

OCCUPATIONAL NOISE-EXPOSURE AND ASSESSING HEARING LOSS OF
NIGHTCLUB WORKERS IN TARAOKAN CITY, INDONESIA

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บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)

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ไนท์คลับ ในเมืองทاراคาน ประเทศอินโดนีเซีย

นายเศรษฐา เพชรยานโต



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต

สาขาวิชาสาธารณสุขศาสตร์

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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

เศรษฐา เพบริยานโต : การสัมผัสเสียงจากการประกอบอาชีพ และการประเมินการสูญเสียการได้ยินของพนักงานในไนท์คลับ ในเมืองทารากาน ประเทศอินโดนีเซีย (OCCUPATIONAL NOISE-EXPOSURE AND ASSESSING HEARING LOSS OF NIGHTCLUB WORKERS IN TARAKAN CITY, INDONESIA) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร. วัฒนสิทธิ์ ศิริวงศ์, 106 หน้า.

สถานประกอบการไนท์คลับสัมผัสเสียงดังจากดนตรีอย่างต่อเนื่องในแต่ละระยะเวลาการทำงานและมีความเสี่ยงต่อการได้ยิน การศึกษาวิจัยชิ้นนี้เป็นการศึกษาชนิดภาคตัดขวาง มีการสุ่มตัวอย่างสุ่มเป็นสัดส่วนของจำนวนพนักงานในแต่ละไนท์คลับ โดยมีพนักงานทั้งสิ้น 117 คน จาก 5 ไนต์คลับ มีการประเมินระดับการรับสัมผัสเสียงโดยการตรวจวัดระดับเสียงด้วยเครื่องซาวด์เลเวลมิเตอร์ (Sound Level Meter) ประเมินภาวะสูญเสียการได้ยินด้วยเครื่องออดิโอมิเตอร์ (Audiometer) และ ใช้แบบสอบถามและการสังเกตสำหรับตัวแปรอื่นๆ ได้แก่ อายุ เพศ ระดับการศึกษา ลักษณะงาน งานอดิเรก การสูบบุหรี่ การดื่มแอลกอฮอล์ กิจกรรมการเล่นกีฬา ช่วงเวลาการทำงาน ชั่วโมงการทำงานต่อวัน ระดับความรู้และการปฏิบัติตนต่อภาวะสูญเสียการได้ยิน บุคคลลักษณะแต่ละบุคคล ระยะสัมผัสเสียง จำนวนแหล่งกำเนิดเสียง และ ขนาดพื้นที่ไนท์คลับ ค่าเฉลี่ยระดับเสียง 5 ไนต์คลับ 107.22 เดซิเบลเอ ซึ่งพนักงานในไนท์คลับดังกล่าวทำงานมากกว่า 6 ชั่วโมงต่อวัน พนักงานจำนวน 104 คน (ร้อยละ 88.9) มีภาวะสูญเสียการได้ยิน ในขณะที่พนักงาน 13 คน (ร้อยละ 11.1) มีภาวะสูญเสียการได้ยินเป็นปกติ พนักงานที่มีภาวะสูญเสียการได้ยิน พบว่า พนักงาน 88 คนมีภาวะสูญเสียการได้ยินระดับต่ำ พนักงาน 15 คนมีภาวะสูญเสียการได้ยินระดับปานกลาง พนักงาน 1 คนมีภาวะสูญเสียการได้ยินระดับรุนแรง พบว่าปัจจัยภาวะสูญเสียการได้ยินเกิดจากงานอดิเรก การสูบบุหรี่ ระดับความรู้และการปฏิบัติตนต่อภาวะสูญเสียการได้ยิน (เทคนิคการวิเคราะห์ความถดถอยแบบโลจิสติก)

การศึกษาครั้งนี้แนะนำให้การตรวจสุขภาพของพนักงานและการปรับเปลี่ยนหมุนเวียนพนักงานในไนท์คลับ เป็นแนวทางเพื่อการป้องกันภาวะการสูญเสียการได้ยินของพนักงานที่เหมาะสมต่อการจัดการไนท์คลับ นอกจากนี้ภาครัฐควรมีการรณรงค์และจัดการฝึกอบรมเกี่ยวกับสุขภาพจากการประกอบอาชีพและการตรวจวัดเสียงในสถานประกอบการไนท์คลับ

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KRESNA FEBRIYANTO: OCCUPATIONAL NOISE-EXPOSURE AND ASSESSING HEARING LOSS OF NIGHTCLUB WORKERS IN TARAKAN CITY, INDONESIA.

