	21	6	7	4	8	300	4	1200	420	20	
TOTAL	118											

Notes. VPID (vehicle Pollution Induced Disease --- CNC. Impact. Closeness of Nose to Silencer

Why PID fall deadly on ARD of city?

More deadly diseases were occurred to ARD of city than other .The incomes are insufficient to meet daily requirements, but they spent progressively on medicine and treatment. The interesting thing is the illness is the part of their occupation. This is because of lingering traffic generated air pollution in the city atmosphere destroy their heart and liver. More than it, most of ARD of city are victims of any air pollution of city as long as they were circulating n the city..Important treat is come from silencer of heavy vehicle because during traffic jam they have to halt close silencer of Heavy Vehicles which emit forcefully diesel burnt exhaust ant in to air ...This is more so dangerous under which both passengers and drivers were victims of emission from vehicles In a day ARD of city will come closer to Silencer of Heavy vehicles an average of 15 minutes in a day The survey convinced us that an area around the Silencer with radius of one meter is Critical Region of Vehicle Pollution (CRVP) and coming any vehicles around it is like falling in to toxic well .Many CRVP is formed during jam. An ARD has to pass many CRVP in a traffic jam and inhale toxic gases. The ARD, who for many times in a day came closer to silencer of heavy vehicles and CRS area which cause for floating and lingering of from burning diesel or petrol suffers from CRVP created PID are called as **Silencer Nose Closeness Effect(.SNC Effect)** The danger of SNC effect is depend on factors like number of times an ARD come closer to silence and period of time or length of time an driver come under the zone of SNC and volume of leaded petrol used by heavy vehicle cone under way

This is dangerous because if the particles emitting from them is larger than 10 µm in diameter , it can most probably deposited almost exclusively in the nose and throat ,on other hand if particle those of smaller than 1 µm, most dangerous, it can reach the lower regions of the lung and heart and cause Asthma and COPD .Many passengers feels sense of omission and drowsiness with total irritation when Autos has to halt close to the face of silencer .However ARD do never feels so as his body try to accommodate it gradually but became a cause of Pollution Induced illness in future

In the **first group** of strong CNC impact group we find that CNC effect would produce no negative health impact in the first age groups (21-25) It is similar to that of weak CNC group in which it is found no pollution induced diseases .Same is the case of second Group(26-30) though they have ten years of service . For this age class is concerned they are strong organs with enough self healing power so that, there will be enough pollution accommodation power and mild pollution will be absorbed by body without adverse effect. We assume 300 working days in a year. From the research it is well understood that an ARD of city has to face to Silencer of heavy vehicle at least for 15 minutes in a day indicating that 4500 minutes (375 hours) for an driver of 5 years of service

Things are entirely changed unfavorably to these ARD of city (strong CNC impact Group) in the **third Group**(31-35) . As ages passes by , the adverse effect of earlier impact of toxic pollution began to appear and symptoms of PID come in gradually .In this Group, out of total 10 Drivers with total service of 12 years, 4 Drivers suffers from severe Asthma and 2 were Heart patient .The verbal information given by them shows that average of not less than 15 minutes in a day that for a ARD circulating in city have to come close with mouth Critical Region of Vehicle Pollution CRVP where 1200 and 1400 time of toxic pollution high than recommended by UN , commission. No other vehicles have these fates except ARD of city. Assuming 300 days

of average working days and an average of 15 minutes of mean CNC Effect in a day, an ARD of city has to pass by 4500 minutes in a year ($15 \times 300 = 4500$). In the third Group 900 hours that an ARD has to face the impact of CNC ($4500 \times 12 / 60 (\text{minutes}) = 900$). This estimation shows that an ARD with 12 years of service had been under the impact of CNC Effect for total of 900 hours in his service which is sufficient to bring down the body capacity and easily subject to PID of various kind depending on health. For weak CNC impact Group an ARD with 8 years of service has to face CNC impact of 120 hours only and out of 13 workers only one suffers from heart diseases (7.69%) because CNC impact is 3 minutes per day instead of 15 earlier.

Forth groups (36-40) are major class working about 12-14 hours daily and subsequently they have to pass through CRVP maximum number of times in a day. For this reason, CNC Effect is maximum among these classes but PID does not increase in same proportion of the growth in CNC Effect. Because, we as said that pollution accommodation capacity is high among youth and their body can absorb pollution particle without much adverse effect in short run. However thing will change in long run. They have to undergo through 4800 minutes of adverse impact of CRVP yearly and 1200 hours if he has service of 15 years ($4800 \times 15 \text{ year} / 60 = 1200$). Among these group heart diseases 16.66. This is because of increasing pollution accommodating power among these group.

To estimate the impact of vehicle pollution in city, we assume that there were an average 300 days of working days for ARD of city. The fifth group (41-45) has also 4500 minutes of CNC impact yearly. We found that the rate of heart diseases is same as previous group. However there are five mild asthma patient in this group. The analysis shows that immediate impact of vehicle pollution is up on lungs and first symptom has been appeared among them as asthma and it gradually develop in to severe COPD and HTN. In this group, out of total 18 ARD taken as random, 5 of them under treatment of asthma and 3 were exhibited symptom of heart diseases. The CRVP and subsequent impact of CNC is measured as 4500 for 300 days. We take the 300 working days in a year, and hence the total CNC Effect on ARD is 1200 hours during his total services of 16 years ($4500 \times 16 \text{ years of service} / 60 = 1200$).

V. Discussion

From the analysis, we find an progressive and direct relationship between CRVP and Growth of Vehicle Pollution Induced Heart diseases (VPIHD) including COPD and HTN. It is found that CRVP and subsequent CNC Effect, can enhance the percentages of VPIHD in all group. In the study except 6 group is found to increase from 10 to 16.66 and from 16.66 to 25 and from 25 to 35. It is found that a stagnant position in the percentage in the growth of heart has been reached in the fifth group. The diseases rate remain unchanged in spite growth of CRVP by each ARD in the city. This group is most elegant one having increasing power to accommodating the air pollution, toxic in their organ, without exhibiting any visible negative impact on health but this benefit is available only in short run. Things will be reverted in long run where in all organs exhibits adverse effect of air pollution breathed years ago. Vehicle emissions intakes during halt near to silencer (CRVP) are particularly harmful to people afflicted with chronic obstructive pulmonary disease (COPD), such as chronic bronchitis. Significant and replicated associations have been found between increased ozone levels and a range of adverse effects on the lungs, and several studies have shown increased risk of hospital admission from COPD associated with high ozone levels. There is also a relationship between the levels of PM10 and morbidity in patients with COPD. The PID is found to increase along with growth of NSC Effect and weakened the auto drivers, and cause to victims of various illnesses prior to reaching age of 60 much before other vehicles drivers indicate urgent need to launch safety measures to protect their life. ARD of city have to issue MUSK urgently at the cost of Government along with free health insurance.

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