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QUALITY OF LIFE: THE EXPOSURE OF A FOOTBALL VIEWING CENTER IN A METROPOLITAN AREA TO NOISE POLLUTION

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ABSTRACT

Because of its impact on hearing and other associated health conditions, noise pollution is an environmental problem. High levels of noise above normal limits cause hearing loss and other attendant problems. In Nigeria, the 'Mini Stadium' is known as the viewing center where football matches are watched via satellite. The noise pollution in this center was determined in this research. To do this, five top teams were chosen for the evaluation, each from the English Premier League (EPL), La Liga, Bundesliga, League 1, and Serie A. For the measurement, a sound level meter was used. The dBA noise concentration spectrum was as follows: EPL (56-108); La Liga (46-106); Bundesliga (54-102); Serie A (49-101); and Ligue 1 (54-101). Compared to the normal limits, the findings revealed that some of the results were above the limits, which means that viewers might be vulnerable to the problem of hearing. It is recommended that acoustic insulators and hearing aids have to be used to reduce the noise-related issues.

1. INTRODUCTION

In general, noise is unfiltered sound, uneven frequency, and unwanted sound. Studies have shown that noise and wellbeing are associated, indicating that noise has side effects on human health [1- 6].

Goal 1 'No Poverty' [7], is one of the Sustainable Development Goals set by the General Assembly of the United Nations in 2015. In this respect, Nigeria is making headway. Funds are made available by the federal and state governments and microfinance banks for the establishment of small enterprises. The establishments of football viewing centers are part of the usage of the funds (Figure 1) widely referred to as 'mini stadium' sure, mini stadiums provide owners with sources of revenue, but are they are responsible for 'Noise Pollution' in terms of environmental hazards? In general, people visit the viewing centers to watch sports, particularly football live matches (foreign leagues), while the interest in some club sides has been created, leading to fan club establishments. Many Nigerians enjoy football, according to Adetiloye [8], but the majority cannot watch it at home due to the high cost of cable subscriptions, so they prefer the option of footbal viewing centers.

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Fig 1. A typical viewing center in Nigeria. Source: Complete Sports [9].

Sport is no doubt important for people's physical health and entertainment. Football, which is watched around the world in the arena, is one of the fascinating sporting events and common games. Not all football fans or lovers will be in the stadium because of one reason or the other, one of the alternatives is football viewing centers situated at convenient locations. There have been actions and responses that create sound during the process of watching the game. Now the question is, what is the level of sound generated? Is it within the recommended sound limits? How does it affect people and animals in and outside the neighborhoods?

In this present study, twenty-five international team matches were used as case studies using a sound level meter to determine the levels and effect of noise on hearing thresholds at a viewing center in Akure, Ondo State, Nigeria.

2. MATERIALS AND METHODS

Akure (Lat: 7o15'0.00 'N; Long: 5o 11' 42.00'E) is located in the southwest of Nigeria [10], with a population of 421,100. Akure is the capital of Ondo State with increases in vehicular movements, hotels and entertainment centers, population, estates, business centers, and other innovations. It is a fast-growing urban area.

This research was carried out on live matches played with matches involving five top teams from English Premier League (EPL) – (Manchester City, Arsenal, Tottenham, Liverpool, and Chelsea); La Liga (Barcelona, Real Madrid, Sevilla, Alaves, and Atletico Madrid); Bundesliga (Bayern Munich, FC Schalke 04, RB Leipzig, SV Werder Bremen, and Borussia Dortmund); Serie A (SSC Napoli, AC Milan, AS Roma, Inter Milan, and Juventus F.C); and Ligue 1 (Paris Saint-Germain F.C, Olympique Lyonnais, Olympique de Marseille, FC Nantes, and AS Monaco) which were viewed at a viewing center. Every team played 25 matches and each match was tracked with a sound level meter (GB: 2266204): 30dBA-130dBA measuring range, precision (± 1.5dB), frequency range (31.5Hz-8KHz), and power supply (3 * 1.5V AAA battery). The manufacturer's procedures were strictly followed. Readings of noise level (dBA) were taken directly from the sources of noise [11]. Using Minitab 16 and Microsoft Excel Statistical Software, the generated values (triplicates) were statistically analyzed.

