HEARING CAPACITY IN RELATION TO NOISE LEVELS AND ORTHER POTENTIAL RISK FACTORS AMONG PRESS PART MACHINE WORKERS IN AUTOPART FACTORY IN SAMUT PRAKRAN THAILAND

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สมรรถภาพการได้ยินต่อระดับความดังเสียงและปัจจัยเสี่ยงอื่นที่เกี่ยวข้องของพนักงานโรงงานปั๊มชิ้นส่วนรถยนต์ในจังหวัดสมุทรปราการ ประเทศไทย

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
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Thesis Title	HEARING CAPACITY IN RELATION TO NOISE LEVELS AND ORTHER POTENTIAL RISK FACTORS AMONG PRESS PART MACHINE WORKERS IN AUTOPART FACTORY IN SAMUT PRAKRAN THAILAND
By	Miss Yupha Pakakate
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ยุภา ผากาเกตุ : สมรรถภาพการได้ยินต่อระดับความดังเสียงและปัจจัยเสี่ยงอื่นที่เกี่ยวข้องของพนักงานโรงงานปั๊มชิ้นส่วนรถยนต์ในจังหวัดสมุทรปราการ ประเทศไทย. (HEARING CAPACITY IN RELATION TO NOISE LEVELS AND ORTHER POTENTIAL RISK FACTORS AMONG PRESS PART MACHINE WORKERS IN AUTOPART FACTORY IN SAMUT PRAKRAN THAILAND) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: Dr. Robert S. Chapman M.D., M.P.H., 72 หน้า.

การศึกษาครั้งนี้ มีการประเมิน ความชุก ของการสูญเสีย การได้ยิน ที่เกี่ยวข้องกับ ระดับเสียง ในกลุ่มตัวอย่างพนักงานปั๊มชิ้นส่วนรถยนต์ 359 คน ใน จังหวัดสมุทรปราการ ประเทศไทย ในปี พ.ศ. 2554-2556 รวมถึงตัวแปรอิสระ อื่น ด้านประชากร , ประวัติการทำงาน และความรู้ ทัศนคติและพฤติกรรม ที่เกี่ยวข้องกับ เสียง และการ สูญเสียการได้ยิน โดยการเก็บรวบรวม ข้อมูล การได้ยิน ผลการตรวจ วัด ระดับเสียง ในสถานที่ หลายแห่งใน โรงงานและสัมภาษณ์ โดยใช้แบบสอบถาม มี การทดสอบสถิติไคสแควร์ สำหรับตัวแปรต้น และ สถติแบบถดถอยโลจิสติก สำหรับตัวแปร อย่างต่อเนื่อง

ความชุกของการ สูญเสียการได้ยิน โดยการวัดในหู ทั้งสองด้าน แตกต่างกัน อย่างชัดเจนจาก 2.5 % ในปี 2010 และ ในปี 2011 พบว่ามีค่าเท่ากับ 31.2 % ระดับความดังเสียง เฉลี่ย มีค่าระหว่าง 89.9-90.4 dB (A) และ ระดับเสียงดังสูงสุด มีค่าระหว่าง 94.6-95.5 dB (A) ในปี 2010 พบว่าการสูญเสียการได้ยิน มีความสัมพันธ์ ที่ไปในทิศทางตรงข้ามกับ คะแนน ของระดับพฤติกรรมและ ไม่มี ตัวแปรอิสระ ที่มีความสัมพันธ์กัน ปี 2011 การสูญเสีย การได้ยิน มีทิศทางเป็นไปในทางลบ อย่างมีนัยสำคัญ ที่เกี่ยวข้องกับ เพศ ชาย (P - 0.048) และ ลดลงอย่างมากในกลุ่มมีความไวต่อการสัมผัสเสียง (p = 0.015) การสูญเสียการได้ยิน มีความสัมพันธ์ เชิงลบกับ การแต่งงาน และ ผลของการสูญเสีย การได้ยินมี ความสัมพันธ์ เชิงบวกกับระดับการศึกษาของพนักงาน (p = 0.116 , p = 0.076 และ p = 0.148 ตามลำดับ) ในปี 2012 การสูญเสียการได้ยิน มีความสัมพันธ์ อย่างมีนัยสำคัญ ในเชิงบวกกับ อายุ รายได้ เพศ ชาย และ การแต่งงาน (p < 0.001 , p = 0.002 , p = 0.005 และ p = 0.038 ตามลำดับ) การสูญเสียการได้ยิน ของพนักงานปั๊มชิ้นส่วนรถจักรยานยนต์มีความสัมพันธ์ทางสถิติ อย่างมีนัยสำคัญ (p = 0.050) การสูญเสียการได้ยิน เกี่ยวข้อง กับการมี ระดับเสียง สูง (p = 0.122) เหตุผลในการ ที่ไม่สอดคล้องกันของ ผล ไม่ชัดเจน นอกจากนี้การวิจัย ในหัวข้อนี้ เป็นสิ่งจำเป็น การวิเคราะห์หลายตัวแปร ต่อไป

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

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YUPHA PAKAKATE: HEARING CAPACITY IN RELATION TO NOISE LEVELS AND ORTHER POTENTIAL RISK FACTORS AMONG PRESS PART MACHINE WORKERS IN AUTOPART FACTORY IN SAMUT PRAKRAN THAILAND. ADVISOR: DR. ROBERT S. CHAPMAN, M.D., M.P.H., 72 pp.

This study evaluated prevalence of hearing loss (dependent variable) in relation to occupational noise levels (main independent variable) in 359 press parts workers at an automotive parts factory in Samut Prakan Province, Thailand, in 2010, 2011, and 2012. Other independent variables included sociodemographic characteristics, work history, and knowledge, attitude, and behavior related to noise and hearing loss. Data collection tools were hearing test results, measured noise levels at multiple sites in the factory, and an interviewer-administered standardized questionnaire. Independent variables were considered separately, by chi-square test for categorical variables and by logistic regression for continuous variables.

Prevalence of measured hearing loss in either ear varied widely, from 2.5% in 2010 to 31.2% in 2011. Means of annual average noise level varied only from 89.9 to 90.4 dB(A), and means of annual high noise level veried only from 94.6 to 95.5 dB(A). Observed associations between independent variables and measured hearing loss prevalence were not consistent from year to year. Also, hearing loss was never statistically significantly associated with measured noise level. In 2010, hearing loss was weakly positively associated with behavior score, and with no other independent variable. In 2011, hearing loss prevalence was significantly negatively associated with male gender (p-0.048), and was significantly lower in workers who reported being sensitive to noise than those who did not (p=0.015). Hearing loss was negatively associated with being married and with self-reporting of hearing loss, and positively associated with educational attainment (p=0.116, p=0.076, and p=0.148, respectively). In 2012, hearing loss was significantly positively associated with age, income, male gender, and being married ($p<0.001$, p=0.002, p=0.005, and p=0.038, respectively). Hearing loss was also significantly lower in the motorcycle parts pressing section than in the automotive parts pressing section or the fuel tank production section. (p=0.050). Hearing loss was also moderately positively associated with high noise level (p=0.122), but not with average noise level. Reasons for inconsistency of results are not clear, although quality of hearing tests was evidently better in 2012 than in other years. Overall, the 2012 results appear most reliable. Conceivably, noise levels at the factory were not high enough to produce appreciable hearing loss. Further research on this topic is needed. Further multivariable analysis of this study's results would also be desirable.

Field of Study: Public Health Student's Signature .....

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CHAPTER I

INTRODUCTION

1.1 Background and Rationale

The development of the automotive industry is usually undertaken in the interest of policymakers in developing countries. The automotive industry has been promoted in order to expand the numerous, and complementary, investments made by auto parts firms as a basis for broad-based industrial growth. Therefore, a number of developing countries have offered several incentives and selective policies aimed at promoting the localization of the domestic automotive industry. (1)In Thailand, the automotive industry has become more export oriented since 1996. Vehicle export units increased from 14,000 units in 1996 to 152,800 units in 2000(2). The automotive industry in Thailand is expected to produce almost 2,000,000 units in 2012, representing a 33 percent increase compared to the same period in 2011. This increase in the number of export units is the result of new vehicles investment and brand new car production in the country.

Even though the Thai automotive industry employs high technology in many parts of the production lines, staff manpower is still very important for operating and controlling the running machinery(2). Most of the staff alternative their work in two shifts between 08:00 - 17:00 and 20:00 - 05:00. While working on the job site, the operation staff will be affected by the noise from operating machines for approximately 8 hours continuously (3). A noise measurement investigation into 55 operation sites at an auto part factory in Samutprakran revealed that 22 of the sites (40% of the monitoring area) measured average noise between 90 – 94.5 db throughout an 8 hour shift (4).

A further important source of information comes from the employee's annual health checkup results. For example, the results of the annual medical examination in 2010 found that out of 1310 employees who took the hearing test, 40 persons or 3% were found to be irregular (4) . 2011 the annual health checkup results found that of 1017 employees who took the hearing test, 96 persons or 9.44% were found to be irregular(4). In 2012 the annual health checkup results found that of 1062 employees who took the hearing test, 309 persons or 40.34% were found to be irregular (The Occupational Health and Safety Department, 2012) (4).

Based on the results of the medical examination conducted in 2010 – 2012, for those employees working at the same pressing section of the factory, the hearing

test found 379 person with the same hearing capacity. In 2010 annual health checkup results found that out of 379 employees who took the hearing test, 6 persons were found to be irregular. The left ear was found to be irregular at a hearing frequency of 4000 – 6000 Hz in 6 persons or 1.6% out of the total employees tested. The right ear was found to be irregular at a hearing frequency of 4000 – 6000 Hz in 5 person or 1.3% (5). Irregularities in both ears at a hearing frequency of 4000 – 6000 Hz were found in 5 persons, or 1.3% of the total.

In 2011, the annual health checkup results found that out of 379 employees checked with the hearing test, 100 persons were irregular. In the left ear, irregular hearing was found at frequency 2000 Hz in 55 persons or 73.5%, at frequency 4000 – 8000 Hz in 9 persons or 2.4%, and at a low frequency in 35 persons or 9.3%. In the right ear, irregular hearing was found at frequency 2000 Hz in 55 persons or 73.5%, at frequency 4000 – 8000 Hz in 9 persons or 2.4%, at a low frequency in 14 persons or 3.7%, and at a high frequency in 9 persons or 2.4% (5).

In 2012 annual health checkup results found that out of 379 employees who took the hearing test, 58 persons were found to have irregular hearing: In the left ear, at a frequency of 3000 Hz, 1 person was found to be irregular or 0.3% of the total. At hearing frequency 4000 Hz 3 persons were found to be irregular or 0.8%. At hearing frequency 6000 Hz 17 persons were found to be irregular or 4.5%. At hearing frequency 8000 Hz 3 persons were found to be irregular or 0.8%. At hearing frequency 1000,2000,4000,8000 Hz 2 persons were found to be irregular or 0.5%. At hearing frequency 3000,4000 Hz 1 person was found to be irregular or 0.3%. At hearing frequency 1000-8000 Hz 3 persons were found to be irregular or 0.8%. At hearing frequency 2000-8000 Hz 1 person was found to be irregular or 0.3%. At hearing frequency 3000-8000 Hz 1 person was found to be irregular or 0.3%. At hearing frequency 3000-6000 Hz 2 persons were found to be irregular or 0.5%. At hearing frequency 3000-8000 Hz 3 persons were found to be irregular or 0.8%. At hearing frequency 4000-6000 Hz 2 persons were found to be irregular or 0.5%. At hearing frequency 4000-8000 Hz 8 persons were found to be irregular or 2.1%. At hearing frequency 6000-8000 Hz 10 persons were found to be irregular or 2.6%(5).

In the right ear at hearing frequency 4000 Hz 4 persons were found to be irregular or 1.06 %. At hearing frequency 6000 Hz 3 persons were found to be irregular or 0.8%. At hearing frequency 8000 Hz 2 persons were found to be irregular or 0.53%. At hearing frequency 4000,8000 Hz 1 person was found to be irregular or 0.27%. At hearing frequency 6000,8000 Hz 5 persons were found to be irregular or

1.33%. At hearing frequency 3000,6000,8000 Hz 1 person was found to be irregular or 0.27%. At hearing frequency 1000-8000 Hz 3 persons were found to be irregular or 0.8%. At hearing frequency 3000-6000 Hz 5 persons were found to be irregular or 1.33%. At hearing frequency 3000-8000 Hz 3 persons were found to be irregular or 0.8%. At hearing frequency 4000-6000 Hz 4 persons were found to be irregular or 1.06%. At hearing frequency 4000-8000 Hz 2 persons were found to be irregular or 0.53%. At hearing frequency 6000-8000 Hz 3 persons were found to be irregular (5).

