

NOISE-INDUCED HEARING LOSS WITHIN A HEARING CONSERVATION PROGRAM IN A MANUFACTURING COMPANY

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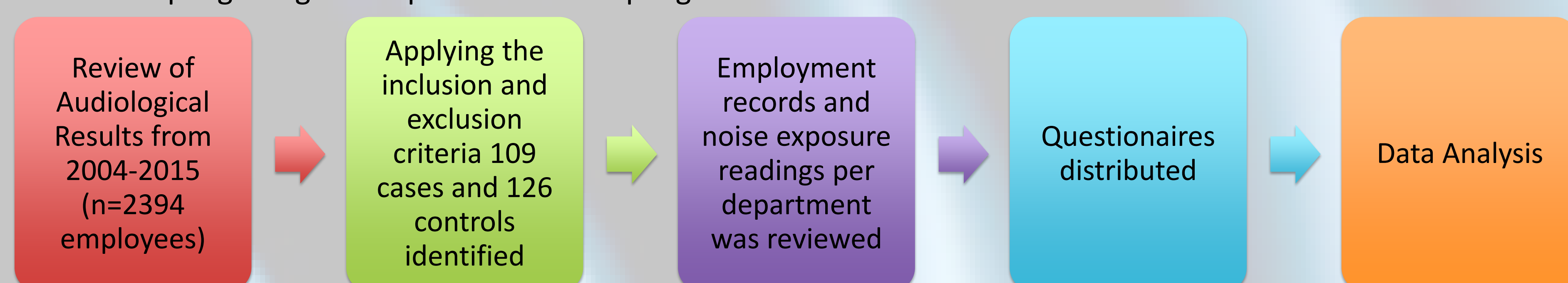
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INTRODUCTION

Occupational noise exposure is a global health problem afflicting most of our industrial sector. An evaluation of the burden of this disease is important in guiding the development of public health policies. The study determined the incidence proportion and associated factors of noise-induced hearing loss in a manufacturing company with a 10-year hearing conservation program

METHODOLOGY

- Study type – nested case control
- Study location - manufacturing factory in the Philippines
- Sample Size - computed using the software Epi Info Ver 7 Stat Calc. Sample will be 138 cases and 138 controls
- Sampling design – simple random sampling



RESULTS

A sample of 235 subjects were obtained from the 2216 employees who underwent audiological testing from 2004-2015. The cases were those who had a threshold shift of 10db or more at 2000Hz, 3000Hz and 4000Hz from a baseline audiometry while the controls did not show any significant change in their audiometry result.

Table 1. Subjects demographic data

Variable	Cases (n=109)	Controls (n=126)	Total (n=235)
Age (Mean +/- SD)	46 years old +/- 7	46 years old +/- 7	
Age Range (Freq,%)			
30-40 years old	29 (27%)	39 (31%)	68 (29%)
41-50 years old	48 (44%)	52 (41%)	100 (42%)
51-60 years old	32 (29%)	35 (28%)	67 (29%)
Sex			
Male (Freq,%)	51 (47%)	79 (63%)	130 (55%)
Female (Freq,%)	58 (53%)	47 (37%)	105 (45%)
Years of employment (Mean +/- SD)	18.72 years +/- 9.44	19.17 years +/- 9.44	
Range of Years of employment (Freq,%)			
1-10 years	7 (6%)	3 (2%)	10 (4%)
11-20 years	73 (67%)	87 (69%)	160 (68%)
21-30 years	10 (9%)	13 (10%)	23 (10%)
>30 years	19 (17%)	23 (18%)	42 (18%)
Hours of Work per week (Mean +/- SD)	52.44 hours +/- 7.63	53.49 hours +/- 7.52	
Range of hours of work per week (Freq,%)			
30-40 hours	10 (9%)	10 (8%)	20 (9%)
41-50 hours	43 (39%)	42 (33%)	85 (36%)
51-60 hours	49 (45%)	63 (50%)	112 (48%)
>60 hours	1(1%)	0 (0%)	1 (0%)
No answer	6(6%)	11(9%)	17 (7%)

The incidence ratio of noise induced hearing loss for the chosen population was 5%. A two tailed T test of equal variance was done on the mean thresholds of the population. The cases had a normal baseline hearing threshold however there is a note of a significant increase in the thresholds starting from 2008 (p value= 00097 for the left ear, p value= 0.0061 for the right ear).

