Evaluation of awareness of noise-induced hearing loss among South African soccer spectators

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ABSTRACT

South African Premier Soccer League matches have recently come under spotlight as recreational activities with potentially hazardous noise levels. While much is known about the noise levels during some of these matches, little is known about the awareness and perceptions of the spectators regarding the risks posed by noise during these matches. This study will evaluate the awareness of noise-induced hearing loss (NIHL) among South African soccer spectators, determine their patterns of exposure to loud noises and their attitude towards hearing protection use. A descriptive quantitative cross-sectional study, using a 24-question, self-administered questionnaire was used. Eighty-two soccer spectators (47 males and 35 females), selected via convenience sampling before the start of a match completed the questionnaire. About half of the respondents 48 % [CI: 36.3, 59.9 %] reported being aware that the noise they were exposed to during soccer matches could potentially be harmful to their hearing. Eighty-seven percent (87 %) [CI: 76.6, 93.4 %] of them did not consider noise-induced hearing loss to be "a very big problem" when compared to other health concerns such as drug and alcohol abuse. Most respondents in this study were not aware of the potential harm of noise to their hearing and most also did not consider hearing loss from noise exposure during soccer matches to be a serious health concern.

Keywords: Noise-induced hearing loss, soccer, spectators, awareness

INTRODUCTION

Hearing loss due to exposure to excessively loud noises is a significant social and public health concern (Chung et al. 2005) and noise exposure will continue to be a major public health problem in the 21st century (Passchier-Vermeer & Passchier 2000). Subsequently, this implies that Noise-Induced Hearing Loss (NIHL) is also likely to continue to be a challenge. The World Health Organization (WHO) has also identified noise-induced hearing loss in developing countries an increasing risk factor for hearing impairment (WHO 1997).

Soccer is one of South Africa's favorite sports and it draws an enormous amount of spectator enthusiasts. However, South African Premiere Soccer League (PSL) matches are known to be some of the noisiest social events. The biggest contributor to noise levels during matches is the *'vuvuzela'*, a trumpet-like instrument that is usually blown by South African soccer lovers at matches (Swanepoel & Hall III 2010). Peak sound levels at some of the PSL matches are in the ranges 115-132 dBA, with average sound levels ranging from 85.3-92.7 dBA (Ramma et al. 2011). These are sound levels that are harmful to human hearing if people are exposed to them for extended durations (ISO 1999).

There have been intense complaints by the general public about the level of noise at soccer matches. Some people have gone to the extent of calling for the banning of

the vuvuzela from soccer matches to reduce excessive noise exposure during matches (Staff Writer 2009). Certain researchers have also called for heightening campaigns to promote public awareness and education about the NIHL at soccer matches (Swanepoel & Hall III 2010). However, before calling for an increase in public awareness campaigns, an attempt should be made to try and understand factors that influence the spectators to behave in a certain manner. In other words, influence for behavior modifications may be achieved more effectively if soccer spectators' perceptions about hearing and NIHL are first understood.[1] Some of the questions that may be asked include: Generally, what do South African soccer spectators know about hearing loss, more specifically, NIHL? What are their views regarding the use of hearing protection, and which strategies could be used to influence preventative behaviors (Chung et al. 2005)?

This study will attempt to answer some of the above stated questions. The objectives of this study were therefore to: 1). Evaluate the awareness of NIHL among South African soccer spectators, 2). Determine their patterns of exposure to loud noises and 3) Determine their attitude towards hearing protections.

RESEARCH METHOD AND DESIGN

This was a descriptive cross-sectional survey study. Before the survey was conducted, ethical clearance was first obtained from the University of Cape Town Faculty of Health Sciences Human Research Ethics Committee (REC REF: 373/2009). Permission was then obtained from the stadium management. The questionnaire used (with permission) in this study was developed at Massachussets Eye and Ear Infirmary, Harvard School of Public Health, and Congent Research, Inc., Chung et al. 2005).

The questionnaire was first adapted and piloted on 10 individuals prior to the commencement of the survey to make it suitable for use in a South African context on the target population for this study. It contained 4 sections; the first section of the questionnaire contained five questions about views towards general health issues relevant to soccer spectators (including hearing loss). The remaining three sections dealt with the following areas; hearing loss, personal exposure to loud noises (specifically vuvuzela noise) and hearing protection. The format of the questions in the questionnaire included multi-dichotomous, multiple choice and open-ended questions.