Hearing Test Capacity Result in Pressing part workers from 2010-2012

Hearing Loss Frequency (Hz)	Not Normal 2010						Not Normal 2011						Not Normal 2012					
	Right Ear	%	Left Ear	%	Both ear	%	Right Ear	%	Left Ear	%	Both ear	%	Right Ear	%	Left Ear	%	Both ear	%
Normal	372	98.4	372	98.4	373	98.7	291	77.0	278	73.5	355	93.9	341	90.2	320	84.7	356	94.2
2000 Hz	0	0.0	0	0.0	0	0.0	55	14.6	55	14.6	0	0.0	0	0.0	0	0.0	0	0.0
3000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
4000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	1.1	3	0.8	3	0.8
6000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	0.8	17	4.5	3	0.8
8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.5	3	0.8	2	0.5
4000,8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0	0	0.0
1000,2000,4000,8000 H	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.5	0	0.0
3000,4000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
4000,8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
6000,8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	1.3	0	0.0	0	0.0
3000,6000,8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0	0	0.0
500 -6000 Hz	1	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1000 -8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	3	0.8	1	0.3
2000 -8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	0.8	1	0.3	1	0.3
3000 - 4000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
3000 -6000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	1.3	2	0.5	2	0.5
3000 -8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	0.8	3	0.8	3	0.8
4000 - 6000 Hz	5	1.3	6	1.6	5	1.3	0	0.0	0	0.0	0	0.0	4	1.1	2	0.5	2	0.5
4000 -8000 Hz	0	0.0	0	0.0	0	0.0	9	2.4	9	2.4	9	2.4	2	0.5	8	2.1	2	0.5
6000 - 8000 Hz	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	0.8	10	2.6	3	0.8
Low Frequency	0	0.0	0	0.0	0	0.0	14	3.7	35	9.3	14	3.7	0	0.0	0	0.0	0	0.0
High frequency	0	0.0	0	0.0	0	0.0	9	2.4	1	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Total	6	1.6	6	1.6	5	1.3	87	23.0	100	26.5	23	6.1	37	9.8	58	15.3	22	5.8
N=504																		

Table 1Hearing Test Capacity Result in Pressing part workers from 2010 -2012

Based on the results of the environment monitoring measurement in 2010, the measurement noise level for the entire stamping parts production line at 28 different points found that the noise level values were over standard > 90 dBA, with an average value between 90 - 97 dB at 18 points or 64.28% of the total measurement points. In 2011 the measurement noise level at all of the stamping parts production line's 29 points found that the values were over the standard > 90 dBA, with an average value between 90 - 90.5 dBA at 18 points or 62.06% of the

total points. In 2012 the measurement noise level at all of the stamping parts production line's 31 points found that the values were over the standard > 90 dBA, with an average value between 90 - 94.5 dBA at 15 points or 48.38% of the total points (5)

The standard range for noise exposure as outlined in the guide by the Ministry of Industry Thailand indicates that noise levels should not exceed 90 dB per 8 hour-shift. Exposure to noise levels exceeding the recommended maximum noise level in a period of time might induce hearing problems and hearing loss in the long term (6) In order to comply with the Department of Labor Protection and Safety's safety policies, the company has introduced ear plug equipment for the 1,030 staff to wear to reduce the noise while working in the pump part areas where the noise exceeded 85 dB. By using this equipment, high frequency noise exposure can be reduced by up to 25-30 dB and can be applied for use in areas where noise has been measured between 115 - 120 dB (6).

The proposed study focuses on hearing levels in relation to noise level among the staff who work at the pressing parts production section at the Autopart Factory Samutprakran Thailand. Ultimately, this study will provide recommendations and guidelines to reduce the exposure of factory staff to noise levels that exceed noise standards in the automotive and other heavy industries.

1.2 Objectives of the study

1. To evaluate the relationship between noise level and hearing capacity among working staff in the pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand
2. To characterize hearing capacity as tested among working staff in pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand
3. To characterize noise levels during the pressing parts process, at the Auto Parts Factory, Samuthprakarn, Thailand
4. To evaluate the relationship between the hearing capacity test and hearing loss behavior protection, the hearing capacity test and attitudes towards hearing loss protection, and the hearing capacity test and knowledge on hearing loss protection, among the working staff in the pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand

1.3 Research questions of the study

1. Is there any association between noise level and hearing capacity test among working staffs in pressing parts, Autopart Factory, Samuthprakarn, Thailand?
2. What are the prevalence of hearing capacity test among working staffs in pressing parts, Autopart Factory, Samuthprakarn, Thailand?
3. What are the noise level among pressing part rocess, Autopart Factory, Samuthprakarn, Thailand?
4. What are the percentage behavior of prevention Noise Induce Hearing Loss among working staffs in pressing parts, Autopart Factory, Samuthprakarn, Thailand?
5. Is there any association between hearing capacity test and Hearing loss behavior protection , hearing capacity test and attitude for Hearing loss protection , hearing capacity test and knowledge for Hearing loss protection among working staffs in pressing parts, Autopart Factory, Samuthprakarn, Thailand?

1.4 Research Hypotheses

1. There is an association between noise levels and the hearing capacity test among working staff in the pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand.
2. There are the prevalence of hearing capacity as tested among working staff in pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand
3. There are varied noise levels during the pressing part process at the Auto Parts Factory, Samuthprakarn, Thailand.
4. There are varied percentages in prevention behavior addressing noise induce hearing loss among working staff in the pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand.
5. There is an association between the hearing capacity test and hearing loss behavior protection, the hearing capacity test and attitudes towards hearing loss protection, and the hearing capacity test and knowledge related to hearing loss protection among working staff the in pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand.

1.5 Benefit of the study

Providing recommendations and guidelines for prevention of hearing loss programs for the working staff in the pressing parts section, so as to protect them from adverse health effects from excessive noise level exposure.

1.6 Study area

Autopart Factory, Bangplee District ,Samuthprakarn, Thailand.

1.7 Variables in the study

1.7.1 Independent variables

Noise Level

Including noise levels in the pressing parts section where a worker hears from 80 – 98 dB(A).

Socio-demographics

Including gender, age, family income, job position, working shift, and number of years of working experience.

Knowledge

Knowledge of health effects related to exposure to excessive noise, and knowledge on how to protect themselves from adverse health effects related to noise exposure in the factory (7)

Attitude

Attitude is perceived as susceptibility to the benefits of using personal protective equipment among working staff to prevent themselves from suffering adverse health effects due to excessive noise exposure in the factory.

Practice

Practice related to the working staff's prevention of adverse health effects stemming from excessive noise exposure in the pressing parts section.

1.7.2 Dependent Variable

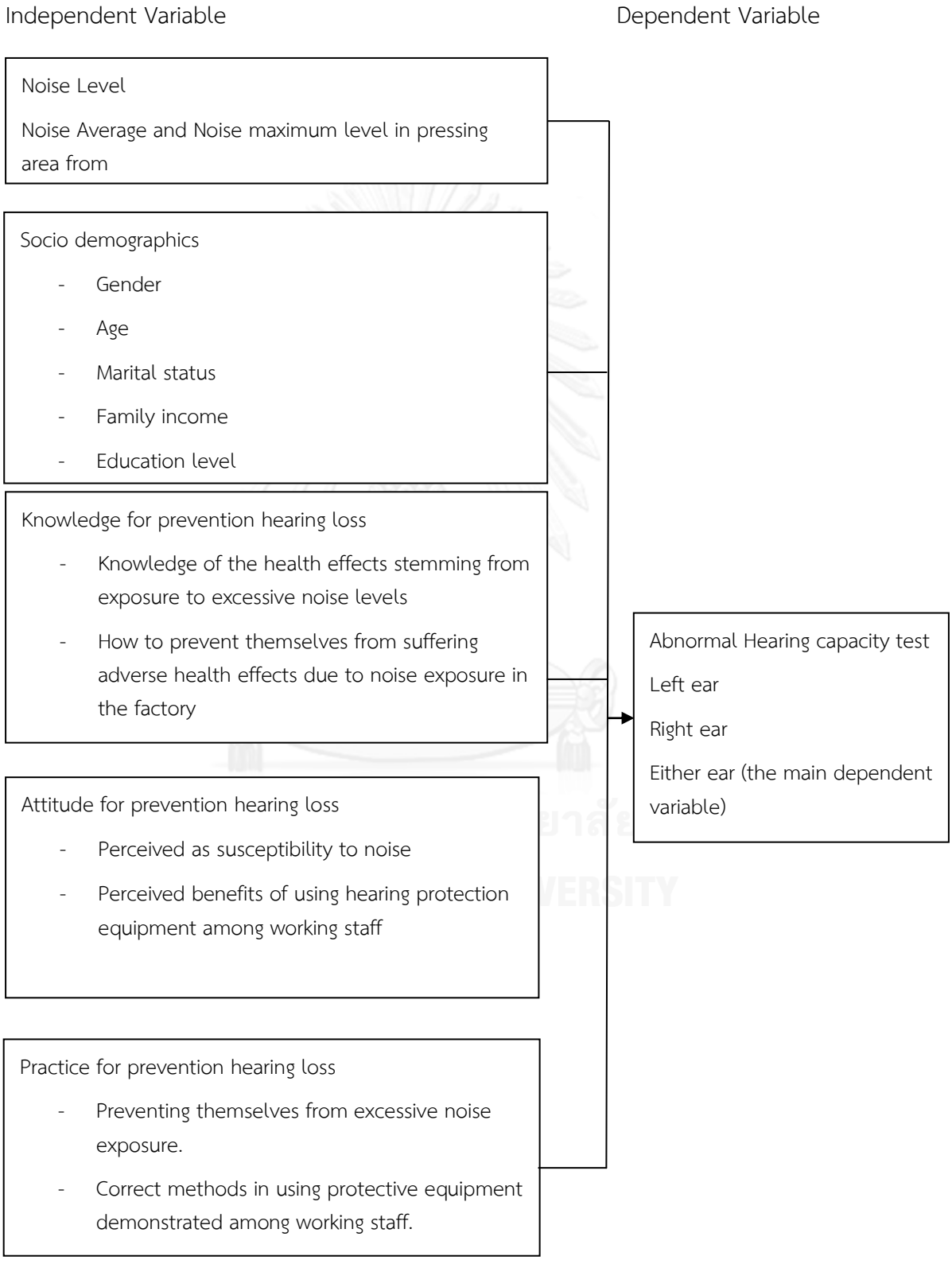
Hearing capacity test

Abnormal hearing capacity in either ear, as measured with the Audiometry method, tested frequency levels at 500 Hz,1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, 5000 Hz, 6000

Hz, 7000 Hz, 8000 Hz At each frequency the basis for deciding normal and abnormal is the difference more than 25 dB(A)(8)

1.8 Conceptual framework

Figure 1Conceptual framework



1.9 Operational definitions

Protective equipment is personal protective equipment employed to provide hearing protection against noise exposure for employees, reducing their noise exposure by 25 - 30 dB(A) .

Hearing capacity test is the method to test provides an evaluation of the sensitivity of a person's sense of hearing and is most often performed by an audiologist using an audiometer.

Noise-induced hearing loss is the exposure to harmful noise levels that are too loud, including loud sounds that last a long time, which may damage sensitive structures in the inner ear resulting in noise-induced hearing loss (NIHL). As a result of NIHL, the capacity of the person’s hearing is reduced.

Socio demographics include noise levels, gender, age, family income, job position, working shift and number of working years.

Knowledge includes awareness of the adverse health effects of exposure to excessive noise, how to use earplugs, and how to prevent the adverse health effects of noise exposure in the factory.

Attitudes are perceived as susceptibility to the benefits of using personal protective equipment (ear plugs) among working staff.

Behavior relates to the worker’s prevention of adverse health effects related to excessive noise exposure, and the correct use of protective equipment among pressing parts working staff.

CHAPTER II

LITERATURE REVIEW

2.1 General information about Hearing loss In Thailand

In the automotive parts industry, there is a significant risk of hearing loss in the workplace (6). The causes of hearing loss have been found to be related to two main reasons and are due to unsafe working conditions(9).

Unsafe conditions can include physical factors. For example, working in an area that is particularly loud may cause hearing loss,(10) and result in the worker being unable to concentrate on their job. As a result, their overall performance decreases and the hearing loss interferes with their ability to converse (11) A study conducted by (12)measured noise levels in environments that included pressing parts. Average volume during welding for the duration of 8 hours was found to exceed by 90 percent 80 dB and exceed by 44 percent 90 dB, which exceeds safety standards in the work environment. Ministry of Interior. Noise level safety regulations require that for those employees working more than 8 hours per day(13), the noise level must be below 80 dB A, which most people will work more than eight hours or more were 71.4 dBA and the average day.(14)

Evidence gathered from samples studied in a sugar factory found that hearing must to look up to 42.30 percent and performance monitoring hearing irregular (15)behavior 34.32 percent of the overall protection level of 74.62 per cent was found to prevent the behavior correlated with the ability to hear a statistically significant ($r = -.304$, $p < .01$). The results reflect that the prevention of hearing loss among working staff is essential, therefore a surveillance system measuring hearing loss among workers as well as safety behavior is important in the field of Occupational Health (9).

Evidence from metal workers found that the factory workers that the used hearing protection had showed a rate of hearing loss (11.9 percent) less than those workers who do not use hearing protection (21.3 percent),(11) which is statistically significant at the .05 level(16). Therefore, in order to reduce hearing loss among workers it is important to encourage the adoption of hearing protection to reduce noise levels.

Regarding the Education (16)study on the production of motor vehicles and the habit of staff to use personal protective equipment, 29% of the workers use

hearing protection, while 70% are in the habit of non using personal protective equipment, which is included in the medium.

The expression of risk depends on factors related to the risk behaviors of individuals who have been trained. (14)

The study of (17) found that the students who had been trained on safety at work (85.4%) result in knowledge and behavior, the more secure of the Icon is my best and please. Community organizations (8)

2.2 General Information of Noise

Noise or Sound is a form of energy from vibration through an intermediary, which could be a solid, liquid and gas. Dangerous noise levels, as defined by the World Health Organization, is sound that exceeds 85 dB at all frequencies. The majority of industrial noise levels that been found to exceed 85 dB can cause adverse physical and mental health effects. (1)

Table 2Hearing Test Capacity Result in Pressing part workers from 2010-2012

WHO grades of hearing impairment

Grade	Hearing level (a)	Impairment
0	≤ 25 dB	None – can hear wispers
1	26-40	Slight – Can hear word at 1M in normal voice
2	41-60	Moderate – Can hear words at 1M in raised voice
3	81-80	Severe – can hear words if shouted into ear
4	≥80 dB	Profound – cannot hear shouted words

Source: Word Health Organization

2.3 Type of Noise

Type 1 Continuous Noise or Steady-state Noise is noise not more than 5 dB, like the sound of air in your home, or the noise from a fan.

Type 2 Fluctuating Noise is noise that rises and falls by more than 5 dB

Type 3 Impact Noise or Impulse Implosive Noise is the highest short-range noise and disappears quickly, in milliseconds, such as the sound of an explosion or the sound of an impact.