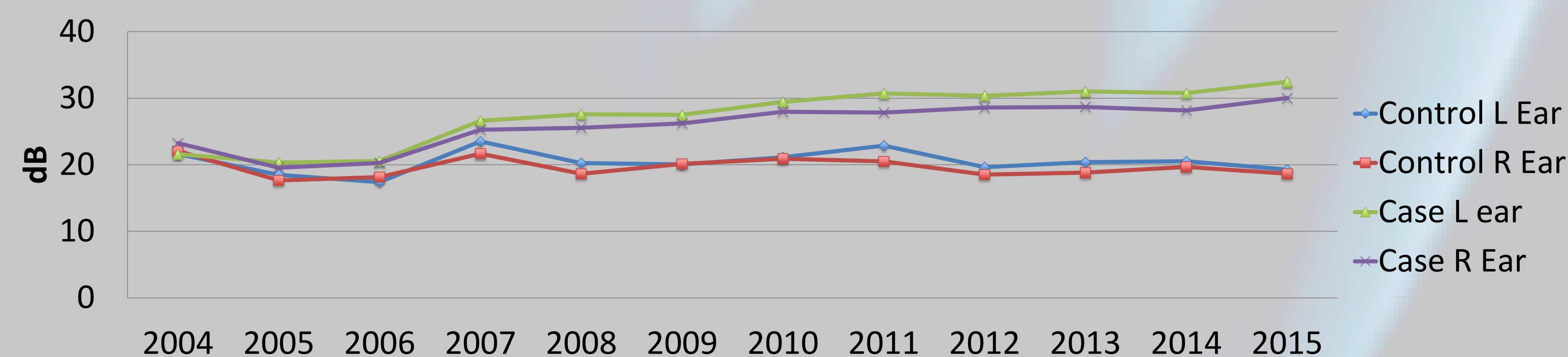


Figure 1. Mean hearing thresholds from 2004-2015

Most of the subjects were from the Fruit receiving/preparation and cookroom department (53%). The noisiest area in the factory only composed 3% of our total sample size and almost half of them had noise induced hearing loss. Most that presented with hearing loss came from the two most well represented department which was the FRCP and PCFP department.

Table 2. Department Distribution and Noise levels

Departments	Noise level (dB)	Cases (n=109) Freq (%)	Controls Freq (%)	Total Freq (%)
Wharf Facility Engineering R & M	72.1	1(0.9%)	0 (0%)	1 (0%)
Packaging	89.25	10(9.17%)	10 (7.94%)	20 (9%)
Can Manufacturing Plant	90.38	7(6.42%)	5 (3.97%)	12 (5%)
Fruit Receiving/ Pre and Ckrm (FRCP)	90.71	62(56.88%)	63 (50%)	125 (53%)
Plastic Contnr & Flex Pouches (PCFP)	89.01	13 (11.93%)	29 (23.02%)	42 (18%)
Processing	92.9	4 (3.67%)	12 (9.52%)	16(7%)
IQF Department	92.9	4 (3.67%)	2 (1.59%)	6 (3%)
Cannery Maintenance	103.6	4 (3.67%)	3 (2.38%)	7 (3%)
Printing Plant	92.23	0 (0%)	2 (1.59%)	2 (1%)
Diversified Products and Pckg QA	89.05	3 (2.75%)	0(0%)	3(1%)
Box Plant	93.9	1 (0.9%)	0 (0%)	1 (0%)

Majority of the workers regardless if they presented with noise induced hearing loss or not used hearing protective devices regularly (78%). Most of them favored the used of ear plugs (40%).