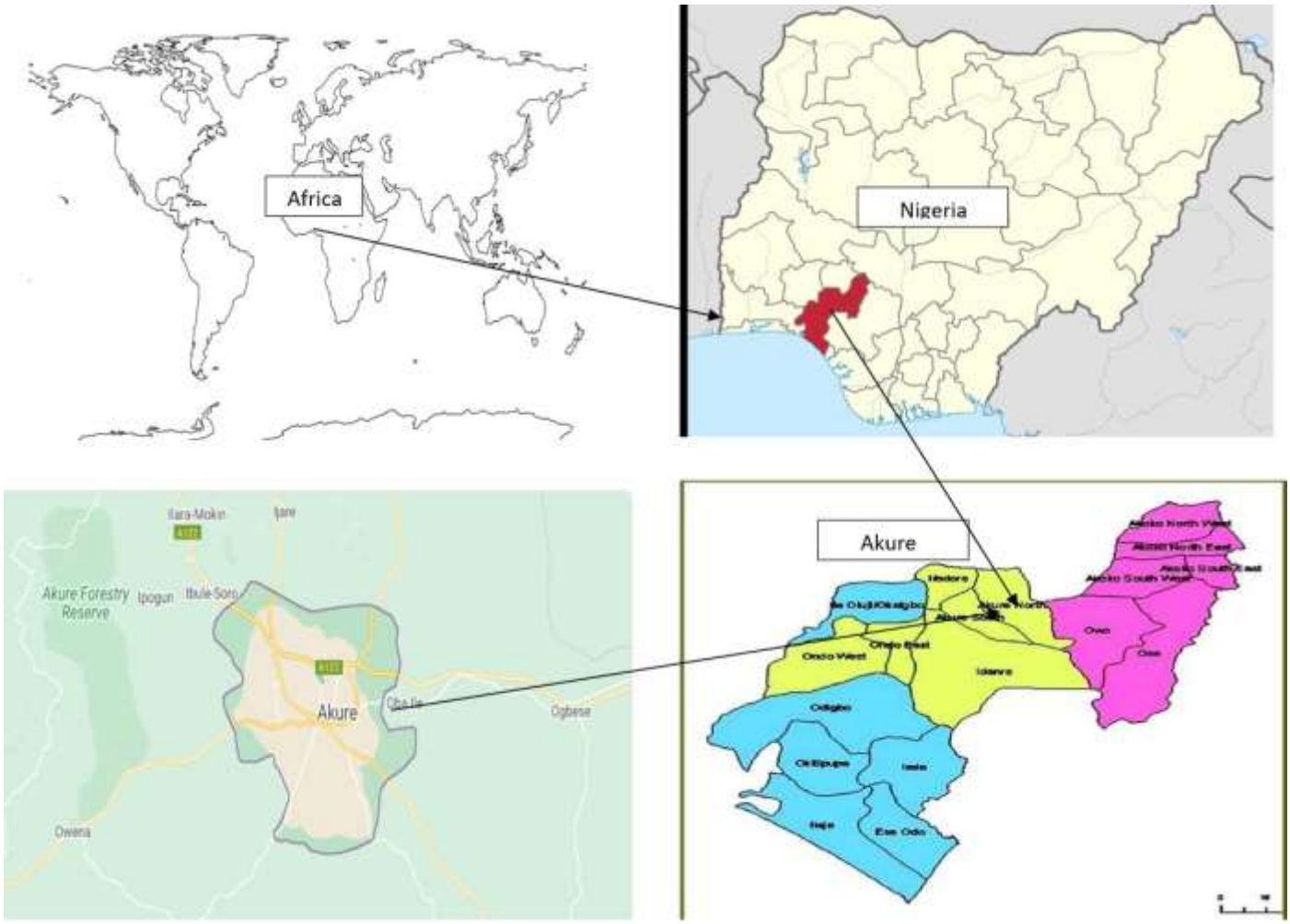

Fig 2. The location of the study area

3. RESULTS AND DISCUSSIONS

The levels of sound registered in the viewing center and values obtained in the matches that that involved Manchester City, Arsenal, and Chelsea (the minimum 56 and maximum 108 dBA) created by the viewers were presented in Table 1 and Figures 3-7. Similarly, in La Liga, 106 dBA was the highest sound created by the viewers (Figure 4). Averages of 83.92, 81.60, and 76.76 were created by viewers of Barcelona, Real Madrid, and Atlántico Madrid matches respectively. Noise levels were also higher than 100 dBA in the Bundesliga (Bayern Munich and Borussia Dortmund matches) - (Figure 5). The noise level recorded during Italia Serie A was below 100 dBA (Figure 6), and finally the matches involving Paris Saint Germain (PSG) was reported in Figure 7 with a mean value of 76.9 dBA, in the French Ligue 1 only noise level that was above 100 dBA was registered by the viewers who watched matches involving Paris Saint-Germain F.C. Compared to the standard limits set for 8 h / day by National Environmental Standards and Regulations Enforcement Agency [12], National Institute for Occupational Safety and Health [13] and Occupational Safety and Health Administration [14] (Table 1), it was observed that the noise levels created by the viewers/audience during the live matches were well above because each match did not exceed 2 h / day. From the outcomes of each league, it could be inferred that matches involving high-noise teams from the EPL, La Liga, and Bundesliga could cause problems for viewers and others outside the viewing center environment. The use of earplugs is recommended for the prevention of the ear problem, according to National Institute on Deafness and Other Communication Disorders [15] noise with a decibel level of 100-115 dB can cause ear harm. Whenever one visits a viewing center to watch football matches, particularly those involving the top teams in each of the league games, it is also important to use this plug.

