TIRE NOISE IMPACT ON HUMAN HEALTH AT KOTRI, JAMSHORO, GUDDU & HALA THE TOWNS ON RIVER INDUS SINDH (PAKISTAN)

By

Engr. Zaheeruddin Memon[1]

ABSTRACT

As regards noise emission from tire is one of main problems faced by humanity, particularly in urban areas.

Noise is undesired and unavoidable consequence of mechanized operations, as the tire noise not only hinders communication, also results in different type of physiological & psychological effects on human health, such as feeling of annoyance, efficiency with which tasks are performed, work interference, accident at work, impairment of hearing, heart diseases, and cancer etc.

The survey conducted on busy roads at residential and commercial areas of Kotri, Jamshoro, Guddu and Hala, the towns situated on river Indus in Sindh (Pakistan). The results show that the noise levels are alarmingly high i.e. 61-100 dB (A) and above, caused mainly due to auto rickshaws, motorcycles because of having very poor type of tires.

Rapid increased traffic flow density resulted people above 90**%** being annoyed and complaining about health ailments.

Like Karachi, and Hyderabad Sindh, the level of noise is much above the acceptable limits with reference to ISO, WHO, EEC, and other national standards. Hence proper control measures are required; otherwise situation can be worst resulting more severe permanent health damaging effects. It is advisable that the existing road traffic noise rules and standards must be revised and implemented forcefully.

Key words: Health & Safety Issues, Tire Noise.

INTRODUCTION

Tire noise is one of the most wide spread sources of noise nuisance in urban areas. The situation is getting alarming with the increased traffic density on roads of said towns.

American traffic engineers under the term Transportation System Management (TSM) have summarized that the road traffic noise pollution is a major cause of unrest and tension among the dwellers living along the roadsides all over the world, especially in urban areas due to dramatic increase in traffic density on the roads, the noise levels have gone much beyond the comfortable limits.

The towns surveyed are facing growing traffic congestion because of in efficiency to cope with dramatic increase in traffic density since last decades. The problem is compounded by rapid population increase and shortage of resources to improve transport infrastructure.

The United Nations (U.N.) estimated that by 2000 A.D. the people living on earth would be more than 6 billion out of which 5 billion will be in developing Countries (Presently 7 billion and should be about 10 billion by 2050). Now it has become necessary that careful management of transport network is essential to eliminate the worst effects of congestion.

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1. A. Prof (R) (Q. A. Engg. Universty Nawabshah) P.O. Tharushah-67480 Distt: Naushahro Feroze Sindh (Pakistan) Ph: +92 242 433534, Cell: +92 03013802732, 03337693964 Email: zhr_mem@yahoo.com, memon_zaheer@hotmail.com

Due to poor education of the society about civic privileges and lack of knowledge about ill effects of high-level noise, no vigorous community actions have surfaced against high-level noise. Most studies are carried out to record the community response to tire noise. In Path Analysis [1] the level of annoyance, sleep disturbance, Interference in daily duties, and health related symptoms [2] are found especially in the nighttime.

A lot of work has been done in developed countries to assess the noise effects on human system and limit high level environmental and occupational noise within acceptable limits, but very little work is being done in Pakistan, which need more attention and thereby help in the formulation of noise reduction program by suppressing at source, preventing its transmission in space, and where it is unwanted is to recommend the protective devices and necessary measures laid down under ISO, E.E.C and other National standards,

ISO CRITERION FOR COMMUNITY ANNOYANCE

International Standards Organization (ISO)[3] has suggested out door criterion for community annoyance (in urban areas of cities with business, trade and administration), i.e.55-65, 45-60 and 40-55 dB (A) for day, evening and night time.

PERMITTED/PROPOSED EUROPEAN ECONOMIC COMMUNITY (EEC) MOTORCYCLE NOISE LIMITS[4]

CATEGORIES	MAX. PERMISSIBLE NOISE LEVELS dB (A) (w.e.f.) OCT. 01.1986	OCT. 01.1995
Equal or less than 80 cc	77	75
Greater than 80 cc and Equal or less than 175 cc	80	78
Greater than 175 cc	82	80

EUROPEAN COMMUNITY DIRECTIVESCONCERNING PERMISSIBLE NOISE LIMITS AT A DISTANCE OF 7.5m FOR NEW VEHICLES[5]

VEHICLE CATEGORIES	NOISE LEVELS dB (A)
Vehicles for passengers, equipped with not more than nine seats	77
Vehicles for passengers, equipped with not more than nine seats, having max. Permissible mass more than 3.5 tons , with engine power less than 150 kW.	80
With engine power of not less 150 KW.	83
Vehicles for Passengers, equipped with more than nine seats, also intended for goods; with max. Permissible mass not exceeding 2 tones	78
With max. permissible mass 2.0-3.5 tons	79
Vehicles for Goods, having max. Permissible mass more than 3.5 tons. with engine power less	81