Study population

Soccer spectators attending a PSL cup-final match (May 22, 2010) at the official opening of a 96 000 seat-capacity flagship stadium for the FIFA 2010 soccer world cup tournament were sampled via convenience sampling to participate in this study. Eighty-two soccer spectators (47 males and 35 females), age range 18-61 years old (median age 30 years old) completed the questionnaire for the study. Nine of the completed questionnaires had to be discarded because they had the required biographical data missing. The remaining questionnaires (n=73); 41 males and 32 females, were analyzed and demographic information of the respondents is presented in Table 1:

Table 1: Demographic profile of the respondents (n=73)

	Respondent (%)
Gender:	
Male	*56*
Female	*44*
Age:	
*20-30**	*53*
31-40	*25*
*> 40**	*17*
Education:	
Secondary†	*47*
Tertiary	*32*
Postgraduate	*20*
Employment status:	
Employed	*75*
Unemployed	*25*
Matches attended (past 12 months):	
<10	*47*
10-20	*33*
>20	*20*

*Respondents <20 years and >60 yrs made up 5 % of the sample
†Respondents with primary education made up <2 % of the sample

Data collection

Data collection took place on the above stated date between 11 a.m. and 2 p.m. (until 1 hour before commencement of the match). Two research assistants waited at two of the many stadium entrances and approached football spectators as they entered the stadium. Football Spectators were surveyed as they went into the stadium to avoid surveying the same individuals multiple times. The researcher was available to answer any question about the study or the questionnaire that the respondent may had.

Data analysis

Both descriptive and inferential statistics were used to analyze the results of the study. Pie-charts and percentages (with 95% confidence intervals [CI]) were used to display patterns of responses. Pearson Chi-square (X^2) was used to infer associations between different variables.

RESULTS

Awareness about HL

Forty-eight percent 48 % [CI: 36.3, 59.9 %] of the respondents in this study reported that they knew that the noise made by blowing the vuvuzela can damage their hearing. Hearing loss due to too much noise during matches was considered to be "a very big problem" by 13 % [CI: 6.4, 24.0 %] of the respondents. Drug and alcohol abuse during football matches was considered to be "a very big problem" by 44 %, [32.6, 56.6 %] of the respondents, followed by cigarette smoking in stadium stands (40 %)[CI: 28.7, 52.4 %], acts of violence (e.g. fights in the stands) (38 %)[CI: 26.6, 49.7 %] and risk of catching airborne infectious diseases such as flu or tuberculosis (TB) at soccer matches (18 %)[CI: 10.5, 29.6 %]. Females were more likely to rate

hearing loss from too much noise during matches to be "a problem" or "a very big problem" than males (p=0.042).

Fourteen percent (14 %) [CI: 6.8, 24.8 %] of the respondents reported experiencing some hearing-related problem after attending a football match. The most frequent hearing related problem reported was 'temporary hearing problem.' Figure 1 below shows how respondents rated hearing loss from too much noise during matches.

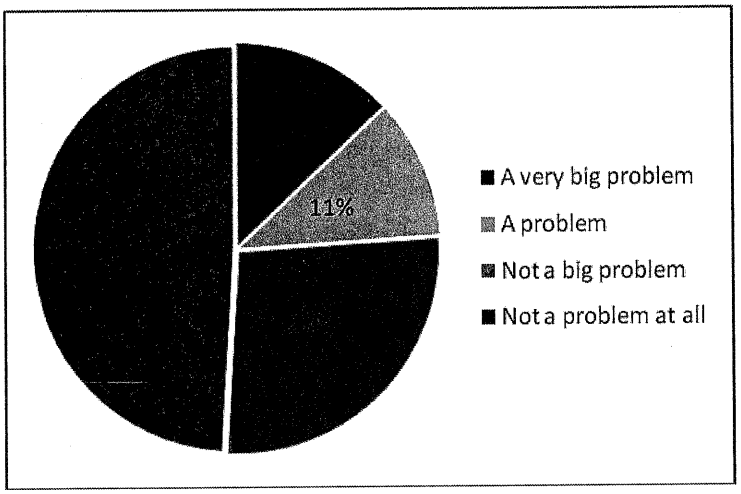

Figure 1: Respondent's rating of hearing loss from too much noise at matches (n=73)

Patterns of noise exposure

Seventy-five percent [CI: 63.6, 84.4 %] of the respondents reported owning a vuvuzela and using or blowing it at all matches they attend. In response to the question; "Now that you know that the noise made by the vuvuzela can damage your hearing, are you going to stop blowing it during matches?" 76 % [CI: 63.3, 86.0 %] of the respondents answered "NO" and 60 % [CI: 44.4, 73.9 %] of those who responded "NO" said that they will not stop blowing the vuvuzela because it is 'part of South African soccer culture' and 38 % [CI: 26.1, 55.3 %] reported that it 'makes the game more fun to watch.' Eighty-eight percent [CI: 77.3, 94.3 %] of all the respondents did not want the vuvuzela to be banned during soccer matches.

Attitudes toward hearing protection

Eight percent [CI: 2.9, 17.8 %] of the respondents reported that they have worn earplugs during a football match while 22 % [CI: 13.1, 33.6 %] of them reported that they have seen someone wearing hearing protection devices at a football match. Twenty-nine percent [CI: 18.7, 40.8 %] of the respondents said that they were "very likely" to use ear plugs during matches if they were provided for free at the stadium. However, 40 % [CI: 28.7, 52.4 %] of the respondents said that they were "not at all likely" to use ear plugs during matches even if they were provided for free. Twenty-two [CI: 12.7, 33.8 %] of the respondents reported that they were "very likely" to use ear plugs next time when they attend a match. Forty-five percent [CI: 32.5, 57.4 %] of the respondents reported that they did not know where they could buy earplugs.