Table 1. Summary of the sound level recorded during each club's matches

Leagues (Clubs)	Range (dBA)	Mean	Std. Dev	CoefVar	Skewness	Kurtosis
Premier League						
Liverpool	64-90	72.32	6.9	9.54	1	0.27
Manchester City	65-106	78.92	12.99	16.46	0.44	-0.86
Arsenal	56-108	79.12	12.64	15.98	0.47	-0.3
Tottenham United	56-99	82.64	12.13	14.68	-0.28	-0.79
Chelsea	64-108	80.16	13.65	17.03	1.17	1.5
Spanish (La Liga)						
Barcelona	3-106	83.93	13.47	16.05	-0.02	-1.3
Sevilla	54-98	68.76	12.31	17.91	0.92	0.23
Atletico Madrid	65-98	76.76	10.75	14	0.73	-0.78
Real Madrid	65-105	81.6	11.13	13.64	0.3	-0.67
Alaves	46-89	69.96	9.76	13.95	0.09	0.88
Germany (Bundesliga)						
FC Schalke 04	54-97	69.12	10.09	14.6	0.82	1.31
FC Bayern Munich	66-102	81.24	11.04	13.58	0.3	-0.94
Borussia Dortmund	61-102	77.76	12.89	16.57	0.5	-10.6
SV Werder Bremen	54-98	70.2	10.7	15.24	0.68	0.48
RB Leipzig	56-98	75.88	10.63	14.01	0.44	-0.26
Italy (Series A)						
Juventus	56-99	76.44	10.94	14.31	0.32	-0.34
Inter Milan	54-98	72	12.33	17.13	0.58	-0.31
As Roma	56-88	70.92	10.34	14.58	0.21	-0.96
AC Milan	55-99	70.12	11.41	16.27	0.9	0.37
SSC Napoli	49-88	69.44	11.32	16.3	-0.08	-0.89
French (Ligue 1)						-1.06
Paris Saint-Germain FC	60-101	76.96	12.48	16.22	0.45	0.82
Olypique Lyonnais	56-87	66.76	0.57	11.34	0.82	-0.43
Olympique de Marseille	54-89	68.88	9.67	14.03	0.35	0.05
FC Nantes	54-77	66.2	6.08	9.19	-0.17	-0.49
AS Monaco	56-96	71.68	11.07	15.44	0.69	
Standard Limits						
WHO [16]	85dBA					
(Concha-Barrientos et al., 2004) [17]						
NESREA [12]	90dBA (8 h/day)					
OSHA [14]	90dBA (8 h/day)					
NIOSH [13]	85dBA (8 h/day)					

WHO – World Health Organisation, NESREA - National Environmental Standards and Regulations Enforcement Agency, OSHA - Occupational Safety and Health Administration, NIOSH - National Institute for Occupational Safety and Health