Type 4 Intermittent Noise, Incoherent Sound. The human ears can pick up sound from 20 to 20,000 Hz frequency. The frequency of sound in everyday life ranges from

125 - 8000 Hz and at 500 - 2000 Hz the human voice is like a pendulum clock (Street noise, data from the Health Sciences industry. M Technology)(18)

2.4 Harmful effects of noise

Excessive noise levels can harm people in a number of different ways. The Health Sciences industry has identified several broad categories of harm resulting from excessive noise levels: (19)

- Harmful to the human hearing system.
- Harmful to human health.
- Harmful in the workplace.

2.5 Harmful to the human hearing system

As a result of excessive noise, a person may experience hearing loss as compared with a person who has normal hearing, for example, when workers are exposed to loud noise. This is true for many professions which have a high risk of hearing loss (16).

The human auditory system is complex and sensitive, and if any of the hair cells are destroyed or damaged it will lead to hearing loss. The nature of the hearing loss is divided into two types:

The study of auditory hair cells found to snuggle. Is an important organ in the human voice. If hair cells are destroyed or damaged, it will lead to hearing loss. The nature of the hearing loss is divided into two types.(11)

2.5.1. Acute loss of hearing (Acoustic Trauma) is defined as the sudden loss of hearing, usually as a the result of contact with a large sudden volume of noise in a short period of time, for example, a jackhammer with a volume greater than 140 db A which sounds like a cannon blast. (15)

2.5.2 Hearing loss from loud noise (Noise Induce Hearing loss) refers to the gradual and net loss of hearing usually found among workers in work environments with loud constant sound above a certain range.

2.6 Types of hearing loss

2.6.1 Temporary hearing loss (Temporary Threshold Shift: TTS) refers to hearing loss caused by exposure to a loud noise for a certain period of time.

Damaged hair cells cannot work temporarily. In general, the hair cells will eventually return to normal after experiencing 14 to 16 hours of temporary hearing loss, which may occur in conjunction with noise in the ears (Tinnitus). If repeated often, the damage done to the hair cells will eventually develop into a permanent net loss of hearing.(18)

2.6.2 Permanent hearing loss (Permanent Threshold Shift: PTS)

Refer to unhearing loss that is permanent. In the early stages of the hearing loss, the Audiogram hearing chart shows that out of hearing loss frequencies ranging from 3000 to 6000 Hz, the frequency of susceptibility to hearing loss is at maximum 4000 Hz.

2.7 Factors for hearing loss and noise level (Sound level)

2.7.1 Duration of the noise exposure per day (Time - Exposure)

2.7.2 Type of sound, for example the impact of the noise can cause physical damage

2.7.3 The frequency of the voice, which sounds at higher frequencies or treble and bass to cause damage to the human auditory system

2.7.4 Number of years worked

2.7.5 The age of the workers

2.7.6 Sensitive to the voice of the individual(11)

2.8 Hearing test technique

The hearing test Autography will check voice frequency ranges from frequency and sound measuring equipment, including frequencies which are not often heard in everyday life. The examination takes this data and creates a graph called an audiogram (20)

The Descending Technique is done by releasing noise at a standard level into the ear of the examinee, before the examiner gradually reduces the noise level by 10 dBHL until at a certain point the examinee ceases to hear any noise. Once the examinee does not hear any noise, the examiner will increase the volume of the noise by 5 dBHL until the examinee hears the noise again. The noise level is reduced by 10 dBHL once again, to ensure that the result is correct, and when the examinee cannot hear a noise the examiner the raises it again by 5 dBHL to measure the minimum noise level that the examinee can hear. (21)

2.9 Examination of ears and hearing.

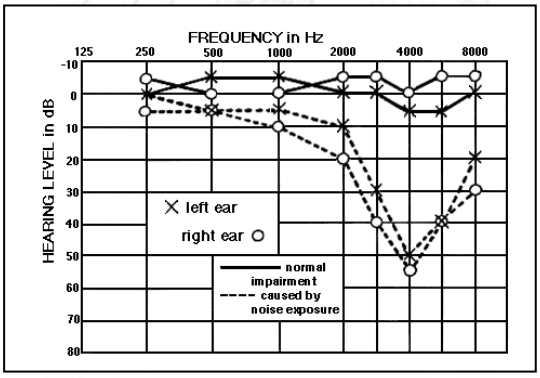
The Audiometer Hearing determines the lowest volume levels that a person can hear at various frequencies, through air conduction voice (AC).(20)

1) The respondent sits in the room (sound boot), with a sound level that shall not exceed a standard 40 dB(A) frequency

2) The experimenter explains to the respondents that a signal will be heard, and once heard to press the response switch

3) The examinee sits with his back to the experimenter, wearing the test headphones with the red cover on the right ear and the blue cover on the left ear

4) The examiner the begins the hearing test, starting well before the beginning of the hearing threshold at the frequency of 500 Hz, 1,000 Hz, before progressing to 2,000, 3,000, 4,000, 6,000 and 8,000 Hz. The examiner will then come back to 1,000 Hz, and then down to 500 Hz and 250 Hz. (21)



Type of noise induce hearing loss by audiometer Hearing Individual test result

5) Criteria to classify Hearing loss: The examiner will classify the results of the hearing test by audio grapy (AC), consisting of hearing frequencies 500, 1000, 2000 3,000, 4,000, 6,000 and 8,000 Hz Hz. If the difference is more than 25 dB(A) in a frequency and the graph is in the shape of a V, it is possible to estimate a tendency towards hard of hearing or hearing loss.(14)

2.10 Definition of knowledge Attitude and Behavior

2.10.1Knowledge

knowledge as “the capacity to acquire, retain and use information; a mixture of comprehension, experience, discernment and skill.” Prapaen Suwan says that knowledge is the basic behavior, where students only have to remember. Recalling, remembering, seeing and hearing are stages of knowledge, including the knowledge of facts, structural definitions and problem solving. Benjamin S. Bloom defines knowledge as being relevant to recalling a story or recalling in general, or in recalling different scenarios through memorization.Patrick Meredith mentions that knowledge requires two main elements: understanding (Understanding) and persistence (Retaining) because knowledge means being able to remember(22)

2.10.2 Attitude

Attitudes are defined as evaluations of entities, including behaviors, that result in perceptions of favor or disfavor. Consequently, attitudes may predispose individuals to adopt or reject specific health-related behaviors

Attitude is well equipped for the expression in any manner that would support or oppose certain circumstances, someone, or something

Attitudes and behaviors are associated with an intended expression. The man with the intention of doing something positive, will show this through behavior. Attitude is the tendency of the mind in relation to experience gained, for example in satisfaction or dissatisfaction, or in agreeing or not agreeing with such feelings as love and hate (12)

2.10.3 Behavior

Behavior refers to a person’s actions, which can occur consciously or unconsciously. Behavior is a consequence of the knowledge, attitudes and beliefs of a person. It may be expressed clearly as an exercise, for example in prevention, walking and eating, or not clearly expressed, for example through stress, anxiety, etc. In general, behavior may be desirable or unwanted. (22)

2.10.4 Audiometry

The Audiometry is a test to measure an individual's hearing threshold level at different frequencies.

2.10.5 Hearing thresholds level

The hearing threshold level is the quietest sound a person can detect at a specific frequency, relative to a young person with normal hearing and was the cut off point 25 dB(A) for normal and abnormal.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research design

This study was a cross-sectional study based on data collected by hearing capacity tests, noise measurements and a questionnaire (Concerning Knowledge, Attitude, and Behavior to prevention hearing loss among pressing parts workers in the Auto Parts Factory, Bangplee District, Samuthprakarn, Thailand.

3.2 Study Area

There are 1,030 people including 800 males and 230 females working in the pressing parts section out of a total of 4,567 persons in the Auto Parts Factory, Bangplee District, Samuthprakarn, Thailand.

3.3 Study population

The study population of this study is comprised of only pressing part workers who have been permanent workers, and who have worked in the pressing parts section of the factory for more than two years, and have results from hearing capacity tests conducted in 2010 – 2012 at the Auto Parts Factory, Bangplee District, Samuthprakarn, Thailand. This research concentrated on pressing parts workers who use personal protective equipment for the prevention of hearing loss. Some of worker demonstrated a lack of knowledge regarding the use of earplugs and lack of attitude towards using earplugs. Therefore, this research was designed to measure the concentration of knowledge, attitudes and behavior regarding the use of earplugs in Thai Summit Auto Parts Industry Co. Ltd., Bangplee District, Samuthprakarn, Thailand.

3.4 Sample size

The press part worker 1030 person who are Press part worker staffs who working press part when were selected by Saturation Sample (Taking Everybody) in this area. The sample size estimation was using the all of worker are working press part more than 2 years and have hearing capacity test from 2010-2012 to allowed for complete data participate. A total of 379 participants were eligible for this study.

3.5 Sampling method

Participants are selected based on the purpose of using systemic sampling by criteria without replacement method. Sampling technique process for screening was conducted by the step below

Create a list of all prospective participants 1030 persons in Press Part Process in Auto Parts Factory Co.Ltd., Bangplee District, Samuthprakarn, Thailand.

Choose list name of press part workers 378 person were same Hearing test capacity from 2010 - 2012

Selected the participant by choosing Saturation sample (Taking Everybody) 379 person for this study .

Inclusion criteria

Male or Female

Duration of time of as a permanent worker and/or as a subcontracted worker who works in the pressing parts section at the Auto Parts Industry Co. Ltd. for more than 2 years

Choose the worker who has worked in the pressing parts section and who has undertaken hearing capacity tests from 2010 – 2012

The participant has the ability to read and write in the Thai Language

Exclusion criteria

The worker staffs who were diagnosed hearing loss or underlying illness.

The worker staffs who were working experience less than 2 years.

Some worker was change process bus was hearing capacity test from 2010-2012 there for that person we cannot choose to study .

3.6 Measurement Tools

To collect the independent variable data, hearing test capacity, noise measurement and structured questionnaire was employed with face-to-face interviews. The questionnaire was modified following WHO guidelines on the development of general KAP surveys

3.6.1 Hearing capacity test

The Audiometer Hearing with the lowest volume levels. That the inspection can be heard. At various frequencies. The hearing by air conduction voice (AC).

1) The respondent was sitting in the room (sound boot) with a sound level shall not exceed the standards in all 40 dB(A) frequency

2) The experimenter explain to the understanding of the tester signal to be heard and to press the response switch

3) The examinee was sitting with his back to the experimenter and the test head phone cover red right ear. Blue cover the left ear

4) The examiner ask to respondents and tested in their ear before the start of the hearing threshold at the frequency of 500 Hz, 1,000 Hz. Then a further 2,000 3,000 4,000 6,000 and 8,000 Hz. Then come back to retest the 1,000 Hz., And then for the next 500, 250 Hz. respectively.

3.6.2 Noise measurement test

Noise measurement test was use Sound level meter to test the noise level at working area .The measuring volume (Sound Level Meter), which gives the effect of the measure in decibels (A) is usually measured at the ear of the workers. To estimate the volume that exceeded the standards or not, the results will be compared to the standards of the Ministry of the Interior - work up to 7 hours / day, a level not exceeding 91 dB A - work. 7-8 hrs / day, the volume must not exceed 90 dB A - more than 8 hours per day, the volume must not exceed 80 dB A and the employer shall provide employees does not work in excess of 140 dB A sound level (15)

3.6.3 Structured questionnaire

A structured questionnaire is used to collect the data, consisting of four parts where most questions are of a close-ended type.

Part 1: Socio-demographic characteristics of pressing part workers in the area of study.

Part 2: Knowledge towards hearing loss prevention

Part 3: Attitudes toward hearing loss prevention

Part 4: Behavior regarding hearing loss prevention

Part 1: Questionnaires for socio-demographic characteristics of press part worker in study area.

There are 14 questions regarding age, years of work, working experience, marital status, education, employment status and income .

Part2: Questions regarding knowledge towards hearing loss prevention.

For this section there are eight questions which ask about the essential knowledge in using earplugs, including the health effects of earplugs and about which types of earplugs are appropriate for workers in order to prevent hearing loss. A correct answer is given a score of 1 and a score of 0 is given for the wrong answer. Scores vary from 0 – 8 points and are then classified in three level as follows:

Table 3 Level of knowledge

Level of knowledge score	Description
0-3 (less than 60 %)	Low level
4-6 (60 – 80 %)	Moderate level
7-8 (80 -100 %)	High level

Part 3: Questions regarding attitudes toward hearing loss prevention

In this section there are eight questions, including questions about the attitude of the pressing parts workers towards using earplugs for hearing loss prevention. These questions are assessed using a Likert scale, with the ratings measured as follows:

Table 4 Likert Rating Scale

Score(Negative)	Score(Positive)	Response
0	4	Strongly agree
1	3	Agree
2	2	Neutral
3	1	Disagree
4	0	Strongly disagree

The scores varied in a range of 0 – 32, where all the individual answers were summed up to calculate the total score and the mean. The total score is classified in there levels:

Concerned attitude 26 – 32 score (81 – 100 %)

Neutral attitude 20 – 25 score (60 – 80 %)

Unconcern attitude 0-19 score (less than 60 %)

Part 4: Questions on behavior regarding hearing loss prevention

There are eight questions regarding the general behavior of workers using earplugs for hearing loss prevention. This section asks about excessive noise exposure and the

correct use of earplugs, as well as the implementation of information regarding hearing prevention among the workers.

There are eight statement with include positive and negative answers. The rating scale is measured as follows:

Table 5 Likert Rating Scale

Statement of behavior score

Response	Score (Positive)	Score (Negative)
Always	4	1
Frequent	3	2
Sometimes	2	3
Never	1	4

The score varies from 8 – 32 score and is classified in to three levels (Good behavior, Fair behavior and Poor behavior):

Good behavior	26 – 32 score	(81 – 100 %)
Fair behavior	20 – 25 score	(60 – 80 %)
Poor behavior	0-19 score	(less than 60 %)

3.7 Data Collection

Data is collected using a structured questionnaire (Appendix), with the following sections:

Socio–demographic characteristics of pressing parts worker in the area of study

Knowledge towards using earplugs for hearing loss prevention

Attitudes towards using earplugs for hearing loss prevention

Behavior towards using earplugs for hearing loss prevention

Data management and analysis

Enter and clean the data

Cleaning the data is done to catch and correct errors before the analysis

Enter the data into the database and conduct a final check to look for entry errors. Run counts or frequencies for each response, and evaluate where missing responses are present

Make extra copies of the data and keep the master files in a safe location

Implement a plan for the analysis of the data using SPSS software

Code the data

Describe subject characterizes - independent and dependent variables

Look for differences between population groups

Test relationships in the data

Statistical Technique

Statistical technique: SPSS software will be used for quantitative data analysis.