DISCUSSION

Despite widespread concerns that have been expressed mostly in the mainstream media about excessively high noise levels during most of PSL matches, the findings of this study revealed that soccer spectators who took part in it considered the risk of a hearing loss from too much noise during matches to be a low health concern when compared to other health concerns (e.g. people smoking in the stands). This was a further confirmation that hearing loss was considered a health concern of low priority amongst these respondents. The findings of this study are consistent with those of previous studies which suggest that unlike health concerns such as drug and alcohol abuse and acts of violence, which may have immediate life-threatening consequences, noise-induced hearing loss takes longer to show, therefore most people tend to rate it as a lower health concern (Chung et al. 2005; Berger 2001).

Only 14 % of the respondents reported experiencing temporary hearing difficulty or tinnitus after attending a soccer match. This is a relatively low proportion than expected, especially when considering high noise levels that have been recorded at some PSL matches (Ramma et al. 2011). This may assist further in explaining why majority of soccer spectators rated hearing loss as a low priority health concern amongst soccer fans. The number of people who reported hearing related problems in this study was low when compared to the number reported in a similar study of people exposed to leisure noise. For instance, in a study by Chung et al. (2005), 61 % and 43 % of the respondents reported experiencing tinnitus and hearing loss respectively after exposure to loud leisure noise.

Only 8 % of the respondents reported ever using hearing protection when attending a soccer match and 22 % of them said that they have seen someone using hearing protection at soccer matches. Low use of hearing protection was not surprising because most people do not like using them. Even in an occupational setting where use of hearing protection is legislated and enforced, employers battle to get the employees to comply with hearing protection use (Arezes & Miguel 2002).

Despite limited contact during this survey between the researchers and respondents, it was encouraging to note that 22 % of the respondents indicated an intention to use hearing protection when attending their next match. This suggests that behavior change towards noise exposure could potentially be facilitated through focused public education on hearing conservation. Effectiveness and positive impact of hearing conservation programs in a non-occupational setting have been reported in some studies (Griest et al. 2007; Luke & Johnson 1999).

CONCLUSION

Majority of South African match spectators who participated in this study did not consider hearing loss to be a major health risk facing people who attend soccer matches. Most of the respondents expose themselves to noise levels that are potentially harmful to their hearing, and most indicated some resistance towards stopping the use of the vuvuzela, a known noise pollutant at soccer matches. However, willingness to use hearing protection was demonstrated, if it were provided at no cost. Even more encouraging was respondents' reports of increased likelihood of using hearing protection if that suggestion came from a doctor or a nurse.

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From ISO 1999 to noise policy

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INTRODUCTON

Noise pollution is a pervasive byproduct of industry and densely populated regions, impacting the quality of life, both socially and medically (Alberti 1998). Almost 25 % of Europe's population is exposed to transportation noise exceeding 65 dBA, determined as 24 h average energy equivalent noise. In some countries more than one half of the population is exposed to transportation noise (Hinchcliffe 1998). When environmental noise exceeds 65 dBA, sleeping is disturbed and the quality of waking hours compromised. Levels exceeding 85 dBA can cause hearing loss. Both in the United States and Europe, 30 million people are exposed to potentially hazardous levels of noise. Approximately 400 to 500 million people are at risk of developing noise-induced hearing loss (NIHL) (Alberti 1998).

NIHL is considered to be one of the most common occupational health hazards of any country. There are no global figures available for the prevalence of NIHL. Such figures, if they did exist, would lack validity in a rapidly changing industrialized world (Alberti 1998).

When NIHL is moderate to severe, it leads to speech distortion, reduced word discrimination, increased noise intolerance and tinnitus. Reduced oral communication is a social handicap (Ward 1986). NIHL also reduces the perception of warning signals, environmental sounds and music. Consequently, NIHL may lead to social isolation, decreased worker productivity and morale, and an increase of job-related accidents (Ward 1986).

The International Organization for Standardization (ISO) published in 1975 a standard for assessing occupational noise exposure for hearing conservation (ISO 1999 (1975)). The version was updated in 1990 The ISO-model (ISO 1999 (1990)) uses three input parameters: age, exposure to noise, and gender in the evaluation of NIHL. Exposure to noise is evaluated using the equal energy principle. Based on these parameters the distribution of NIHL can be calculated. The variation is large; for men the difference between 10 % and 90 % percentile of hearing loss is 60 dB when the subjects are exposed to a noise level of 100 dBA for 30 years. According to the ISO-model women are somewhat less vulnerable to noise than men. The large variation has been explained by several factors like pitfalls in the equal energy principle, other noise exposure, confounding biological and environmental factors and individual susceptibility factors (Borg 1992; Campo & Lataye 1992; Pyykkö et al. 1988).

According to ISO 1990 there are two components responsible for the deterioration of hearing: the age related component and noise exposure related component. According to the standard the age related component (presbyacusis) is more important than the noise exposure related component until the daily exposure is 90-95 dB. In the standard these components are additive, which suggests that people that are susceptible to noise have an increased risk of hearing loss even without noise exposure.

The ISO 1999 (1990) predicts the distribution of audiometric results in large populations. Audiometry is the gold standard in the evaluation of hearing loss. However the