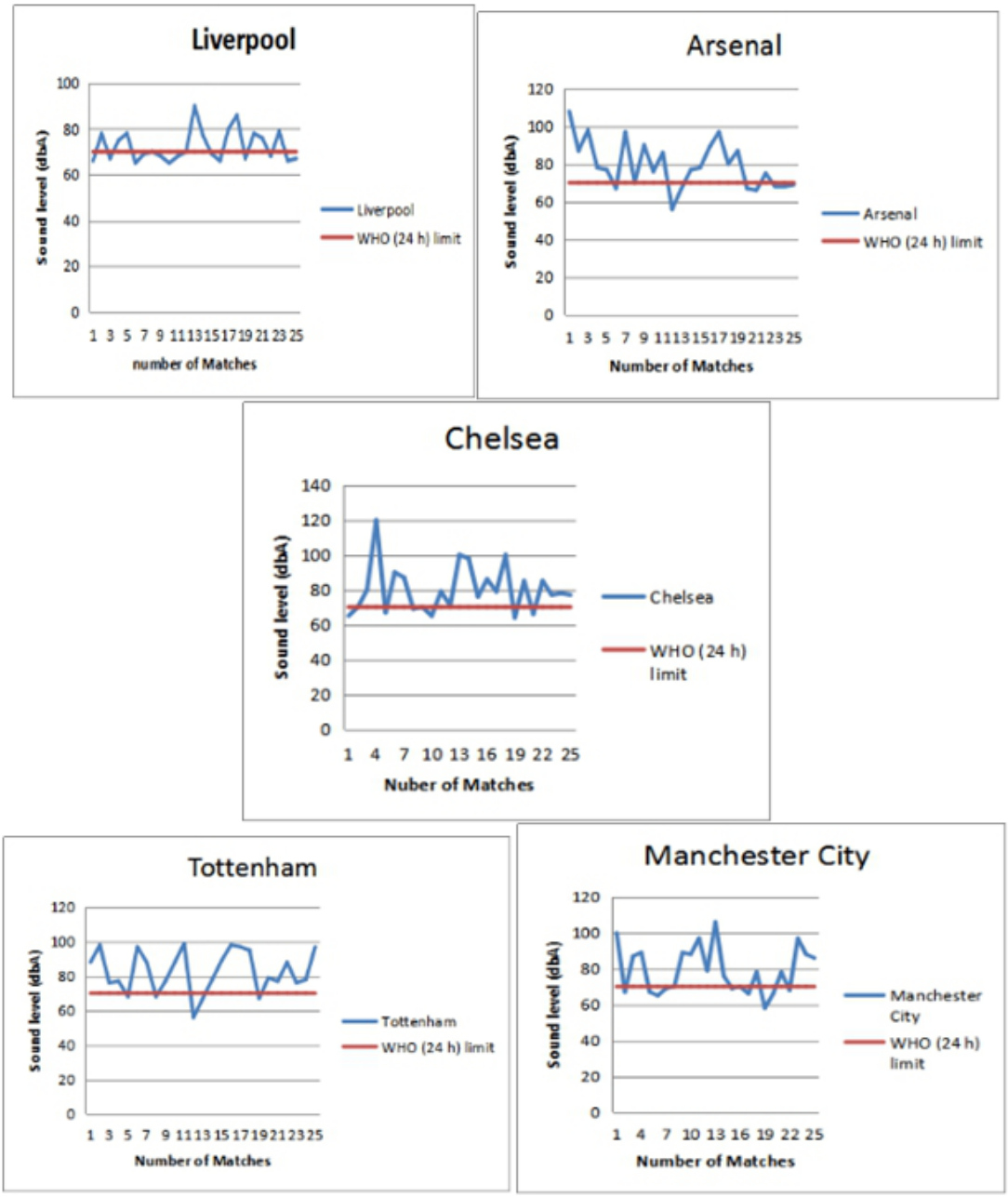

Fig 3. Noise levels obtained from five top English Premier League matches (English Clubs)

