

Aircraft Noise and the Quality of Life of Community Residents Around Port Harcourt International Airport, South- South Nigeria

Aniefiok O. Akpan* Effiong O. Obisung and Ubon E. Asuquo

Department of Physics, University of Calabar, P.M.B 1115, Calabar, Cross River State, Nigeria

*E-mail of the corresponding author: aniefiokotu@gmail.com

Abstract

Studies of aircraft noise and quality of life of residents living around Port-Harcourt international airport, South-South Nigeria have been carried out. 1552 out of 1800 questionnaires representing 86 percent of the total which bordered on aircraft noise annoyance and disturbances were received, collated and analysed. There was a very high correlation between noise annoyance and the daily disturbances from the aircraft noise on people which included fatigue, lack of concentration, headache, night sleep, relaxation and communication disturbances. The number of highly annoyed people which cut across the youth, middle age and adults increased as the day- night sound levels of the aircraft noise increased. These findings show clearly that the quality of life of people living around Port Harcourt International airport has greatly been impaired by noise from aircraft.

Keywords: Aircraft noise, annoyance, disturbance, quality of life, community residents.

1. Introduction

Health effects due to aircraft noise on people as considered by the world health organisation includes annoyance, sleep disturbance and cardiovascular disease (Brosaft 1997; Fields 1993; Van et al. 2005; Wirth 2004). The effect of noise are seldom catastrophic and are often transitory but adverse effects can be cumulative with prolonged or repeated exposure. Sleep disruption, the masking of speech and television and the inability to enjoy one's property or leisure time impairs the quality of life (Baerjee et al. 2008; Fidel et al. 1995; Ollerhead et al. 1992).

The multi- dimensional concept of quality of life which include aspects of emotional, functional, physical, mental and social well being as perceived by individuals offers wide possibility to look at the health related outcomes of noise, in this case aircraft noise (Bullinger 1991; Hansen 2002; Hiramatsu et al 1997; Kryter 1982).

Noise exposure for the exposure- response relations is re presented by A-weighted sound levels averaged over the day, evening and night periods (Dirk et al. 2010; Eric et al. 2011; Issarayangyun et al 2004). Residential satisfaction and noise reactions such as annoyance may be reciprocally associated with each other (Eric et al. 2011; Finegold 1993; Kroesen et al. 2010). Some studies have found associations of residential satisfaction with noise annoyance but it is not clear whether satisfaction is a secondary reaction to noise.

The concept of life quality is increasingly important in socio-economic research. According to the world health organisation (WHO) health includes physical, psychological and social well being of an individual (Issarayangyun et al. 2003; Wirth 2004; World Health Organisation (WHO) 2011). Major commercial airports promote the air transport industry and generate positive economic benefits to the airport and its host economy but external cost are associate with these benefits. Increase in aircraft movements cause negative environmental impacts especially noise pollution (Meister et al. 2000; Menkiti et at. 1993; Obisung et al. 2005). The effects of aircraft noise on the well being of the community must seriously be addressed.

2. Methodology

Port-Harcourt is the capital of Rivers State and airport town in South- South Nigeria. It lies along Bonny boundary, an eastern distributory of the Niger, 66Km (41 miles) upstream from the gulf of guinea. Port-

Harcourt international airport has a passenger volume of about 1081587 per annum and is rated the third largest airport in Nigeria.

This study was aimed at assessing the reaction to aircraft noise of residents around the Port-Harcourt international airport. The main objectives were to assess the impact of aircraft noise on residents and to get the exposure respond relationship for aircraft noise annoyance and disturbances due to the noise.

With a stratified random sampling method within 40 to 45 Kilometre distance from the airport, the effects of aircraft noise on Community residents' quality of life was investigated. Residents were interviewed with questionnaires with regards to their residential situations and residential satisfaction, reactions to aircraft noise, attitudes related to aircraft and the airport generally, health related variables such as health related quality of life complaints and sleep quality.

Acoustical parameters which were taken into consideration and calculated were equivalent sound level (L_{Aeq}) and maximum sound level (L_{max}). For analysis, aircraft noise indexes were indicated for day-time ($L_{Aeq, 16hrs}$; 6am -10am), night-time ($L_{Aeq, 8hrs}$; 10pm -6am) and 24 hours of day using the day- night level L_{dn} including a penalty of 10 dB(A) for the night time as well as day- evening-night level L_{den} with a penalty of 5 dB(A) for evening and 10 dB(A) penalty for night.