Descriptive data analysis was used to describe the independent and dependent variables in the data. Frequency distributions will be prepared for categorical variables. Summary descriptive statistics, e.g., mean, standard deviation, range, and median was given for continuous variables.

	Continuous Data	Categorical Data
Independent variables.	Mean, SD, Range, Median	Frequency distributions
Dependent variables.	Mean, SD, Range, Median	Frequency distributions

Inferential data analysis. Bivariate analysis was conducted to assess associations between independent and dependent variables. In this analysis, dependent variables was analyzed in relation to one independent variable at a time. Correlation analysis was used when dependent and independent variables are both continuous. Independent t-tests, one-way analysis of variance, or corresponding non-parametric techniques was used when dependent variables are continuous and independent variables are categorical. Chi-square tests was used when dependent and independent variables are categorical. Logistic regression analysis was used when dependent variables are dichotomous and independent variables are continuous.

Table 6 Likert Rating Scale

Absolute value or r	Interpretation
0.90 – 1.00	Very high correlation
0.70 – 0.90	High correlation
0.50 – 0.70	Moderate correlation
0.30 – 0.50	Low correlation
0.00 – 0.30	Little if any correlation

3.10 Ethical Considerations

Ethical approval was obtained from the Ethical Committee of Chulalongkorn University (Research Number 195.1/55) on September 27, 2013 and the purpose and procedures of the research were clearly explained not only to the research assistants but will also be explained to the respondents before the interview, the purpose of the study will be explained to the respondents. The privacy and confidentiality of the data will be strictly maintained, while the questionnaires will be coded anonymously.

3.11 Expected benefit and application

This study anticipates that a better understanding of the level and association of Knowledge Attitude and Practice (KAP) will enable the better planning of behavioral-change programs in relation to preventing hearing loss among workers, particularly those in pressing parts production.

3.12 Obstacles

Problems/obstacles possibly faced in conducting the survey is that workers in their workplaces will have limited of time for face-to-face interviews, coupled with high security restricting the entrance of outside persons.

CHAPTER IV

RESEACH RESULT

This research aims to study the relationship between hearing capacity and other risk factors among the Auto Parts Factory employees who worked in the press part divisions, including Automotive Press Parts, Motorcycle Press Parts and Fuel Tank Press Parts divisions. The information was collected from 359 participants by face to face interview with structured questionnaire. To find the relationships, the researcher matched the collected socio demographic characteristics, knowledge, and attitude data of the respondents with their hearing capacity results and the noise measurement results tested during the years 2012.

The results of the study are presented in 9 parts as follows.

Part 1: Socio demographic characteristics of workers in the Press Parts Divisions

Part 2:Knowledge about hearingloss prevention among the worker in the Press Parts Divisions

Part 3: Attitude towards hearing loss prevention among the worker in the Press PartsDivisions

Part 4:Hearing loss prevention among the worker in the Press Parts Divisions

Part 5: The varied noise levels during the pressing process at the Auto Parts Factory, Samuthprakarn, Thailand

Part 6: The varied percentages of hearing capacity tested among working staff inPress Parts Divisions at the Auto Parts Factory, Samuthprakarn, Thailand

Part 7: The association between noise levels and the hearing capacity among staff in the Press Parts Divisions at the Auto Parts Factory, Samuthprakarn, Thailand

Part 8: The association between the hearing capacity and hearing loss protection;the hearing capacity and attitudes towards hearing loss protection; and the hearing capacity and knowledge related to hearing loss protection amongstaff in PressPartsDivisions at the Auto PartsFactory, Samuthprakarn, Thailand

4.1 Socio demographic characteristic of worker in the press parts section

The respondents were 359 workers in the three pressing part divisions in the Auto Parts Factory, Samuthprakarn, Thailand. Most respondents who worked in the press part divisions were male (83.0 %). Despite 86.9 % of them had been trained on the PPE use before, majority of them did not used PPE foam (91.9%). Around ninety percent (87.7 %) were noise sensitive and half of the respondents (51.8 %) got paid for more than 15000 THB per month. Almost all of them (97.8 %) were in the operator level. About forty percent of them (39.8 %) worked in Press Parts Division(s) for more than 9 years.

Table 7 Socio- demographic Characteristics (dichotomous)

Variable	**Characteristic Status (N=359)**	
	Yes	**No**
	n (%)	**n (%)**
Use Foam	29 (8.1)	330 (91.9)
Training PPE	312 (86.9)	47 (13.11)
Noise Sensitivity	315 (87.7)	44 (12.3)
Married	240 (66.9)	119 (33.1)
Income > 15K	173 (48.2)	186 (51.8)
Press years > 9	143 (39.8)	216 (60.2)
Male	298 (83.0)	61 (17.0)
Operator level	351 (97.8)	8 (2.2)

As presented in table 4.1.2, majority of the respondents were graduated from high school(37.9 %).Around forty percent were in Auto Press Parts Division and Motorcycle Press Parts Division each. Majority of the respondents(43.7 %)were aged between 22to 33 years. Mean age was 34.8 years and median age was 34 years.

Table 8 Socio- demographic Characteristics (categorical, non-dichotomous)

Socio- demographic Characteristics (categorical, non-dichotomous)

Variable	Number (n)	%
Education Level*		
Primary School	17	4.7
Secondary School	128	35.7
High School	136	37.9
Certificate/Diploma	68	18.9
Bachelor Degree	10	2.8
Section		
Auto press part	157	43.7
Motocycle press part	154	42.9
Fuel Presspart	48	13.4
Age		
< 20 – 33	154	42.9
34 – 41	157	43.7
42 – > 53	48	13.4
Mean = 34.8 , Median = 34.0 ,SD=6.0		

*In data analysis, education was divided into 3 levels, was > High School , High School and education level < High school .

4.2 The Knowledge for prevention hearing loss in the press parts factory

The respondents' knowledge was evaluated with 8 questions. The respondents got one point for correct answer and zero point for incorrect answer. The knowledge score ranged from 0 – 8 point.

In this study, the average knowledge score of the respondent was 5.21 points. Around half of the respondents (49.3 %) had moderate knowledge and got between 4 – 6 points.

Table 4.2.1 shows that among the positive detection question, the highest item with correct answers was “Wearing hearing protector can prevent your ear from noise exposure”. All respondents (100 %) knew they must wear hearing protector to prevent their ears from noise exposure. Almost all respondents (96.7%) knew that they must wear hearing protector when they were in the area with more than 80dBAnoise level. More than half of them (65.5%) checked NRR with hearing protector before choosing the hearing protector and 98.6 % of them knew that “If they work in the area with more than 85 dB(A) noise level, they must have the hearing capacity test every year.

As for the Negative detection question, the highest item with correct answers was “do not engage in the area with over 140 dB(A) noise level” (81.6 %). More than half (69.6 %) of the respondents knew that “wearing the hearing protector can reduce noise exposure in the working area where noise level is higher than 80dBA”. Seventy percent (70.2 %) knew that “hearing protector could not protect them from Noise level of 40 – 50 dB(A)”. Finally, only about 57.4 % of the respondents knew that “the hearing protector equipment will reduce their risk of hearing impaired or deaf in the future”

Table 9 Knowledge toward hearing loss prevention

Knowledge toward hearing loss prevention

Knowledge Item	Number of Yes n = 359	Percentage %
1. Wearing hearing protector can prevent your ear from noise exposure. (+)	359	(100.0)
2. Wearing hearing protector all the working noise level > 80 dBA can not reduce noise exposure. (-)	250	(69.6)
3. You must wear hearing protector when you engage the area with > 80 dB noise. (+)	347	(96.7)
4. You must wear hearing protector when you engage the area with > 140 dBA noise. (-)	293	(81.6)
5.You must check NRR with hearing protector before you choose hearing protector . (+)	235	(65.5)
6. If you work in the area with noise level > 85 dBA you must have the hearing capacity test every year. (+)	354	(98.6)
7. The Hearing Protector equipment will reduce your chance and becoming hard of Hearing or debt in the future. (-)	206	(57.4)
8. Hearing protector keep me from hearing Noise level 40 – 50 dBA. (-)	252	(70.2)

Table 4.2.2 presents the distribution of the respondents' knowledge level on hearing loss prevention. Around half of the respondents(49.3 %)had "Moderate knowledge", while 34.5 % had "Low knowledge", and only 16.2 % had "High knowledge". The minimum knowledge score was 2 points, and the maximum knowledge score was 8

points. The average knowledge score was 5.21 points with 1.4 points standard deviation

Table 10 Distribution of Knowledge level on hearing loss prevention among press part workers

Distribution of Knowledge level on hearing loss prevention among press part workers

Knowledge Level	Number (n=359)	Percent %
Low Level 0-3 Score (< 60 %)	124	34.5
Moderate Level 4-6 Score (60 – 80 %)	177	49.3
High Level 7-8 Score (>80)	58	16.2
Min =2 , Max=8 ,Mean =5.2,SD=1.4		

4.3 The Attitude for prevention hearing loss in the press parts factory

Table 4.3.1 shows that about forty percent (39.0 %)of the respondents agreed with the positive statement “hearing protector can protect their ear from noise induce hearing loss”. As for negative statements, 65.5 % of the respondents strongly agree that “Hearing protective equipment is not important for them”, 49.6 % strongly agreed that “Hearing protector cannot protect their ears from noise exposure ”, 49.6 % strongly agreed that “If they don’t have hearing problem they don’t need hearing protector”, 56.3 strongly agreed that “wearing the hearing protector is not important for noise protection in working area”, 35.7 % agreed that “wearing hearing protect to rmake it difficult for them to talk and communicate with other people”. 44.6 % agreed that “wearing ear protective device lead to ear problems or ear infection in the future”, 43.7 % agreed that “wearing ear protective device reduce their work efficiency”.

Table 11 Attitude toward hearing loss prevention

Attitude toward hearing loss prevention

Attitude Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	n(%)	n(%)	n(%)	n(%)	n(%)
1.Hearing Protector equipment for my hearing is not important. (-)	23 (6.4)	13 (3.6)	9 (2.5)	79 (22.0)	235 (65.5)
2.The hearing protector can protect my ear from Noise Induce hearing loss. (+)	71 (19.8)	7 (1.9)	20 (5.6)	140 (39.0)	121 (33.7)
3. The Hearing protector is can not protect my ears from noise exposure. (-)	6 (1.7)	19 (5.3)	12 (3.3)	144 (40.1)	178 (49.6)
4.If you don't have hearing problem, the hearing protector will needless for you. (-)	6 (1.7)	19 (5.3)	12 (3.3)	144 (40.1)	178 (49.6)
5. Wear hearing protector is not important for noise protection in working area. (-)	10 (2.8)	13 (3.6)	8 (2.2)	126 (35.1)	202 (56.3)
6. Wear hearing protection device that make you have difficulty to talking and communicating with other people. (-)	55 (15.3)	34 (9.5)	47 (13.1)	128 (35.7)	95 (26.5)
7. If you wear ear protective device are causing your ear problems or ear infection in the future . (-)	7 (1.9)	24 (6.7)	55 (15.3)	160 (44.6)	113 (31.5)
8. If you wear ear protection device to make you reduce work efficiency. (-)	4 (1.1)	14 (3.9)	27 (7.5)	157 (43.7)	157 (43.7)

Table 4.3.2 shows the distribution of the respondents' attitude level on hearing loss prevention. Almost all of them (95.3 %) had "Unconcern attitude", a few of them (4.5%) had "Neutral attitude" , and only 0.3% of them had "Concern attitude". The minimum attitude score was 0 point, and the maximum attitude score was 30 points. The average attitude score was 8.58 point with 5.53 points standard deviation.

Table 12 Distribution of Attitude level on hearing loss prevention among press part workers

Distribution of Attitude level on hearing loss prevention among press part workers

Attitude Level	Number (n=359)	Percent %
Concerned attitude (81 – 100 %)	1	0.3
Neutral attitude (60 – 80 %)	16	4.5
Unconcern attitude (less than 60 %)	342	95.3
Min =0 , Max=30 , Mean=8.58 , SD=5.53		

4.4 The Behavior for prevention hearing loss in the press parts factory

Data shown in Table 4.4.1shows that among the positive statement, 66.6 % of the respondents had never "checked their ear protector and ensure that it is clean and has no dirt before using it", About half of the respondent (58.5 %) had never "pulled their ear before wear ear plugs", 56.8 % of the respondent always "wear ear protection equipment method accurately when they were checked by authority", 88 % of them had never "wear ear protection equipment all the time when they were engaged in press part area". As for the negative statements 62.4 % of them had never felt uncomfortable and felt dislike bringing something into their ears, 69.4 % of the respondents will never wear ear protection when it is malfunction or damaged and 91.6 % of the respondents had never always wear ear plugs in one side while you work.