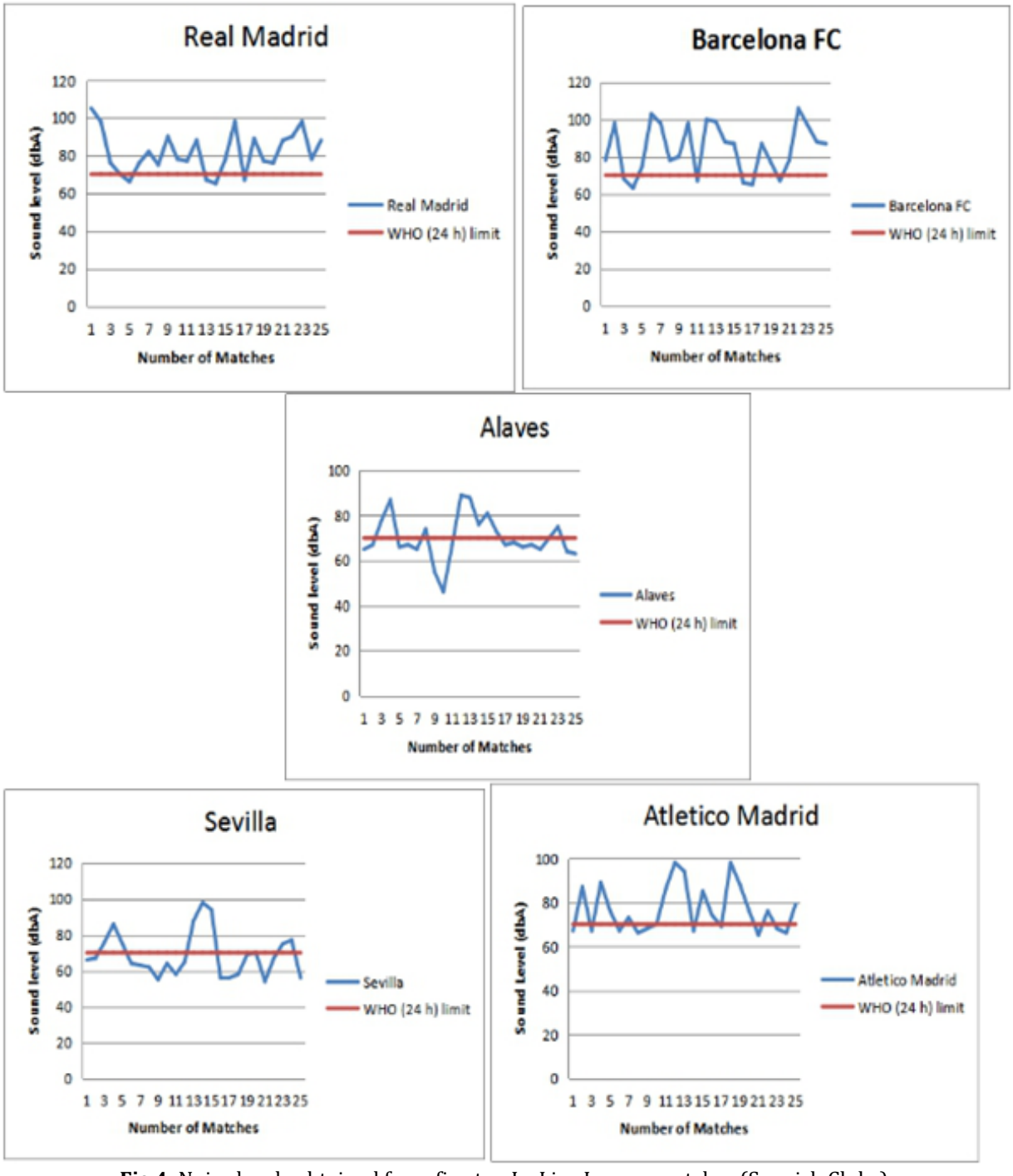

Fig 4. Noise levels obtained from five top La Liga League matches (Spanish Clubs)

