

Metro coaches are fitted with electric motors which makes it noisier as compared to Railways. Frequent breaking and acceleration makes it a noisier means of transportation. Air bus A320 is noisier during take-off, but at its optimum cruising speed the journey is maintained at 72.3 dBA. Journey in LHB coach is silent (60.2 dBA) as compared to other means of transportation. Journey in Metro coach is noisier (70.8 dBA) than the LHB coach of train.

IV. CONCLUSION

The average noise level recorded in car at 60 km/hr is 65.6 dBA with annoyance of 31.5%. The average noise level recorded in LHB coach is 60.2 dBA with annoyance of 22.5% which is least among all these four means of transport. The average noise level in metro coach is 70.8 dBA and annoyance of 36.84%. Air Bus A320 recorded 72.3 dBA during cruising ground speed of 650 km/hr and annoyance of 44.44% which is highest among all four.

REFERENCES

- [1] M. Grubesa and S. Suhanek, "Traffic Noise.," *Noise and Environment*, 2021.
- [2] M. E. Braun, S. J. Walsh, J. L. Horner, and R. Chuter, "Noise source characteristics in the ISO 362 vehicle pass-by noise test: Literature review," *Applied Acoustics*, Vol. 74, No. 11, pp. 1241-1265, 2013, DOI: <https://doi.org/10.1016/j.apacoust.2013.04.005>.
- [3] WHO, "Burden of disease from environmental noise, World Health Organization," *Copenhagen: Regional Office for Europe*, 2011.
- [4] P. Singh, D. Kumari and N. Sharma, "A Review of Adverse Effects of Road Traffic Noise on Human Health," *Fluctuation and Noise Letters*, Vol. 17, No. 1, 2018.
- [5] E. Kerns, E. A. Masterson, C. L. Themann, and G. M. Calvert, "Cardiovascular conditions, hearing difficulty, and occupational noise exposure within US industries and occupations," *Am J Ind Med*, Vol. 61, No. 6, pp. 477-491, Jun. 2018, DOI: 10.1002/ajim.22833.
- [6] D. Banerjee, S. K. Chakraborty, S. Bhattacharyya, and A. Gangopadhyay, "Evaluation and analysis of road traffic noise in Asansol: an industrial town of eastern India," *Int J Environ Res Public Health*, Vol. 5, No. 3, pp. 165-171, Sep. 2008, DOI: 10.3390/ijerph5030165.
- [7] M. Islam, N. Nahar, M. Islam, M. Islam, and M. Hossen, "Traffic Induced Noise Pollution and its Impact on Human Health in Chittagong City Corporation," *Journal of Environmental Science and Natural Resources*, Vol. 8, No. 2, pp. 37-40, 2016, DOI: 10.3329/jesnr.v8i2.26862.
- [8] V. Miguel *et al.*, "The Role of MicroRNAs in Environmental Risk Factors, Noise-Induced Hearing Loss, and Mental Stress," *Antioxid Redox Signal*, Vol. 28, No. 9, pp. 773-796, Mar. 2018, DOI: 10.1089/ars.2017.7175.
- [9] T. C. Halonen JI, M. Blangiardo, M. B. Toledano, D. Fecht, J. Gulliver, H. R. Anderson, S. D. Beevers, D. Dajnak and F. J. Kelly, "Long-term exposure to traffic pollution and hospital admissions in London," *Environmental Pollution*, Vol. 208, pp. 48-57, 2016.
- [10] W. Zijlema *et al.*, "Road traffic noise, blood pressure and heart rate: Pooled analyses of harmonized data from 88,336 participants.," *Environ Res*, Vol. 151, pp. 804-813, Nov. 2016, DOI: 10.1016/j.envres.2016.09.014.
- [11] T. H. Kageyama, S. Yano, T. Kuwano and S. Sueoka, "Exposure-response relationship of wind turbine noise with self-reported symptoms of sleep and health problems: a nationwide socio-acoustic survey in Japan," *Noise Health*, Vol. 18, No. 81, pp. 53-61, 2016.
- [12] K. W. Zakri, A. S. Sudarsono, J. Sarwono, S. S. Utami, N. Hidayah and N. N. Hamdani, "Noise comparison of Argo Parahyangan train in different class and journey time," *AIP Conf Proc*, Vol. 2088, No. 1, pp. 50014, Mar. 2019, DOI: 10.1063/1.5095348.
- [13] M. Younes, A. Heikal, A. Kotb, and H. N. Zohny, "Field Study of the Noise Exposure Inside Running Metro Unit," *Civil Engineering Journal*, Vol. 7, pp. 560-574, Mar. 2021, DOI: 10.28991/cej-2021-03091674.
- [14] X. Yang and C. Yan, *Simulation of Wheel/Rail Noise of High Speed Train Running on the Slab Track*. 2009. DOI: 10.1061/41064(358)469.
- [15] IS Code 3098, "The noise pollution (regulation and control) rules," 1980.
- [16] Indian Railways, "Railways Industry Report," 2022.
- [17] Indian Railways, "Maintenance Manual for LHB coaches," 2010.
- [18] DMRC, "Annual Report (2021-22)," 2022.
- [19] Airbus, "A 320 family," 2023. [Online]. Available: <https://www.airbus.com/en/products-services/commercial-aircraft/passenger-aircraft/a320-family> (accessed Feb. 12, 2023).
- [20] Flightradar24. [Online]. Available: <https://www.flightradar24.com> (accessed Feb. 11, 2023).
- [21] J. Lambert, F. Simonnet, and M. Vallet, "Patterns of behavior in dwellings exposed to road traffic noise," *J. Sound Vib*, Vol. 92, pp. 159-172, Jan. 1984, DOI: 10.1016/0022-460X(84)90553-4.
- [22] D. Ouis, "Annoyance from Road Traffic Noise: A Review," *J Environ Psychol*, Vol. 21, pp. 101-120, Mar. 2001, DOI: 10.1006/jevp.2000.0187.