Table 13 Behavior for prevention hearing loss in the press parts factory

Question Behavior	Always %	Frequency %	Sometime %	Never %
1.You will checked ear protector equipment before use and make sure that it is clean and no dirt. (+)	4 (1.1)	44 (12.3)	72 (20.1)	239 (66.6)
2.You will pull your ear at all times before wear ear plugs. (+)	36 (10.0)	50 (13.9)	63 (17.5)	210 (58.5)
3.You will wear ear protection equipment method was accurate when checked by authorities. (+)	204 (56.8)	36 (10.0)	63 (17.5)	56 (15.6)
4.You will wear ear protection equipment all the time when you engage in press part area.(+)	14 (3.9)	5 (1.4)	24 (6.7	316 (88.0)
5. You will fell uncomfortable and do not like to bring something to put in your ear. (-)	26 (7.2)	24 (6.7)	85 (23.7)	224 (62.4)
6.You still also wear ear protection even if it is problem or damaged. (-)	26 (7.2)	13 (3.6)	71 (19.8)	249 (69.4)
7.You will be trained to prevent noise in working area and every time there have a training course. (+)	20 (5.6)	57 (15.9)	45 (12.5)	237 (66.0)
8.You always wear ear plugs in one side while you work. (-)	18 (5.0)	4(1.1)	8(2.2)	329 (91.6)

Data in table 4.4.2 shows the distribution of the respondents' hearing loss preventive behavior. It was found that 49.6 % of them had "Poor behavior", 41.5 % of them had "Fair behavior", while only 8.9%had"Good behavior". The minimum behavior score was 13 points, and the maximum behavior score was 32 points. The average score was 25.3 points with 4.12 points standard deviation.

Table 14 Distribution of Behavior level on hearing loss prevention among press part workers

Distribution of Behavior level on hearing loss prevention among press part workers

Practical Level	Number (n=359)	Percent (%)
Poor behavior (81 – 100 %)	178	49.6
Fair behavior (60 – 80 %)	144	41.5
Good behavior (less than 60 %)	32	8.9
Min =13 , Max=32 ,Mean =25.3 ,SD=4.12		

4.5 The varied noise levels during the pressing part process at the Auto Parts Factory

Table 4.5.1shows noise levels during the pressing process in the working areas at the Auto Parts Factory from the year 2010 to the year 2012.

According to the Noise Hi level results evaluated in the year 2010, the minimum noise was90.2 dB(A), the maximum noise was 101.7 dB(A), and the average of noise was 94.6 dB(A) with 2.42dBA stand deviation.

The Noise Average level results measured in the year 2010 showed that the minimum noise was 87.6dB(A), the maximum noise was 94.6 dB(A), and the average noise was 90.3 dB(A) with 1.67 dB(A) and deviation.

In the year 2011, the Noise Hi level results reported the minimum noise was 90.2 dB(A), the maximum noise was 101.7dB(A), and the average noise was 94.7 dB(A) with 2.34 dB(A) stand deviation.

The 2011 the Noise Average level test results showed that the minimum noise was 87.6dB(A), the maximum noise was 93.8 dB(A), and the average noise was 90.4 dB(A) with 1.61 dB(A) and deviation.

The Noise Hi level results recorded in the year 2012 reported that the minimum noise was 92.3 dB(A), the maximum noise was 102.2 dB(A), and the average noise was 90.5 dB(A) with 2.11 dB(A) and deviation.

As for the Noise Average level in 2012, the minimum noise was 87.6 dB(A), the maximum noise was 93.7, and the average noise was 89.0 dB(A) with 1.71 dB(A) and deviation.

Table 15 Noise levels during the pressing part process at the Auto Parts Factory from 2010 – 2012

Noise levels during the pressing part process at the Auto Parts Factory from 2010 – 2012

Value	Noise Level					
	2010		2011		2012	
	Noise Hi	Noise Avg	Noise Hi	Noise Avg	Noise Hi	Noise Avg
Min	90.2	87.6	90.2	87.6	92.3	87.6
Max	101.7	94.9	101.7	93.8	102.2	93.7
Mean	94.6	90.3	94.7	90.4	95.5	89.0
SD	2.42	1.67	2.34	1.61	2.11	1.71

As shown in table 4.5.2, Noise levels during the pressing process at the Auto Parts Factory was 56.3% over standard in 2010, 56.8% over standard in 2011, and 36.5% over standard in 2012.

Table 16 Noise levels during the pressing part process at the Auto Parts Factory comparative with standard from 2010 – 2012

Noise levels during the pressing part process at the Auto Parts Factory comparative with standard from 2010 – 2012

Year	Noise Standard Status (N=359)	
	Standard	Over Standard
N=359	n (%)	n (%)
2010	157 (43.7)	202 (56.3)
2011	155 (43.2)	204 (56.8)
2012	228 (63.5)	131 (36.5)

Table 4.5.2 The varied percentages of hearing capacity tested among working staff in PressParts Divisions during the year 2010 to 2012

Table 4.6.1 shows varied percentages of hearing capacity tested among working staff in PressParts Divisions during the year 2010 to 2012.

In 2010, 97.5 % of the respondents had normal right ear hearing capacity and 98.6% had normal left ear hearing capacity, and97.5 % or them had normal both ear hearing capacity.

In 2011, 78.8 % of the respondents had normal right ear hearing capacity and 72.1% had normal left ear hearing capacity, and 68.8 % or them had normal both ear hearing capacity.

In 2012, 90.3 % of the respondents had normal right ear hearing capacity and 79.1% had normal left ear hearing capacity, and 79.1 % or them had normal both ear hearing capacity.

Table 17 Hearing Capacity Test Results, 2010 – 2012

Hearing Capacity Test Results, 2010 – 2012

Hearing Result	2010			2011			2012		
	Right	Left	Either	Right	Left	Either	Right	Left	Either
(N=359)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Normal	350	354	350	283	259	247	324	284	284
	(97.5)	(98.6)	(97.5)	(78.8)	(72.1)	(68.8)	(90.3)	(79.1)	(79.1)
Not Normal	9	5	9	76	100	112	35	75	75
	(2.5)	(1.4)	(2.5)	(21.2)	(27.9)	(31.2)	(9.7)	(20.9)	(20.9)

4.7The association between Socio demographics, Knowledge Attitude and Behavior with Hearing Capacity, in 2010

4.7.1 The Association between Socio demographics and Hearing capacity test abnormal in either ear in 2010

Relationship between socio demographics and hearing capacity test characteristic 2010 were analyzed by chi square test and P-value of selected variable. From Table 4.7.1 Use Earplugs (Foam) Train PPE ,Noise Sensitive , Marital status ,Press Experience > 9 Year, Income > 15 K, Hearing Loss ,Male, Noise STD had p-value as 0.159, 1.000 ,1.000 ,1.000 , 0.326 , 0.743 ,0.743 , 0.653 , 0.512 , 0.522 and 0.513 respectively which were not significant (p>0.05) with hearing capacity test 2010. Relationship between Press Parts Division and Hearing capacity test characteristic 2010 were analyzed by chi square test and P-value of selected variable. Automotive Press Parts , Motorcycle Press parts and Fuel Tank Press Parts were not significant (p>0.05) with hearing capacity test 2010. Relationship between the education level and hearing capacity test 2010 were analyzed by chi square test and P-value of selected variable. All of education levels, (lower than secondary school , high school and higher than high school) were not significant (p>0.05) with hearing capacity test 2010

Table 18 The Association between Socio demographics and Hearing capacity test abnormal in either ear in 2010

The Association between Socio demographics and Hearing capacity test abnormal in either ear in 2010

Characteristic	Hearing Capacity Test		P-value
	Normal (%)	Not Normal (%)	
Using for Earplugs (Foam)			0.159
Yes	27 (93.1)	2 (6.9)	
No	323 (97.9)	7 (2.1)	
PPE Training			1.000
Yes	46 (97.6)	1 (2.1)	
No	304 (97.4)	8 (2.6)	
Noise Sensitivity			1.000
Yes	307 (97.5)	8 (2.5)	
No	43 (97.7)	1 (2.3)	
Married Status			1.000
Yes	234 (97.5)	6 (2.5)	
No	116 (97.5)	3 (2.5)	
Experience in Press Parts > 9 Year			0.326
Yes	141 (98.6)	2 (1.4)	
No	209(96.8)	7 (3.2)	
Income > 15 K			0.743
Yes	182 (97.8)	4 (2.2)	
No	168 (97.1)	5 (2.9)	
Hearing Loss			0.743
Yes	317 (97.2)	9 (2.8)	

No	33 (100.0)	0 (0.0)	
Male			0.653
Yes	291 (97.7)	7 (2.3)	
No	59 (96.7)	2 (3.3)	
Over Noise STD			0.512
Yes	198 (98.0)	4 (2.0)	
No	152 (96.8)	5 (3.2)	
Press Parts Type			0.522
Automotive	154 (98.1)	3 (1.9)	
Motocycle	150 (97.4)	4 (2.6)	
Fuel Tank	46 (95.8)	2 (4.2)	
Education Level			0.513
< Secondary School	141 (97.2)	4 (2.8)	
High School	134 (98.5)	2 (1.5)	
> High School	75 (96.2)	3 (3.8)	

4.7.2 Relationship between Knowledge Attitude and Behavior and Hearing Capacity test in 2010

As shown in table 4.7.2, the association between Knowledge and Hearing capacity test of the Right Ear and the Left Ear 2010 were analyzed by Quai Square test .Knowledge score ranged in 3 levels as High , Moderate and Low were not significantly associated with Hearing capacity test at p-value = 0.432(p> 0.05)

Table 19 Relationship between Knowledge Attitude and Behavior and Hearing Capacity test in 2010

Relationship between Knowledge Attitude and Behavior and Hearing Capacity test in 2010

Hearing Test Status	Low	Moderate	High	P-Value
Normal	119	174	57	0.432
n(%)	(96.0)	(98.3)	(98.3)	
Abnormal	5	3	1	
n(%)	(4.0)	(1.7)	(1.7)	

4.7.3 Relationship between Attitude and Hearing Capacity test in 2010

As shown in table 4.7.3 the Association between Attitude and Hearing capacity test of the Right Ear and the Left Ear 2010 were analyzed by Quai Square test. Attitude score ranged in 3 levels as Unconcerned ,Neural and concerned were not significantly associated with Hearing capacity test at p-value = 0.357 ($p > 0.05$)

Table 20 Relationship between Attitude and Hearing Capacity test in 2010

Relationship between Attitude and Hearing Capacity test in 2010

Hearing Test Status	Unconcern	Neural	Concern	P-Value
Normal	334	15	1	0.357
n(%)	(97.3)	(93.8)	(100.0)	
Not normal	8	1	0	
n(%)	(2.3)	(6.2)	(0.0)	

4.7.4 Relationship between Behavior and Hearing Capacity test in 2010

As shown in table 4.7.4, the association between Behavior and Hearing capacity test the Right Ear and the Left Ear 2010 were analyzed by Quai Square test. Behavior score ranged in 3 levels as poor , Fair and Good were not significantly associated with Hearing capacity test at p-value = 0.121 ($p > 0.05$)

Table 21 Relationship between Behavior and Hearing Capacity test 2010

Relationship between Behavior and Hearing Capacity test 2010

Hearing Test Status	Poor	Fair	Good	P-Value
Normal	30	144	176	0.121
n(%)	(93.8)	(96.6)	(98.9)	
Not normal	2	5	2	
n(%)	(6.2)	(3.4)	(1.1)	

4.7.5 Logistic Regression Relating Socio-demographics to Hearing Capacity test in 2010

As shown in table 4.7.5 , the association between Scio demographics and Hearing capacity test of the Right Ear and the Left Ear 2010 were analyzed by Logistic regression test. Working year experiences, Age, Noise Average level and Noise high level were not significantly associated with Hearing capacity test at p-value = 0.875, 0.499, 0.380 and 0.367 (p> 0.05) respectively.

Table 22 Logistic Regression Relating Socio-demographics to Hearing Capacity test 2010

Logistic Regression Relating Socio-demographics to Hearing Capacity test 2010

Variable	Odds ratio	95 % CI	P-value
Work Year (unit 3 yr)	0.953	0.521 – 1.742	0.875
Age (yr)	1.037	0.933 -1.153	0.499
High Noise (dBA)	0.881	0.663 – 1.170	0.380
Average Noise (dBA)	0.816	0.525 – 1.269	0.367

4.8 The association between Socio demographics ,Knowledge , Attitude ,Behavior and Hearing Capacity in 2011

4.8.1 The Association between Socio demographics and Hearing capacity test in 2011

Relationship between socio demographics and hearing capacity test characteristic 2011 were analyzed by chi square test and P-value of select variable. As shown in Table 21, Noise Sensitive was significantly associated with Hearing capacity test at p-value = 0.015 ($p< 0.05$) However, there were not significantly associated between Using of Earplugs (Foam), PPE training , Marital status , Working experiences in Press Parts more than 9 years, Income Hearing Loss ,Male, Noise STD and Hearing capacity test at p –value at 0.835 , 0.499, 0.116, 0.563 , 0.257, 0.076, 0.909, 0.182 and 0.148 respectively ($p>0.05$), Relationship between Press Parts Division and hearing capacity test 2011 were analyzed by chi square test and P-value of select variable. As shown in Table 23, Automotive Press Parts , Motorcycle Press Parts and Fuel Tank Press Parts were not significantly ($p>0.05$) associated with hearing capacity test 2011. Relationship between of Education level and hearing capacity test 2011 were analyzed by chi square test and P-value of select variable. The education level lower than Secondary school , high School and higher than high school were not significantly ($p>0.05$) associated with hearing capacity test 2011

Table 23 The Association between Socio demographics and Hearing capacity test in 2011

The Association between Socio demographics and Hearing capacity test in 2011

Characteristic	Hearing Capacity Test		P-value
	Normal (%)	Not Normal (%)	
Using for Earplugs (Foam)			0.835
Yes	21 (72.4)	8 (27.6)	
No	226 (68.5)	104 (31.5)	
PPE Training			0.499
Yes	30 (63.8)	17 (36.2)	
No	217 (69.6)	95 (30.4)	

Noise Sensitivity			0.015
Yes	224 (71.1)	91 (28.9)	
No	23 (52.3)	21 (47.7)	
Married Status			0.116
Yes	172 (71.7)	68 (28.3)	
No	75 (63.0)	44 (37.0)	
Experience in Press Parts > 9 Year			0.563
Yes	101 (70.6)	42 (29.4)	
No	146 (67.6)	70 (32.4)	
Income > 15 K			0.257
Yes	113 (71.5)	53 (28.5)	
No	114 (65.9)	59 (34.1)	
Hearing Loss			0.076
Yes	229 (70.2)	57 (29.8)	
No	18 (54.5)	15 (45.5)	0.048
Male			
Yes	18 (54.5)	15 (45.5)	
No	35 (57.4)	26 (42.6)	
Over Noise STD			0.909
Yes	141 (69.1)	63 (30.9)	
No	106 (68.4)	49 (31.6)	
Press Parts Type			0.182
Automotive	116 (73.9)	41 (26.1)	
Motocycle	100 (64.9)	54 (35.1)	
Fuel Tank	31 (64.6)	17 (17)	

Education Level			0.148
< Secondary School	106 (73.1)	39 (26.9)	
High School	94 (69.1)	42 (30.9)	
> High School	47 (60.3)	31 (39.7)	

4.8.2 Relationship between Knowledge and Hearing Capacity test in 2011

As shown in table 4.8.2, the association between Knowledge and Hearing capacity test of the Right Ear and the Left Ear 2011 were analyzed by Quai Square test. Knowledge score ranged in 3 levels as High , Moderate and Low were not significantly associated with Hearing capacity test at p-value = 0.581 (p> 0.05).