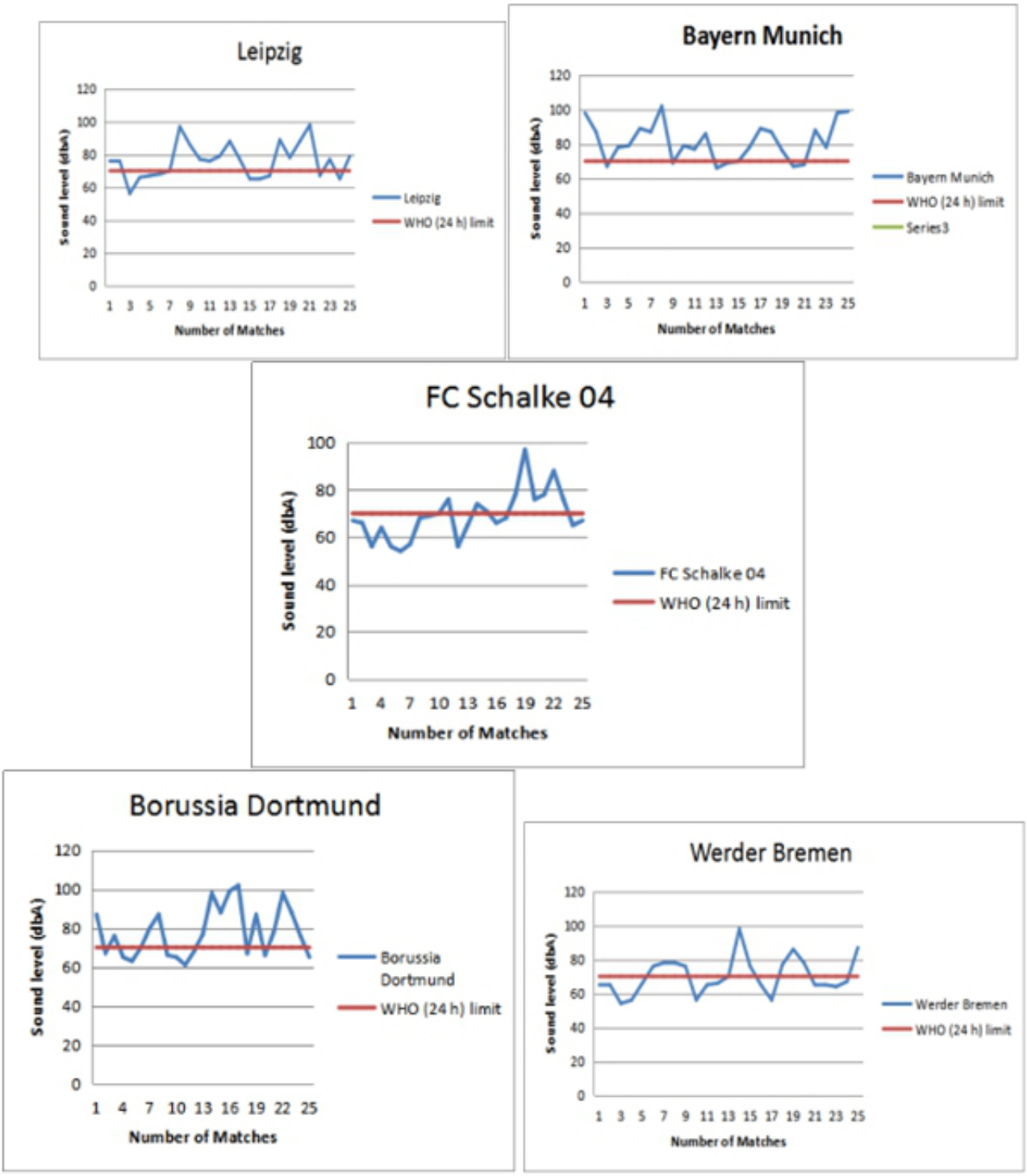

Fig 5. Noise levels obtained from five top Bundesliga League matches (German Clubs)