With an engine power 75-150 kW.	83
With an engine power of not less than 150 kW.	84

An increase of 1-2 dB (A) have been allowed for vehicles diesel engine

HEALTH EFFECTS

Noise is one of the deadliest pollutants in the urban areas of Pakistan. Depending upon the level, quality and exposure duration of noise, it may result in adverse effects on the human health. These effects can come about by the short-term exposure to intense sound or continuous exposure to less intense noise levels. In mild cases of either type, such exposures may result in reduction in output of work, lack of efficiency, impairment of hearing or just a vague feeling of annoyance, etc. Studies on human working in noisy environments have suggested an increased incidence of heart disease problems, accidents at work, irritation, speech interference, Sleep disturbance, work interference, cancer, headache, tension, digestive, respiratory, and nervous problems and so many physiological and psychological effects on human system. The effects of sound on human system may be categorized as.

(i) Auditory Effects.

(ii) Non-Auditory Effects.

METHODOLOGY

i, Noise Intensity

The prevailing tire noise survey conducted and data collected at four different towns has been analyzed for average background (L_{90}), average (L_{50}) and average peak (L_{10}) values and discussed with reference to recognized International criteria for community annoyance and existing legislation in Pakistan.

Measuring instrument Sound Level Meter TES 1351 regularly calibrated and checked prior and after each measurement, keeping microphone 1.5 meters above ground level at 1-3 meters from source, data recorded in dB (A), at “Fast” response in Lmax. at every site. Noise level measurements made at intervals of every ten minutes. In each measuring mode, ten readings taken in a period of about two minutes shown in fig. 1, & given in tab. 1

ii, Vehicle Flow density

Number of vehicles counted with respect to type of vehicle after every 10 minutes and average (hourly) flow of vehicles, percentage and general vehicle condition data, shown in figs. 2, 3 & given in tab. 2

Noise Questionnaire

Public opinion obtained from various cross sections of people like, shopkeepers, cabin holders, general pedestrians and road dwellers given in tabs.3, 4, & 5

RESULTS AND DISCUSSIONS

From survey of towns noise found 61 to 100 dB (A) which is far higher than the maximum limit of 85 dB (A) as allowed by ISO and other National Standards. The worst hit place from noise point of view is Jamshoro where the peak noise level is alarmingly high ranging up to 100 dB (A), because of using sudden brakes at congested narrow road turning, railway crossings and unlawfull bus Stop also tires of mostly inferior quality create noise & pollute environment.

These results also show that average background noise levels (L_{90}) at these sites exceeds 79 dB (A**)**, which is above the maximum permissible noise level criteria i.e. 60 dB (A) recommended for community annoyance by E EC, ISO and other national standards.

The average (L_{50}) and average peak (L_{10}) and leq (T) values exceed 85, 93 dB (A) and 89 dB (A) respectively, showing tire noise levels alarmingly high and may lead to adverse effects to roadside traders and dwellers in the towns.

Despite of less number the auto rickshaws with six passenger seats produce alarming noise, followed by rickshaws with two passenger seats and buses.

This study shows that two stroke automobiles with inferior tires are the major contributors to noise pollution.

Vehicle density found 16,730 per hour, the major contribution was from rickshaws and motorcycles which was above 65%,

About 86% people at Guddu, while about 85-92% living at Kotri & Hala and at Jamshoro 90-100% were annoyed, complaining about health ailments like headache, deafness, Irritation and respiratory trouble etc.

Tab.1 **Noise Level at various sites**

S.No.	Spot	Time hrs.	L_{90}	L_{50}	L_{10}	Recorded		
						Lowest Value dB(A)	Peak Value dB(A)	LAeq dB(A)
1.	Kotri	8:30-17:00	71.5	79.0	84.9	65.0	96.0	82.0
2.	Guddu	-do-	70.8	75.6	84.2	67.0	93.0	78.95
3.	Jamshoro	-do-	79.6	85.6	93.6	74.0	100.0	89.1
4.	Hala	-do-	70.2	79.2	88.0	61.0	97.0	84.85

Lowest values	61.0 – 74.0 dB(A)
Peak	93.0 – 100 dB(A)
L_{90}	70.2 – 79.6 dB(A)
L_{50}	75.6 – 85.6 dB(A)
L_{10}	84.2 – 93.6 dB(A)

Tab.2 **GENERAL VEHICLE CONDITION (%)**

T Y P E	**BAD CONDITION**	**NOISE EMITTING**	**EMITTING POLLUTE GASES**	**USE OF POOR TYRES CAUSING NOISE.**
Rickshaw	97	99	95	93
Four / Six Seater	97	99	97	90
Motor Cycle	70	75	65	85
Car	64	30	44	40
Van	55	45	45	60
Bus	55	80	70	98
Truck	80	85	75	90
Pickups	65	60	64	60