Table 24 Relationship between Knowledge and Hearing Capacity test 2011

Relationship between Knowledge and Hearing Capacity test 2011

Hearing Test Status	Low	Moderate	High	P-Value
Normal	86	118	43	0.580
n(%)	(69.4)	(66.7)	(74.1)	
Abnormal	38	59	15	
n(%)	(30.6)	(33.3)	(25.9)	

4.8.3 Relationship between Attitude and Hearing Capacity test in 2011

As shown in table 4.8.3 ,the association between Attitude and Hearing capacity test of the Right Ear and the Left Ear in 2011 were analyzed by Quai Square test among variables. Attitude score ranged in 3 levels as Concern ,Neural and Unconcern were not significantly associated with Hearing capacity test at p-value = 0.717 (p> 0.05)

Table 25 Relationship between Attitude and Hearing Capacity test in 2011

Relationship between Attitude and Hearing Capacity test in 2011

Hearing Test Status	Unconcern	Neural	Concern	P-Value
Normal	236	10	1	0.717
n(%)	(69.0)	(62.5)	(100.0)	
Not normal	106	6	0	
n(%)	(31.0)	(37.5)	(0.0)	

4.8.4 Relationship between Behavior with Hearing Capacity test in 2011

As shown in table 4.8.4, the Association between Behavior and Hearing capacity test of the Right Ear and the Left Ear in 2011 were analyzed by Quai Square test among variables. Attitude score ranged in 3 levels as Poor , Fair and Good were not significantly with Hearing capacity test at p-value = 0.422 (p> 0.05)

Table 26 Relationship between Behavior and Hearing Capacity test in 2011

Relationship between Behavior and Hearing Capacity test in 2011

Hearing Test Status	Poor	Fair	Good	P-Value
Normal	19	102	126	0.422
n(%)	(59.4)	(68.5)	(70.8)	
Not normal	13	47	52	
n(%)	(40.6)	(31.5)	(29.2)	

4.8.5 Logistic Regression Relating Socio-demographics to Hearing Capacity test 2011

As shown in table 4.8.5, the association between Socio demographics and Hearing capacity test of the Right Ear and the Left Ear in 2010 were analyzed by Logistic regression test among 4 variables. Working year experiences more than 3 years, Age, Noise Average level and Noise high level were not significantly associated with Hearing capacity test at p-value = 0.225, 0.404, 0.449 and 0.745 (p> 0.05) respectively.

Table 27 Logistic Regression Relating Socio-demographics to Hearing Capacity test 2011

Variable	Odds ratio	95 % CI	P-value
Work Year (unit 3 yr)	0.881	0.718- 1.081	0.225
Age (yr)	1.016	0.979 – 1.054	0.404
High Noise (dBA)	0.964	0.875 – 1.061	0.449
Average Noise (dBA)	0.977	0.850 – 1.123	0.745

4.9 The association between Socio demographics, Knowledge, Attitude ,Behavior and Hearing Capacity in 2012

4.9.1 The Association between Socio demographics and Hearing capacity test in 2012

Relationship between socio demographics and hearing capacity test in 2012 were analyzed by chi square test and P-value of select variables. As shown in Table 4.9.1, Noise Sensitivity ,Married Status, Income more over than 15,000 bath and Male Gender were significantly associated with Hearing Capacity test in 2012 at *P* value = 0.038 , 0.002,0.006 respectively (p< 0.05) Using of Earplugs (Foam) PPE Training, Marital status , Experiences in Press Parts > 9 Year, Hearing Loss and Noise STD were not significantly associated with Hearing Capacity test in 2012 at p-value = 0.637 ,0.248 ,0.614 ,0.291 , 1.000 , 0.687 , 0.375 respectively (p>0.05Relationship between Press Parts Divisions and Hearing Capacity test in 2012 were analyzed by chi

square test and P-value of select variables. Automotive Press Parts , Motocycle Press Parts and Fuel Tank Press Parts were not significantly associated with Hearing Capacity test in 2012 (p>0.05) Relationship between Education level and hearing capacity test in 2012 were analyzed by chi square test and P-value of select variables. Education levellower than Secondary school , High School and Higher than high school were not significantly associated with Hearing Capacity test in 2012 (p>0.05)

Table 28 The Association between Socio demographics and Hearing capacity test in 2012

The Association between Socio demographics and Hearing capacity test in 2012

Characteristic	Hearing Capacity Test		P-value
	Normal (%)	Not Normal (%)	
Using for Earplugs (Foam)			0.637
Yes	22 (75.9)	68 (20.6)	
No	262 (79.4)	7 (24.1)	
PPE Training			0.248
Yes	34 (72.3)	13 (27.7)	
No	250 (80.1)	62 (19.9)	
Noise Sensitivity			0.614
Yes	253 (80.3)	62 (19.7)	
No	31 (70.5)	13 (29.5)	
Married Status			0.038
Yes	182 (75.8)	58 (24.2)	
No	102 (85.7)	17 (14.3)	
Experience in Press Parts > 9 Year			0.291
Yes	109 (76.2)	34 (23.8)	
No	175 (81.0)	41 (19.0)	
Income > 15 K			0.002

Yes	135 (72.6)	51 (27.4)	
No	149 (8.1)	24 (13.9)	
Hearing Loss			1.000
Yes	258 (79.1)	68 (20.9)	
No	26 (78.8)	7 (21.2)	
Male			0.006
Yes	228 (76.5)	70 (23.5)	
No	56 (91.8)	5 (8.2)	
Over Noise STD			0.687
Yes	102 (77.9)	29 (22.1)	
No	182 (79.8)	46 (20.2)	
Press Parts Type			0.050
Automotive	117 (74.5)	40 (25.5)	
Motocycle	131 (85.1)	23 (14.9)	
Fuel Tank	36 (75.0)	12 (2.5)	
Education Level			0.375
< Secondary School	114 (8.6)	32 (21.4)	
High School	104 (76.5)	32 (23.5)	
> High School	66 (84.6)	12 (15.4)	

4.9.2 Relationship between Knowledge and Hearing Capacity test in 2012

As shown in table 4.9.2, the Association between Knowledge and Hearing capacity test of the Right Ear and the Left Ear 2012 were analyzed by Quai Square test among variables. Knowledge score ranged in 3 levels as High , Moderate and Low were not significantly associated with Hearing capacity test at p-value = 0.096 (p> 0.05)

Table 29 Relationship between Knowledge and Hearing Capacity test 2012

Hearing Test Status	Low	Moderate	High	P-Value
Normal	94	148	42	0.096
n(%)	(75.8)	(83.6)	(72.4)	
Abnormal	30	29	16	
n(%)	(24.2)	(16.4)	(27.6)	

4.9.3 Relationship between Attitude and Hearing Capacity test in 2012

As shown in table 4.9.3, the association between Attitude and Hearing capacity test of the Right Ear and the Left Ear in 2012 were analyzed by Quai Square test among variables. Attitude score ranged in 3 levels as Concern ,Neural and Unconcern were not significantly associated with Hearing capacity test at p-value = 0.198 (p> 0.05)

Table 30 Relationship between Attitude and Hearing Capacity test 2012

Relationship between Attitude and Hearing Capacity test 2012

Hearing Test Status	Unconcern	Neural	Concern	P-Value
Normal	272	12	0	0.198
n(%)	(97.5)	(75.0)	(0.0)	
Not normal	70	4	4	
n(%)	(20.5)	(25.0)	(100.0)	

4.9.4 Relationship between Behavior and Hearing Capacity test in 2012

As shown in table 4.9.4, the Association between Behavior and Hearing capacity test of the Right Ear and the Left Ear in 2012 were analyzed by Quai Square test among variables. Attitude score ranged in 3 levels as poor , Fair and Good 2011 were not significantly associated with Hearing capacity test at p-value = 0.675 (p> 0.05)

Table 31 Relationship between Behavior and Hearing Capacity test in 2012

Relationship between Behavior and Hearing Capacity test in 2012

Hearing Test Status	Poor	Fair	Good	P-Value
Normal	25	115	144	0.675
n(%)	(78.1)	(77.2)	(80.9)	
Not normal	7	34	34	
n(%)	(21.9)	(22.8)	(19.1)	

4.9.5 Logistic Regression with Socio-demographic with Hearing Capacity test 2012

As shown in table 4.9.5, the association between Socio demographics and Hearing capacity test of the Right Ear and the Left Ear in 2012 were analyzed by Logistic regression test among variables. Age was significantly associated with Hearing capacity test at p-value = 0.000 ($p< 0.05$) . However, Working year experiences more than 3 years, Noise Average level and Noise high level were not significantly associated with Hearing capacity test at p-value = 0.063, 1.222 and 0.731 ($p> 0.05$) respectively.

Table 32 Logistic Regression Relating Socio-demographics to Hearing Capacity test in 2012

Logistic Regression Relating Socio-demographics to Hearing Capacity test in 2012

Variable	Odds ratio	95 % CI	P-value
Work Year (unit 3 yr)	1.254	0.988- 1.591	0.063
Age (yr)	1.311	1.227 – 1.401	0.000
High Noise (dBA)	1.097	0.976 – 1.233	0.122
Average Noise (dBA)	0.974	0.839 – 1.131	0.731

4.10 Summary table Associations for variables for which p ≤ 0.15

Regarding to table 4.10.1 showed the association among socio demographic variable and hearing capacity test 2010 there were not significant among behavior there were significant association between hearing capacity test in 2010 ($p < 0.15$) .

The association among socio demographic variable and hearing capacity test 2011 there was significant with noise sensitive ($p < 0.15$) , married there was significant ($p < 0.15$) ,Hearing loss training there was significant ($p < 0.15$) , male there was significant ($p < 0.15$) ,education level there was significant ($p < 0.15$) among the knowledge attitude and behavior with hearing capacity test there were not significant.

The association among socio demographic variable and hearing capacity test 2012 there was significant with noise married ($p < 0.15$) ,among income > 15 K was significant ($p < 0.15$),among male was significant ($p < 0.15$), among department was significant ($p < 0.15$),among knowledge was significant ($p < 0.15$), among work year was significant ($p < 0.15$), among age was significant ($p < 0.15$), among high noise level was significant ($p < 0.15$).

Table 33 Associations for variables for which p ≤ 0.15, Abnormal hearing test by year, directions and p-values of associations

Associations for variables for which p ≤ 0.15, Abnormal hearing test by year, directions and p-values of associations

Variable	2010	2011	2012
High noise level			(Positive) 0.122
Average noise level			
Over noise standard			
Socio demographic			
Male		(Negative) 0.048	(Positive) 0.006
Age			(Positive) <0.001
Married		(Negative) 0.116	(Positive) 0.038
Income > 15K			(Positive) 0.002
Education		(Positive) 0.148	
Noise-sensitive		(Negative) 0.015	
Press Experience > 9 yr			
Work years			(Positive) 0.063
Hearing loss		(Negative) 0.076	
Department			(Motorcyclelower) 0.050
Use earplugs			
PPE training			
Knowledge , Attitude , Behavior			
Knowledge			(lower at mid-level) 0.096
Attitude			
Behavior	(Positive)0.121		

CHAPTER V

DISCUSTION, CONCLUTION, AND RECOMMENDATIONS

This chapter comprises of the discussion, conclusion and recommendations . This study is a cross-sectional study that collected the data of hearing capacity tests, noise measurements and a structure questionnaire of knowledge, attitude, and behavior to prevention hearing loss among pressing parts workers in the Auto Parts Factory. The aim of this study is to evaluate the associations--the hearing capacity test and hearing loss behavior protection, the hearing capacity test and attitudes towards hearing loss protection, and the hearing capacity test and knowledge related to hearing loss protection in press parts worker in Samut Prakan Province, Thailand. Noise measurement and hearing capacity test result in 2012 were measured. The 379 participants were selected by choosing saturation sample (Taking Everybody) but some respondents were excluded because they change process or job. Therefore, only 359 respondents were conducted for face to face interview. This study data was analyzed by correlation test and logistic regression .

5.1 Summary

5.1.1 Socio demographic characteristic

The result of socio demographic characteristics of worker in the press parts factory showed that most respondents who worked in press part factory were male. The personal protective equipments for respondent were not used foam type but used silicone type with the hearing capacity test in each year were not significant was similarity study relationship between the frequency of PPE used and hearing capacity test were not significant (X^2 = 2.684) (Kanyanee,2005), Training PPE for the respondent each year were not significant as opposed to previous study that the correct of PPE used was significant.(23)

The association of noise sensitive and hearing capacity test is significant at *P* value 0.015 (p< 0.05), which is similar to the previous study by Janjira,2010 . Relationship between income over 15000 Thai baht and hearing capacity test is significant at P value 0.002 (p<0.05). from result found that when the working man hour for each respondent presents by income include overtime shown that more working man hours more income salary estimated by minimum wages per day 300 Thai baht (Ministry of labor and social welfare ,2013). And relationship between sex male and hearing capacity test is significant 0.006 (p< 0.05) .(24)

5.1.2 The Knowledge Attitude and Behavior for prevention hearing loss in the press parts **factory.**

Regarding Knowledge level on hearing loss prevention, respondent who had Moderate Level was a major group (49.3%) and there was a significantly association between knowledge and hearing capacity test in 2012 while there was Low Level (34.5 %) and High level only 16.2 % .