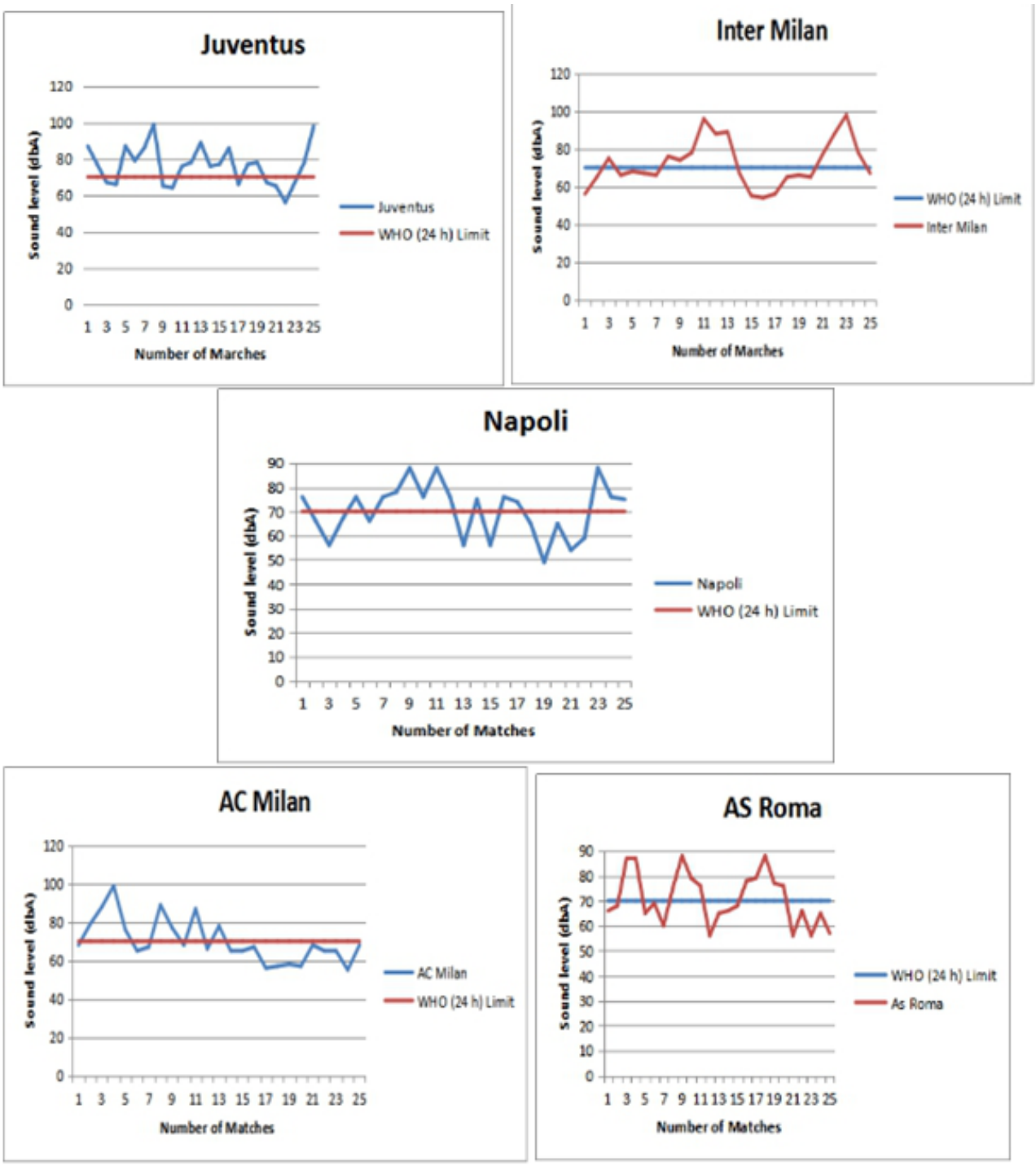

Fig 6. Noise levels obtained from five top Serie A matches (Italian Clubs)