3. Result

1800 questionnaires were given out to respondents out of which 1552 valid responds were received representing 86% of the total.

4. Discussion of Result

Table 1.0 shows the number of respondents by gender, age and socio-economic status. As shown, 18 respondents did not give their submissions and it was found that they were the non working class. This makes one to believe that the working class showed more concern about the noise as it disturbs them while concentrating in their daily business or while relaxing either at home or outdoors after a long day activity. Age wise, there was a high response from middle aged adults than the youth. This goes to confirm the concern shown by the working class because of the impact of the noise on them as compared to the old and the youth. Respondents in the middle and high socio-economic status showed more concern about this pollution than the low income group which is in line with findings from other research work (Dirk et al. 2010). This may not be unconnected with the fact that they are unable to enjoy their property and leisure time due to aircraft noise (Baerjee et al.2008; Tharit et al. 2005; Van et al. 2005).

The respondents reaction to aircraft noise levels above 65 dB(A) at night ($L_{Aeq,8hrs}$) was very low (Table 2.0). One may tend to believe that having been exposed to the noise for a long time at night, they are either adapted to it or felt reluctant to complain since nothing has been done about it over the years.

Figure 1.0 shows the Dose-response relationship on aircraft noise annoyance. This curve shows the percentage of highly annoyed respondents as related to day-night level (L_{dn}). It is very clear from this finding that moderate sound levels lead to severe noise annoyance due to aircraft noise which is again in line with other research findings [Baerjee et al.2008].

Aircraft noise annoyance is relatively highly correlated with all disturbance judgements, both with disturbances of daily activities indoors, in the day or night and outdoors (Figure 2.0). It shows how noise annoyance correlates with disturbances such as fatigue, concentration, headache, night sleep relaxation and communication of respondents.

5. Conclusion

The effects of aircraft noise on the quality of life of residents living around Port-Harcourt international airport, South- South Nigeria have been investigated. A total 1552 questionnaires which bordered on aircraft noise

effects on humans such as annoyance and daily disturbances were received from respondents and analysed. These disturbances which include fatigue, concentration, headache, night sleep and concentration were correlated with aircraft noise annoyance on the respondents. An exposure- response curve showing the percentage of highly annoyed respondents showed increase of annoyed people as the day- night noise level increased.

The high correlation of annoyance with the daily disturbance of the noise on community residents is a clear indication of the impairment on the quality of life of the people living around this airport which is of course due to aircraft noise.

Residents around the vicinity of airports are disturbed, their daily activities are interfered with and this results to a high level of annoyance. These disturbances seriously undermine the quality of life of the people and need to be checked.

Acknowledgement

The Port-Harcourt noise impact study would not have been successful but for the co-operation of the people living in the vicinity of this airport who willingly responded to the questions they were being asked through the questionnaires, this is a great contribution towards finding solutions to this environmental problem. We sincerely thank them for their cooperation.

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Table 1.0 Number of respondents by gender, age and socio-economic status

	Variable	Number of Respondents	% Valid
Gender	Male	658	42.4
	Female	876	56.4
	No response	18	1.2
Age	18-20	48	3.1
	21-30	143	9.2
	31-40	168	10.8
	41-50	231	14.9
	51-60	201	13.0
	61-70	272	17.5
	71-80	211	13.6
	81-90	163	10.5
	>90	101	6.5
	No response	14	0.9
Socio-economic Status	Low	247	15.9
	middle	892	57.6
	High	401	25.8
	No response	12	0.7

Table 2.0 Number of respondents by indicators of aircraft noise exposure

Sound level (L_{Aeq} (dB))	L_{den}		L_{dn}		$L_{Aeq16hrs}$		$L_{Aeq8hrs}$	
	N	%	N	%	N	%	N	%
<45	5	0.3	89	5.7	3	0.2	332	21.4
45-50	84	5.4	346	22.3	330	21.3	336	23.6
50-55	324	20.9	306	19.7	318	20.5	363	23.4
55-60	373	24.0	278	17.9	381	24.5	370	23.8
60-65	313	20.2	265	17.0	414	26.7	119	7.7
>65	453	29.2	270	17.4	106	6.8	2	0.1
Total	1552	100	1552	100	1552	100	1552	100