Attitude level on hearing loss prevention of respondent showed that most respondents had unconcern attitude (95.3 %). There was not significant association between attitude and hearing capacity test with other years.

Behavior level on hearing loss prevention of respondent showed that the major group had Good behavior (65.7 %) and there was a significant association between behavior and hearing capacity test in 2010, which was similar to previous study found that association between Behavior and hearing capacity test was significant ($r = -0.230$,$p < 0.01$) (9)

5.1.3 The varied percentages of hearing capacity tested among working staff in pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand.

Noise Average level in press part working area from 2010 -2012 found that the minimum of level monitoring at working area was 87.6 dB(A) and maximum level monitoring at working area was 93.8 - 94.6 dB(A). Average of Noise Average level was 89.0 - 90.4 dB (A) and standard deviation was 1.67 that the result conforms to Department of Disease Control. The standard range for noise exposure outlined by the Ministry of Industry Thailand indicates that noise levels should not exceed 90 db per 8 hour-shift. Exposure to noise levels exceeding the recommended maximum noise level in a period of time might induce hearing problems and hearing loss in the long term (Department of Disease Control, 2012).(6)

5.1.4 The varied noise levels during the pressing part process at the Auto Parts Factory, Samuthprakarn, Thailand

Regarding the table showed percentages of hearing capacity tested among working staffs in pressing parts in 2010 had hearing capacity test of right ear, left ear and both ear were normal with 97.5 % ,98.6 % and 97.5 %, respectively. In 2011, hearing capacity test resulted with right ear, left ear and both ear was normal with 78.8 % ,72.1 % and 68.8 % , respectively . In 2012, hearing capacity test resulted with right ear, left ear and both ears was normal with 90.3 %, 79.1 % and 79.1 %, respectively.

In each year, results found that there were normal cases more than not normal cases.

5.1.5 The associations between the hearing capacity test and hearing loss behavior protection, the hearing capacity test and attitudes towards hearing loss protection, and the hearing capacity test and knowledge related to hearing loss protection among working staff the in pressing parts section at the Auto Parts Factory, Samuthprakarn, Thailand .

According to Table 4.7.1 relationship between socio demographic and hearing capacity test characteristic 2010--Use Earplugs (Foam) Train PPE ,Noise Sensitive , Marital status ,Press Experience > 9 Year, Income > 15 K, Hearing Loss ,Male, Noise STD, press part type of Factory, education level were not significant (p>0.05). In addition, the Association between of Knowledge, Attitude and Behavior Hearing capacity test with of Right Ear and Left Ear 2010 were not significant (p> 0.05).

The Association between Socio demographic and Hearing capacity test with Right Ear and Left Ear 2010 was analyzed by Logistic regression test among variable Work year more over 3 year showed p-value was 0.875, which was not significant (p> 0.05); Work year experience was not significant (p> 0.05); Noise Average level were not significant (p> 0.05); Noise high level were not significant (p> 0.05) .

Regarding socio demographic and hearing capacity test characteristic 2011 in table 4.8.1, Noise Sensitive were significant (p< 0.05) with hearing capacity test 2011 while other socio demographic with use Earplugs (Foam) Train PPE Marital status ,Press Experience > 9 Year, Income > 15 K, Hearing Loss ,Male, Noise STD , Press part type factory and education level were not significant (p>0.05). The Association between of Knowledge, Attitude and Behavior Hearing capacity test with of Right Ear and Left Ear 2011 were not significant (p> 0.05).

Table 4.8.3 showed logistic regression result of the association between socio demographic and right and left ear hearing capacity test in 2011. There was no significant association between socio demographic and work years , average and high level of noise were not significantly association with socio demographic as well (p> 0.05).

In 2012 hearing capacity test ,there were relationship between socio demographic characteristic and noise sensitivity , married status, income over 15 K and male were significant (*p*< 0.05 while Using Earplugs (Foam) Train PPE Marital

status ,Press Experience > 9 Year, Hearing Loss , Noise STD, Education level were not significant (p>0.05).

Relationship between of Press part type factory and hearing capacity test characteristic 2012 were significant association with hearing capacity test 2012 (p<0.05) which similarity with the data of Ministry of Labor In the automotive parts industry mentioned that there is a significant risk of hearing loss in the workplace (Ministry of Labor, 2011) . Table 4.9.2 showed that there were no association between of Knowledge, Attitude and Behavior and Hearing capacity test with of Right Ear and Left Ear 2012 (p> 0.05).

Table 4.8.12 showed the association between Scio demographic and Hearing capacity test with of Right Ear and Left Ear 2012 analyzed by Logistic regression test .Work year more over 3 year p-value was 0.063 were not significant (p> 0.05) , Work year experience were strongly significant (p< 0.05) ,Average level Noise and high level Noise were not significant associate (p> 0.05)

5.2 Discussion

Regarding to the prevalence results with hearing capacity test in 2010 - 2012 found that in 2010 the prevalence of employees who had the abnormal hearing capacity test result with left ear and the right ear was 2.5. In 2011 , the abnormal hearing capacity test result with left ear and the right ear was 31.2. In 2012, the abnormal hearing capacity test result with left ear and the right ear was 20.9. This study found the hearing capacity test result was difference in each year regarding to source of hearing capacity test data .

In fact, the researcher found the prevalence results with hearing capacity referenced from many sources of hearing capacity test data which is probable that Data Analysis and Conclusion of Test result depended on skills , experience , examination and interpretation of each company in order to definition. The research found in 2010 and 2011 there are measure of the hearing capacity test only once a time and did not re-confirm with the result of abnormal cases. Therefore, the accuracy of the data in 2012 are more accurate and reliable than other years because it had the repeated examination and measurement of system control for employees to take a break 20 minutes before test hearing then found the result data when re-confirmed the performance results were different just a little bit.

However , the researcher had been involved to monitor work flow , employee's control and covered the gathering data from employee before check up. Then they mentioned the test result of hearing capacity in 2012 were believable.

The Results of prevalence of hearing capacity test in 2010 - 2012 found the employee's prevalence of the hear ability result of abnormal left ear and right ear is the lowest when compared with other years . In Opinion each year had a different methods to interpret. The hearing capacity test result might depended on the individual staff or might be a cognitive difference in the data analysis and navigation of different magnitudes.

In 2010 found the data was not analyze by specify the abnormal frequency range and record data has a hearing loss , whiles the data in 2011 and 2012 were identified clearly in the frequency range of employees with the abnormal hearing. It may be possible that the data analysis results was interpret error , the official severity which checked the process of the hearing capacity test to the employee had not check the condition of the area, and external factors of noise . In 2010 with a total of the productivity were less than when compared with other year from 2011-2012 . In 2011-2012 the noise exposure were highest because of high productivity when compared to 2010 , In 2010 comparing with preventive maintenance in other year were less maintenance of machinery, the mechanical conditions of use that mean machine used completely.

With the result In 2010, found that had the relationship between behavior of hearing protection and hearing capacity test result was significant while other years were not significant. In the result their employees behavior who worn hearing protection devices may be worn the wrongful or did not wear all the working time because no strict rule and punishment to control the employees to wear earplug all the working time. In other factors , The hearing protector may not prevent noise level in the working area or inappropriate the noise levels that behaviors result to wear hearing protection were significant , so that the company should be taken strictly inspection systems of wearing hearing protection.

In 2011 - 2012 were not significant possibility in those years had the establishment of inspection control and prevent noise exposure and had hearing conservation program (Hearing Conservation). With the result in 2011 found the relationship between Noise sensitive and hearing capacity test was significant while 2011 and 2012 they were not significant in the same group of workers as employees . Marital status in 2011 was significant with the test results of the hearing capacity and

while in 2010 and in 2012 were not significant in researcher's opinion that found the men who were in married must had the responsibility and obligations of their family and also had more stress to take care their family which affected sleepless.

The Hearing loss training in 2011 found that the relationship between Hearing loss training and hearing capacity test was significant the researcher found in 2011 the employee were corporate to join the hearing loss training programs as well. From that result the employees understood in the method for prevent themselves from hearing loss , while 2010 does not have the hearing loss training and there are high productivity of production line that could not support the employee's sending to attend the training course As a result, employees did not get in the information of prevention of hearing loss during operation. The Factor with sex was found male is the most of sex with press part worker in 2011 and 2012 that were significant with the results of the hearing capacity test because of the most press part workers were male therefore they are more vulnerable than female sex . Therefore, gender might be correlated with the results of the hearing capacity test, while in 2010 was not significant. It may be possible that they may be errors in the interpretation information of hearing capacity test . While the education level of employees is the test results of the hearing capacity in 2011 were significant. Factor higher education level found the staff were more understood and practiced in the prevention of the loss of hearing than employee's low levels of education.

With the result in 2012 found that the relationship between marital status and hearing capacity test was significant from the previous study. Incoming factor was significant with the hearing capacity test in the researcher's opinion and found employees who income with high. That could means employees have more of working man hours and more than eight hours in one day, which factors affect the risk of noise exposure . Which is associated with the hearing capacity of press parts staff.

The relationship between Production departments and hearing capacity test was significant because type of press part machine capacity and press part material were difference such as material of press part of motorcycle part and fuel tank part was thin aluminum layer while the automotive press part was steel which difference from press type had effected with noise exposure when pressing and affected to hearing capacity test . As a result, the hearing capacity test of the motorcycle stamping parts was less minimum. Factor of knowledge level of the employees were found in associated with hearing capacity test when the employees had good

understanding with hearing loss prevention and they can prevent themselves from noise exposure well .

This study found most employees have the knowledge levels in Low, the employee is still not well understood with hearing loss prevention that should be considered to training about preventing hearing loss. And should be strict in sending staff to attend the training. This study still found the age of work were correlated with the results of the hearing capacity test that in 2010 and 2011 was not significant. It caused of age of work was affect the sense and the risk which affected the result of hearing capacity test. As illustration Old Age of employee correlated with the results of the hearing capacity test because their age effected the hearing levels of employees which had more of hearing dropped. High Noise level factor was affect to the hearing capacity test of employees in 2011 and 2010 was not significant . In fact, the researchers found the high productivity rate in 2012 was the highest year in total production which the government policy about the first car was increased the production in automotive parts industry . Then this increasing employee were affected to the hearing capacity test result also.

5.3 Limitation of study

This study was conduct in worker who worked in Auto part factory, Samutprakarn Province which means that the findings would not be generalized to all workers in other similar industries in Samutprakarn, Thailand among the respondent had limited of time for face-to-face interviews.This is a cross-sectional study which showed uncertainty in time relationships among measured variables. Meaning that it usually cannot specifically test for causality in observed associations. And varied of source the information of hearing capacity test of press part workers each year from 2010 -2013.

This study only used structure questionnaire to evaluate the respondent behavior. Further study should also confirm respondent behavior by monitoring PPE.

There are varied of time and limitation of working time and company productivity in order to the respondents could not rest their ear from noise exposure at least 10 – 12 hour before hearing test with the hearing test requirement control to the hearing capacity test with other respondent so that their barrier may result deviation.

Because this study was study in 2012, therefore hearing capacity test instruments condition cannot be return checked.

Hearing capacity test in each year was done by 3 difference Health Examination Companies which may result in the different agents with expertise in communications to respondents prior hearing test. Background noise levels were not available because the production line runs 24 hours per day.In this study, associations were evaluated with bivariate analysis only. Multiple regression analysis was not used, so the relative importance of independent variables could not be evaluated in detail.

5.4 Recommendation.

Health surveillance should provide with the results of the hearing evaluation before start working and collect the basic data from individual worker to prevent hearing loss.Should have the back ground noise for the next study.

There should be a reference for measurement the environment with individual device with audio meter for monitoring and evaluate the accuracy of the exposure identify for each person. All employees who have hearing capacity test result out of the ordinary should be suggestion from the occupational medical.

5.5 Benefit of study

The result of this study will enable the better planning of behavioral-change programs in relation to prevent hearing loss among workers, particularly those who works in pressing parts production in this factory.

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APPENDIX

APPENDIX A Questionnaire (English version)

Topic: The Knowledge Attitude and Practice for prevention Hearing loss among working staffs in the Auto part Factory in Samutprakran , Thailand

Part 1: Questionnaires for socio-demographic characteristics of press part worker.

Direction : Please indicate your response by marking (√) the box that corresponds back ground is you are mostly.

1.Age

☐ < 20 ☐ 21 – 25 ☐ 26 – 30

☐ 31 – 35 ☐ 36- 40 ☐ 41- 45

☐ > 50

2.Sex

☐ Male ☐ Female

3. Marital status

☐ Single ☐ Married ☐ Widowed

4. Education:

☐ Primary School ☐ Secondary School ☐ High School

☐ Certificate/Diploma ☐ Bachelor Degree ☐ Master Degree

☐ Other

5. Working experience:

☐ 0-2 ys ☐ 3-5 ys ☐ 6-8 ys

☐ 9-11 ys ☐ > 12 ys

6. Working press part experience:

☐ 0-2 ys ☐ 3-5 ys ☐ 6-8 ys

☐ 9-11 ys ☐ > 12 ys

7.Income THB (Include OT) :

☐ < 10000 ☐ 10001 -15000 ☐ 15001 - 20000

☐ 20001 - 25000 ☐ 25001 – 3000 ☐ 30001 - 35000

☐ 35001- 40000 ☐ >40000

8. Do you have personally background of hearing loss?

☐ Yes ☐ No

9. Have you ever been test of hearing capacity from Annul Health Checkup 2012?

☐ Yes ☐ No

10. Do you use personal protective equipment for prevention noise while you work?

☐ Yes ☐ No

11.What's type of Hearing Protector equipment do you use?