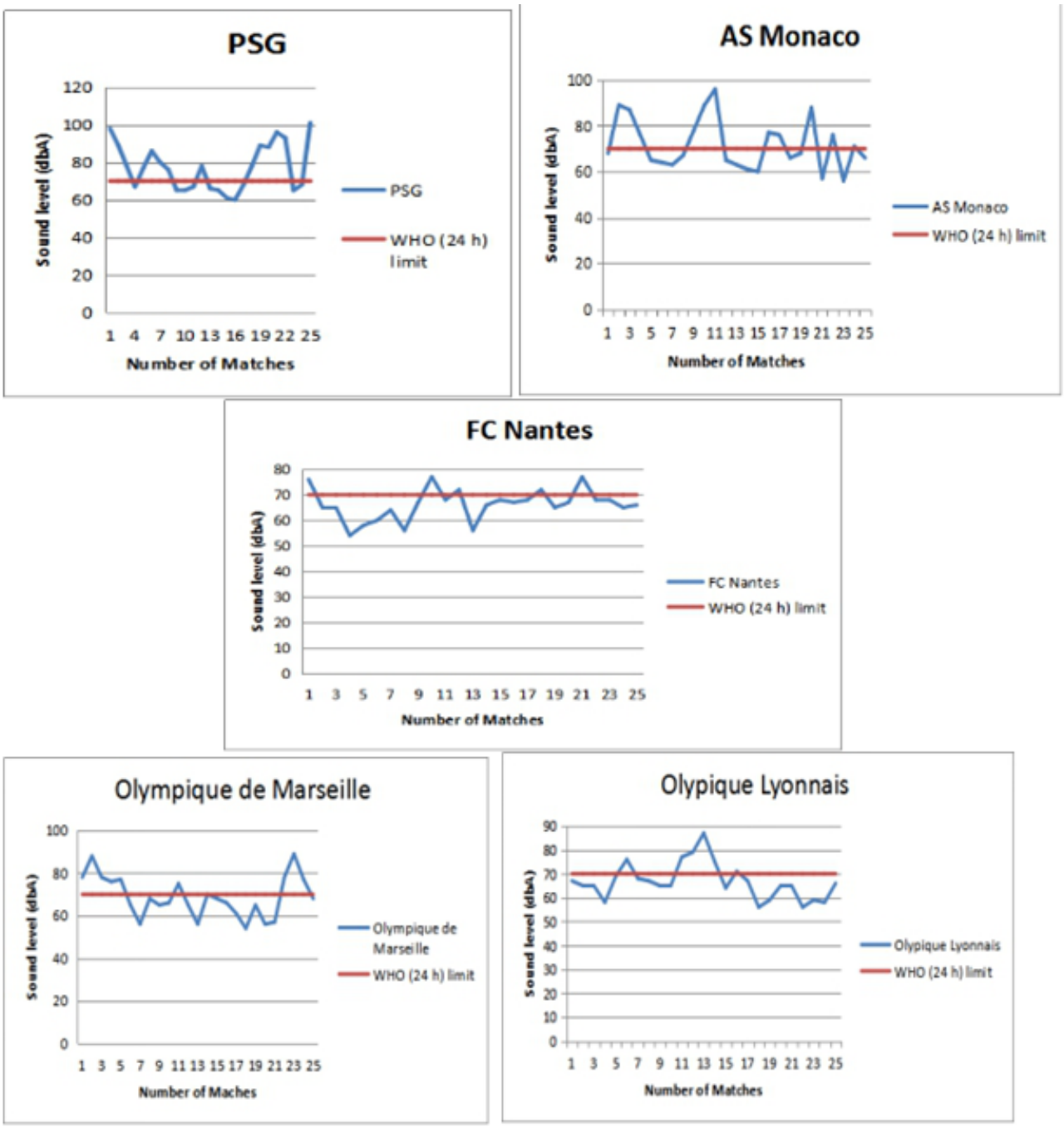

Fig 7. Noise levels obtained from five top Lique 1 matches (French Clubs)

The high levels recorded during the matches could be due to the following reasons: (i) excitement after goals were scored, (ii) when a losing team equalized or when goals were scored, (iii) when matches were won, (iv) goalmouth scramble, (v) missed scoring opportunities, (vi) using vuvuzelas, (vii) whistles, (viii) cheering fans, just to name a few.

It was found that the findings were not comparable to 140 dBA reported for live matches at the 2010 FIFA World Cup [18], the 123-140 dBA noise reported by Barnard et al. [19] at a football match; the 105 and 124 dBA recorded by Cranston et al. [20] at a hockey match, and lastly, the 121-141 dBA obtained by Barnard et al. [19] and Sjödin [21] in a six-day badminton game. In a research conducted by Flamme and Williams [22] on the impact of noise on sports officials, it was reported that an unprotected official at 104 dBA is at risk of hearing loss [23].

4. CONCLUSION

The research was performed at a viewing center in Akure, Nigeria, to determine the noise levels. For the research, five top teams from distinct continents were chosen. WHO, NESREA, OSHA, and NIOSH were compared with the results obtained, based on this, it was found that the noise levels were higher and above the normal limits. The effect of this is the exposure of a possible risk to the viewers and individuals around the centers' hearing issues. A high number of spectators, goalmouth scrambles, misses, targets, the allocation of penalties, just to name a few, were established as the causes of high noise levels. Hearing aids should be used to mitigate the hearing difficulties of particular viewers, and if the center's management is financially buoyant, strong acoustic insulators, absorber panels, or dampers should be used to improve the viewing centers.

Future study is on the pipeline where different viewing centers in the town would be subjected to the same monitoring as this study is a preliminary work of noise assessment in viewing centers.

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