Tab.3 **QUESTIONNAIRE ABOUT PUBLIC HEALTH AILMENTS**

Survey Site	Name/Profession.	Working since.	Disease If any.
Kotri	Abid Opticals	20 Yrs.	Respiratory
	Ahmed Medical Store	25 Yrs.	Allergy
	Mr. Qurban	16 Yrs.	Deafness
	Jamal Juice cabain	45 Yrs.	irritration
	Gul Muneer Chatt Cart	15 Yrs.	Headache
	Hameed Cane Juicer	23 Yrs.	eye sore
	Raees Pan Cabin	35 Yrs.	Headache,Cough.
Jamshoro	Maula Bux Hotel.	15 Yrs.	Irritration
	Jan Zaman Fruit Cart	30 Yrs.	Insomnia,
	Ajmal Watch Maker	42 Yrs.	Blood pressure
	Shaber Tyre repapir	10 Yrs.	Headache
	Pasha Pan Cabin	50 Yrs.	Eye redness,
	Riaz Hussain	25 Yrs.	Deafness,
Guddu	Sharef Book House	24 Yrs.	Normal
	Khalique watch maker	13 Yrs.	Respiratory
	Sher Zaman Fruit	16 Years	Headache, Deafness
	Karim Pan Cabin	25 Years	Mental trouble,Headache,
Hala	Yousif Cassette Player	12 Yrs.	Irritation, Respiratory
	Fast food Cabin	25 Yrs.	Normal
	Shahid cloth store	12 Yrs.	Headache
	Bhitai Electric store	26 Yrs.	Tension, irritation
	Hala Hadi crafts	41 Yrs.	Deafness, Irritation
	Shabnam Cold Drink	32 Yrs.	Eye redness,

Tab. 4 **QUESTIONNAIRE ABOUT FLOW ANNOYANCE**

SURVEY SITE	SPOTS	SATISFA-CTORY	UN-SATIS-FACTORY	BOTHE-RING	BOTHERING %
Kotri	Tea Stall			✔	
	Fruit Juicer			✔	
	Medical Store			✔	
	Pan Cabin			✔	
	Students			✔	
	Vehicle owner			✔	96
	Drivers		✔		
Jamshoro	Optional Center			✔	
	Watch Maker			✔	
	Rice Thella			✔	
	Stationary Mart	✔			
	Hotel			✔	100
	Students			✔	
	Vehicle holder			✔	
Guddu	Pan Cabin		✔		
	student			✔	
	Shoe Maker			✔	
	Medical Store			✔	93
	Sugar Cane Juicer		✔		
	Hotel			✔	
	Police Man			✔	
	Lady			✔	
				✔	

Hala	Recording Center Washing M/C Shop H.M.C Office Police Station Pan Cabin Police Man Passer by Student			✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔	97

Tab. 5 **WORST HIT PLACES**

SURVEY SITE	SPOTS REMARKS	LOWEST dB(A)	PEAK dB(A)	LAeq dB(A)	
Guddu	Main Chok	67.0	93.0	78.95	Alarming.
Kotri	Phatak	65.0	96.0	82.2	Alarming.
Jamshoro	Round about	74.0	100.0	89.1	Alarming.
Hala	Main Road	61.0	97.0	84.85	Alarming.

FINDINGS

a. The noise from 61 to 100 dB(A) is alarmingly high as against E.E.C limits, ISO criteria and other National Standards, and may lead to adverse effects to roadside traders and dwellers in the towns.

b. Traffic density found higher as against roads capacity.

c. Public mostly found annoyed, and complaining about health ailments, the major complains were headache and deafness, irritation, speech interference and tension etc.

CONTROL MEASURES

i. Use of proper muffling devices in automobiles should be made compulsory.

ii. Awareness be created among the public about civic privileges and ill effects of high level noise through electronic media, press, posters and public rallies.

iii. Narrow and uneven roads be widened and aligned properly, with sound absorbing treatment.

iv. Encroachments should be removed and unlawfull stops of vehicles should be banned.

v. In order to know more specifically the damaging effects of noise, complete medical check up of commercial vehicle drivers should be carried out.

vi. Law enforcement agencies should be provided with sound level meters for spot-checking, and strengthened with trained manpower.

xii. As suggested by the traffic police that buses, trucks, tractor trolleys, horse/donkey carts and four / six seaters (creating mainly noise and smoke) should be banned in city area.

Main reasons of high-level noise are absence of regulatory laws, therefore, recommended that standards for maximum permissible noise in different sectors should be framed out and implemented properly through legislation closer to EEC & other developed countries.

Recommendations

The control of noise pollution might require alteration or modification of any of these following basic elements.

(i) Modifying the source to reduce its noise output.

(ii) Altering or controlling the transmission path and the environment to reduce noise level reaching the listener.

(iii) The main source of noise is auto rickshaws with tires in bad condition. The best way would be to replace these rickshaws with new means of transport.

(iv) Placing barriers, screens or deflectors in the noise path.

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