☐  Foam

☐  Silicone

☐  Ear Muff

12. Have you been trained the method in wearing ear Personal Protective Equipment course ?

☐ Yes ☐ No

13. Do you have Hearing illness from born?

☐ Yes ☐ No

14. Do you have noise sensitivity?

☐ Yes ☐ No

Part2: Questionnaire for Knowledge toward hearing loss prevention

Direction : The following are Knowledge toward hearing loss prevention

Question	Yes	No
1. Wearing hearing protector can prevent your ear from noise exposure.		
2. Wearing hearing protector all the working noise level > 80 dBA can not reduce noise exposure.		
3. You must wear hearing protector when you engage the area with > 80 dBA noise for prevention your ear from hearing loss.		
4. You must wear hearing protector when you engage the area with > 140 dBA noise for prevention your ear from hearing loss.		
5.You must check NRR with hearing protector before you choose hearing protector .		
6.If you work in the area with noise level > 85 dBA you must test the hearing capacity every year for protect your health from hearing loss.		
7. The Hearing Protector equipment will reduce your chance and becoming hard of Hearing or debt in the future.		
8. The Hearing protector can keep your ear from hearing Noise level 40 – 50 dBA.		

Part 3: Questionnaire for Attitude for hearing loss prevention

Direction : The following are Attitude toward for hearing loss prevention

Question	Strongly Disagree	Disagree	Neural	Agree	Strongly Agree
1. Hearing Protector equipment for my hearing is not important.					
2.The hearing protector can protect my ear from Noise Induce hearing loss.					
3. The Hearing protector is can not protect my ears from noise exposure.					
4.If you don't have hearing problem ,the hearing protector will needless for you.					
5. Wear hearing protector is not important for noise protection in working area.					
6. Wear hearing protection device that make you have difficulty to talking and communicating with other people.					
7. If you wear ear protective device are causing your ear problems or ear infection in the future					
8. If you wear ear protection device to make you reduce work efficiency.					

Part 4: Questionnaire Practice for hearing loss prevention

Direction : The following are Practice for hearing loss prevention

Question	Always	Frequency	Sometime	Never
1.You check ear protector equipment before use and make sure that it is clean and no dirt				
2.You pull your ear at all times before wear ear plugs (See picture). 				
3.You wear prescribed ear protection equipment method was accurate when checked by authorities				
4.You wear ear protection equipment all the time when you engage in press part area				
5. You bring something to put in your ear instant of ear protector such as cotton when you don't have ear protector .				
6.You wear ear protection even if it is problem or damaged				
7. You get training every time there have a training course to prevent noise in the work area .				
8.You were ear plugs in only one side while you work.				

APPENDIX B Questionnaire (Thai version)

หมายเลขแบบสอบถาม .....

แบบสอบถาม

การวัดระดับความรู้ ทัศนคติ และพฤติกรรม ในการป้องกันการสูญเสียการได้ยินของพนักงาน

แผนกปั๊มชิ้นส่วนรถยนต์ จังหวัดสมุทรปราการ

การแนะนำตัวและการยินยอมให้สัมภาษณ์

สวัสดีครับ/ค่ะ ผม/ดิฉันชื่อ_____ ทำงานกับโครงการสมรรถภาพการได้ยินต่อระดับความดังเสียงและปัจจัยเสี่ยงอื่นที่เกี่ยวข้องของพนักงานปั๊มชิ้นส่วนรถยนต์จังหวัดสมุทปราการ โครงการสมรรถภาพการได้ยินต่อระดับความดังเสียงและปัจจัยเสี่ยงอื่นที่เกี่ยวข้องของพนักงานปั๊มชิ้นส่วนรถยนต์เพื่อนำมาใช้วางแผนการทำงานในการป้องกันการสูญเสียสมรรถภาพการได้ยิน การสละเวลาตอบข้อซักถามของท่านจะเป็นประโยชน์อย่างยิ่งต่อการวางแผนงานด้านการให้บริการด้านสุขภาพภายในบริษัทของท่าน การสัมภาษณ์ใช้เวลาประมาณ 15-20 นาที ข้อมูลหรือคำบอกเล่าของท่านจะถูกเก็บเป็นความลับอย่างเคร่งครัด และจะไม่พาดพิงกลับถึงท่าน

การให้สัมภาษณ์เป็นไปตามความสมัครใจ ท่านสามารถเลือกปฏิเสธที่จะตอบคำถามบางข้อหรือทั้งหมดได้ การตัดสินใจให้สัมภาษณ์หรือไม่นั้นจะไม่ส่งผลใด ๆ ต่อท่าน ผม/ดิฉันหวังว่าท่านจะให้ความร่วมมือและตอบแบบสอบถามนี้ เนื่องจากความคิดเห็นของท่านมีความสำคัญ ท่านโปรดแจ้งให้ผม/ดิฉัน หยุดการสอบถามและอธิบายหากท่านไม่เข้าใจในคำถามข้อใด

- ท่านยินดีที่จะให้สัมภาษณ์หรือไม่

☐ ยินดี ☐ ไม่ยินดี

<u>หากตอบว่า “ไม่ยินดี” ยุติการสัมภาษณ์และกล่าวขอบคุณ</u>

ส่วนที่ 1 ข้อมูลทั่วไป

1.อายุ

☐ < 20 ปี ☐ 21 – 25 ปี ☐ 26 – 30 ปี

☐ 31 – 35 ปี ☐ 36- 40ปี ☐ 41- 45 ปี

☐ > 50 ปี

2.เพศ

☐ ชาย ☐ หญิง

3.สถานภาพ

☐ โสด ☐ สมรส ☐ หย่าร้าง

4. การศึกษา

☐ ประถมศึกษา ☐ มัธยมต้น ☐ มัธยมปลาย

☐ ปวช./ปวส. ☐ ปริญญาตรี ☐ ปริญญาโท

☐ อื่นๆ

4. ประสบการณ์ทำงาน (ปี)

☐ 0-2 ปี ☐ 3-5 ปี ☐ 6-8 ปี

☐ 9-11 ปี ☐ > 12 ปี

5. ประสบการณ์ทำงานปั๊ม (ปี)

☐ 0-2 ปี ☐ 3-5 ปี ☐ 6-8 ปี

☐ 9-11 ปี ☐ > 12 ปี

7.รายได้ต่อเดือน (รวมค่าล่วงเวลา):

☐ < 10,000 บาท ☐ 10,001 -15,000 บาท ☐ 15,001 – 20,000 บาท

☐ 20,001 – 25,000 บาท ☐ 25,001 – 30,000 บาท ☐ 30,001 – 35,000 บาท

☐ 35,001 – 40,000 บาท ☐ >40,000 บาท

8. คุณมีความรู้ความเข้าใจเรื่องการสูญเสียการได้ยินมาก่อนหรือไม่?

☐ ใช่ ☐ ไม่ใช่

9. คุณได้ผ่านการทดสอบสมรรถภาพการได้ยินจากการตรวจสุขภาพพนักงานประจำปี 2555 หรือไม่?

☐ ใช่ ☐ ไม่ใช่

10. คุณใช้อุปกรณ์ป้องกันอันตรายส่วนบุคลเพื่อป้องกันเสียงดังในขณะที่คุณปฏิบัติงานหรือไม่?

☐ ใช่ ☐ ไม่ใช่

11. คุณใช้อุปกรณ์ป้องกันอันตรายจากเสียงดังในขณะปฏิบัติงานของคุณด้วยอะไร?

 ☐ ปลั๊กอุดหูชนิดโฟม

 ☐ ปลั๊กอุดหูชนิดซิลิโคน

 ☐ ที่ครอบหู

12. คุณเคยผ่านการฝึกอบรมโครงการฝึกอบรมการใช้อุปกรณ์ป้องกันหูอย่างถูกวิธีหรือไม่?

☐ ใช่ ☐ ไม่ใช่

13. คุณมีปัญหาเรื่องการสูญเสียการได้ยินแต่กำเนิดหรือไม่?

☐ ใช่ ☐ ไม่ใช่

14. คุณเป็นผู้มีประสาทในการรับสัมผัสเสียงได้ไวหรือไม่?

☐ ใช่ ☐ ไม่ใช่

ส่วนที่ 2 : สอบถามความรู้ความเข้าใจในการป้องกันการสูญเสียการได้ยินของพนักงานแผนกปั๊มชิ้นส่วนรถยนต์

คำถาม	ใช่	ไม่ใช่
1.การสวมใส่อุปกรณ์ป้องกันหูสามารถป้องกันหูของคุณจากเสียงดังในขณะปฏิบัติงาน		
2. การสวมใส่อุปกรณ์ป้องกันหูตลอดระยะเวลาการทำงานในพื้นที่เสียงดังมากกว่า 80 เดซิเบลเอ ไม่สามารถป้องกันอันตรายจากเสียงดังได้		
3. คุณต้องสวมใส่อุปกรณ์ป้องกันหูทุกครั้งเมื่อจะเข้าไปในพื้นที่เสียงดังมากกว่า 80 เดซิเบลเอ เพื่อป้องกันหูของคุณจากการการสูญเสียการได้ยิน		
4. คุณต้องสวมใส่อุปกรณ์ป้องกันหูทุกครั้งเมื่อจะเข้าไปในพื้นที่เสียงดังมากกว่า 140 เดซิเบลเอ เพื่อป้องกันหูของคุณจากการสูญเสียการได้ยิน		
5.คุณต้องตรวจสอบค่าความสามารถในการลดเสียงของอุปกรณ์ป้องกันเสียง (NRR) ก่อนทุกครั้งที่ต้องเลือกใช้อุปกรณ์ป้องกันเสียงดัง		
6.คุณต้องเข้ารับการตรวจสมรรถภาพการได้ยินทุกปีถ้าคุณทำงานในพื้นที่เสียงดังมากกว่า 85 เดซิเบลเอเพื่อรับทราบสมรรถภาพการได้ยินและเพื่อเป็นป้องกันการสูญเสียการได้ยิน		
7.การสวมใส่อุปกรณ์ป้องกันหูเป็นการลดระดับการได้ยินหรือทำให้หูหนวกในอนาคตได้		
8. อุปกรณ์ป้องกันหูสามารถลดระดับเสียงดังที่คุณได้ยินได้ถึง 40 -50 เดซิเบลเอ		

ส่วนที่ 3 : สอบถามทัศนคติในการป้องกันการสูญเสียการได้ยินของพนักงานแผนกปั๊มชิ้นส่วนรถยนต์

คำถาม	**ไม่เห็นด้วยอย่างยิ่ง**	**ไม่เห็นด้วย**	**ปานกลาง**	**เห็นด้วย**	**เห็นด้วยอย่างยิ่ง**
1.อุปกรณ์ป้องกันหูไม่มีความจำเป็นต่อการป้องกันการสูญเสียการได้ยิน					
2.การสวมใส่อุปกรณ์ป้องกันหูสามารถป้องกันหูของคุณจากการสูญเสียสมรรถภาพการได้ยินได้					
3.อุปกรณ์ป้องกันหูไม่สามารถป้องกันหูของคุณจากอันตรายของเสียงดังขณะปฏิบัติงาน					
4.หากคุณไม่มีปัญหาด้านการได้ยิน อุปกรณ์ป้องกันเสียงไม่มีประโยชน์สำหรับคุณในขณะปฏิบัติงาน					
5.การสวมใส่อุปกรณ์ป้องกันหูไม่มีความจำเป็นสำหรับการป้องกันเสียงดังในขณะทำงานในพื้นที่เสียงดัง					
6. การสวมใส่อุปกรณ์ป้องกันหูทำให้คุณมีความลำบากในการพูดคุยและสื่อสารพนักงานคนอื่นในขณะปฏิบัติงาน					
7.หากคุณสวมใส่อุปกรณ์ป้องกันหูจะทำให้คุณมีปัญหาโรคติดเชื้อในช่องหูได้ในอนาคต					
8. หากคุณสวมใส่อุปกรณ์ป้องกันหูทำให้คุณไม่สามารถทำงานได้อย่างมีประสิทธิภาพ					

ส่วนที่ 4 : สอบถามพฤติกรรมในการป้องกันการสูญเสียการได้ยินของพนักงานแผนกปั๊มชิ้นส่วนรถยนต์

คำถาม	**ทำทุกครั้ง**	**ทำ บ่อยครั้ง**	**ทำนานๆครั้ง**	**ไม่เคยทำ**
1.คุณทำการตรวจสอบอุปกรณ์ป้องกันหูว่าต้องสะอาดไม่มีสิ่งสกปรกก่อนนำมาใช้งาน				
2.คุณทำการดึงใบหูของฉันก่อนทุกครั้งในการสวมใส่ปลั๊กอุดหู (ตามรูปภาพ) 				
3.คุณทำการสวมใส่อุปกรณ์ป้องกันหูตามวิธีการที่ถูกต้องเมื่อมีเจ้าหน้าที่มาตรวจสอบ				
4.คุณใส่อุปกรณ์ป้องกันหูทุกครั้งเมื่อฉันเข้าไปทำงานในพื้นที่ปั๊มชิ้นส่วน				
5.คุณนำสิ่งใดๆไปสวมใส่ในรูหูของคุณเสมอเช่น สำลี เพื่ออุดหูของคุณแทนปลั๊กอุดหู				
6.คุณทำการใส่อุปกรณ์ป้องกันหูถึงแม้ว่ามันจะแตกหัก หรือชำรุด				
7.คุณเข้าอบรมหลักสูตรการป้องกันเสียงดังในพื้นที่การทำงานทุกครั้งที่มีการฝึกอบรมของบริษัทฯเสมอ				
8.คุณใส่ปลั๊กอุดหูในหูข้างใดข้างหนึ่งเสมอเมื่อคุณทำงาน				

“ขอขอบคุณทุกท่านในความร่วมมือในการตอบแบบสอบถาม”

VITA

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2009 – 2014 Thai Summit Auto part Industry Co.,Ltd Position Safety Officer

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- Safety Monitoring of Environment
- CCCF Activity and Risk Assessment
- Safety standard and Work In instruction of safety
- TIS/ OHSAS 18001
- Fire evacuation Practice
- Safety Trainner