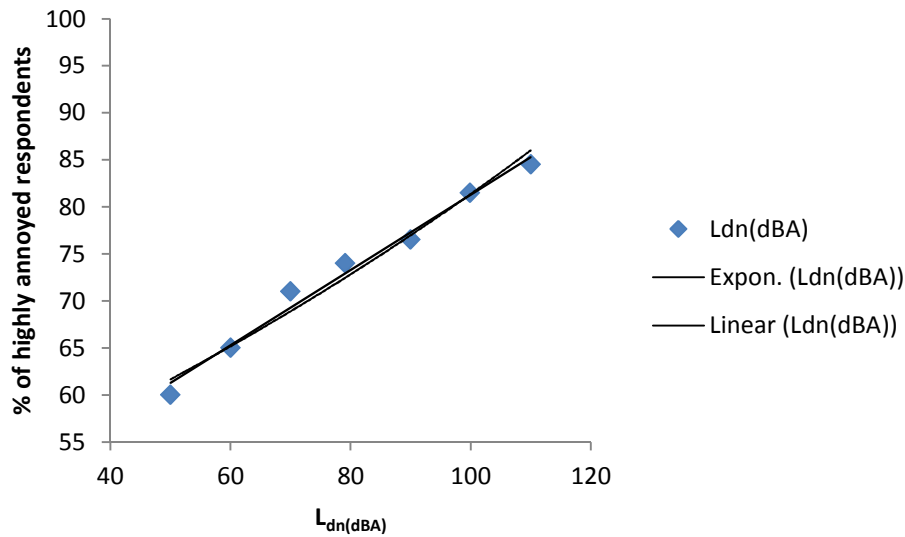


Fig 1.0 Dose-response curve on annoyance due to Aircraft noise in the vicinity of Port-Harcourt international airport

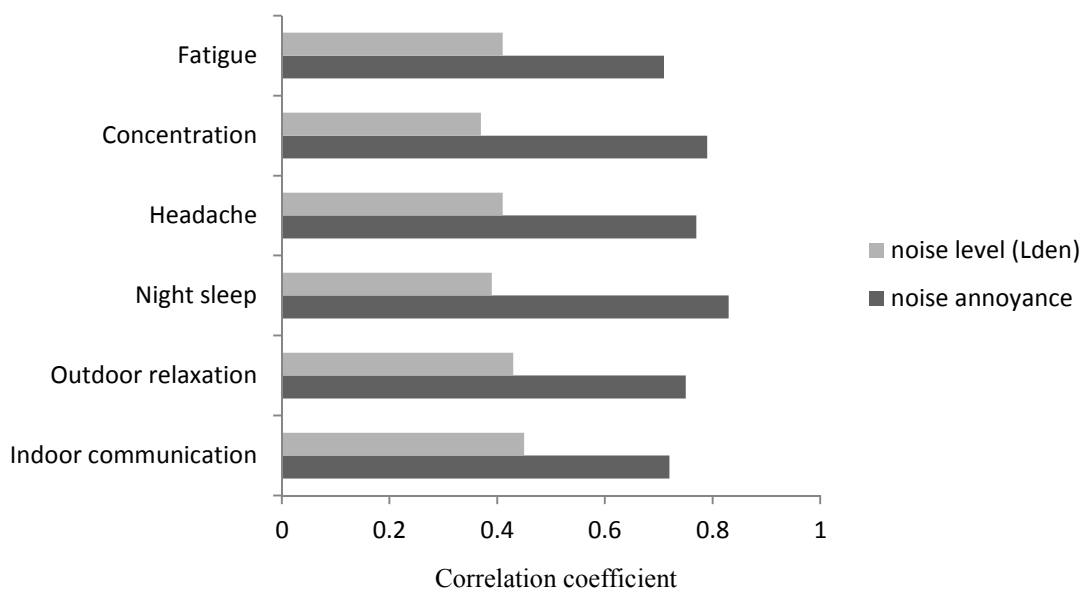


Fig 2.0 Correlation of aircraft sound levels and aircraft annoyance with impacts on respondents

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