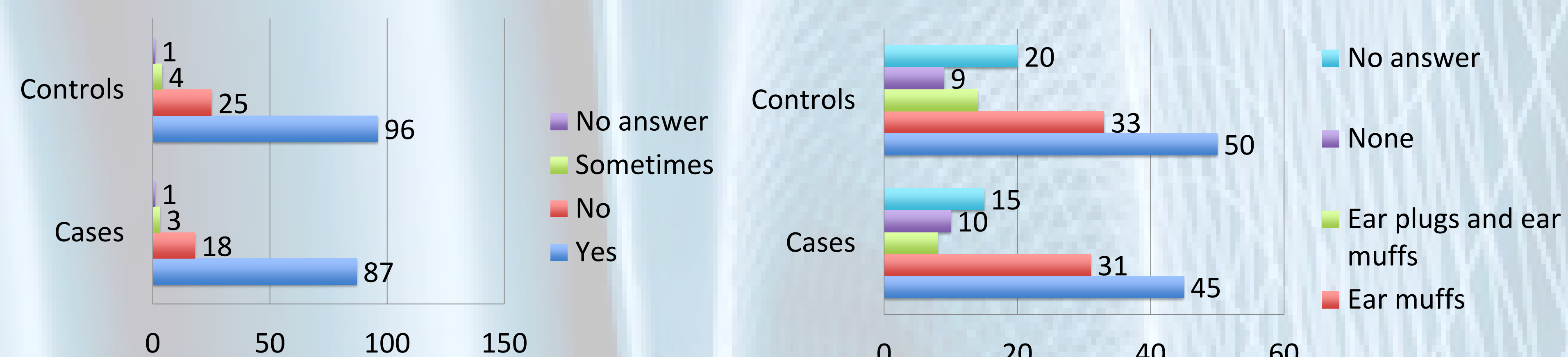


Fig 2. Regular use of ear protection

Fig 3. Types ear protection used

A data abstraction sheet was used to elicit the population's risk factors for hearing loss.

Table 3. Risk factors for hearing loss

Risk factors	Cases (n=109) Freq (%)	Controls (n=126) Freq (%)	Total (n=235) Freq (%)
History of childhood ear infections			
Yes	16 (15%)	14 (11%)	30 (13%)
No	93 (85%)	112 (89%)	205 (87%)
History of adult ear infections			
Yes	21 (19%)	13 (10%)	34 (14%)
No	88 (81%)	113 (90%)	201 (86%)
Hearing loss after childhood illness			
Yes	8 (7%)	3 (2%)	11 (5%)
No	100 (92%)	122 (97%)	222 (94%)
No Answer	1 (1%)	1 (1%)	2 (1%)
Hearing loss secondary to head trauma			
Yes	3 (3%)	1 (1%)	4 (2%)
No	106 (97%)	124 (98%)	230 (98%)
No Answer	0 (0%)	1 (1%)	1 (0%)
History of Dizziness			
Yes	23 (21%)	31 (25%)	54 (23%)
No	85 (78%)	94 (75%)	179 (76%)
No Answer	1 (1%)	1 (1%)	2 (1%)
Hypertension			
Yes	24 (22%)	27 (21%)	51 (22%)
No	85 (78%)	99 (79%)	184 (78%)
Diabetes			
Yes	11 (10%)	7 (6%)	18 (8%)
No	98 (90%)	119 (94%)	217 (92%)

Conditional logistic regression with univariate and multivariate analysis was done to determine which factors influenced the hearing threshold for the population

Table 4. Univariate and Multivariate Analysis

Variable	Odds Ratio	P-Value
UNIVARIATE ANALYSIS		
Sex	1.911556	0.015
History of adult ear infection	2.074301	0.055
MULTIVARIATE ANALYSIS		
Sex	2.941272	0.008

CONCLUSION

The hearing conservation program of the manufacturing company has been effective in reducing the incidence of noise induced hearing loss. Males and those with a history of ear infections are more prone to develop noise induced hearing loss.