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Occupational noise-exposure is a majority problem in the workplace. Nightclub is one sector of the entertainment industry that will grow rapidly in the future. Many overseas research indicates that nightclub workers were exposed to loud music constantly throughout the work shift and putting their hearing at risk. This study design was cross-sectional with proportional random sampling and it was determined by the number of subjects in each nightclub. A total 117 nightclub workers from 5 nightclub were participated. Noise exposure level was assessed by Sound Level Meter monitoring, measuring hearing loss was done by Audiometer, and other variables (such as: age, gender, educational background, job description, hobby, smoke, drink alcohol, sport activities, duration work, length workday, knowledge and practice, characteristic workers, distance, number of loudspeaker, and total floor area) were assessed by questionnaires and observation.

The average noise at nightclub was 107.22 dBA where every employee works more than 6 hours per day. A total of 104 respondents (88.9%) had hearing loss, while 13 respondents (11.1%) did not experience any hearing loss (normal). From 104 respondents who indicated experiencing hearing loss, mostly at the level of mild (88 respondents), 15 respondents (moderate), and 1 (one) respondent in the level of severe. Multiple logistic regression found hobby, smoke, knowledge and practice were strongest predictor may affect to hearing loss.

Provide regular inspections of the ears of workers, doing the job rotation system it was a good solution to prevent from hearing loss for management of nightclub. The government also should regularly conduct campaigns and provide training on occupational health, and routinely perform noise measurements.

Field of Study: Public Health

Student's Signature

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Advisor's Signature

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LIST OF ABBREVIATIONS

DALY	Disability-Adjusted Life Year
dBA	A-weighted Decibels
dB	Decibels
dBHL	Decibel Hearing Loss
DJ	Disk Jockey
ESHL	Early Sensorial Hearing Loss
Hz	Hertz
ISO	International Organization for Standardization
NC	Nightclub
NIDCD	National Institute on Deafness and other Communication Disorders
NIHL	Noise-Induced Hearing Loss
PTS	Permanent Threshold Shift
RMS	Root Mean Square
RNID	Royal National Institute for Deaf People
SLM	Sound Level Meter
SPSS	Statistical Package for Social Science
TTS	Temporary Threshold Shift
UK	United Kingdom
WHO	World Health Organization

CHAPTER I

INTRODUCTION

1.1 Background and Rationale

Noise is unwanted sound for the ear. Impulsive sound could harm the ears. Ears damage usually occurs at the eardrum. Initially, there will be a high-frequency hearing loss, but slowly it will keep decreasing to the lowest frequency (1).

Noise in the workplace is a major health problem for many countries. It is estimated that at least 7 million people (35% of total population) exposed to noise > 85 dBA. Deaf occurred in the industry is in the first among the group of labor illness caused by the noise during > 20% (2).

Noise induce Hearing Loss (NIHL) or hearing loss is a disease that damages one part or the whole hearing. It occurs in one or both ears. The damage can be mild, moderate, or severe. The damage occurs because of the constant exposure to noise in the environment (2). Exposure to noise is measured based on the power of the sound source in units of decibel area (dBA) which is a unit for measuring sound levels. Noise exposure can cause hearing loss in a period when long exposure times and high noise levels (3).

The decreasing in hearing sensitivity, often called notch, occurs in the audiometric configuration between 3,000-6,000 Hz. Hearing loss is a gradual process that is not realized for many years. When hearing loss occurs, patients generally complain not able to follow the conversation (4).

A study conducted in the UK involving more than 22,000 subjects found that the prevalence of hearing loss increased due to the duration of exposure to the noise goes on continuously (5). Genesis NIHL causes DALY (Disability-Adjusted Life Year) more than four million, received disability related to hearing loss. DALY number found that males larger than females. Regulations controlling noise exist but are rarely enforced. For example, countries in Southeast Asia have regulations regarding the prevention of NIHL, but unfortunately it lacks of implementation and not enforced while the workers left unaware of the impact caused by the noise (6).

For occupational noise, the best characterized health risk is hearing impairment. The first effects of excessive noise exposure is typically the increasing hearing threshold (threshold shift), as assessed by audiometry. Threshold shift is the precursor of NIHL, the main outcome of occupational noise. It corresponds to a permanent increase in the threshold of hearing that may be followed by tinnitus. Because hearing impairment is usually gradual, the affected worker will not notice any changes in their hearing ability until a large threshold shift has occurred (7).

Minister of Manpower and Transmigration Republic of Indonesia Number PER.13/MEN/X 2011 on Value Threshold physical factors and chemical factors in the workplace. Threshold Limit Value (TLV) is a standard factor of danger in the workplace as a concentration/intensity weighted average (time weighted average) is unacceptable labor without causing disease or illness, the daily work for a period not exceeding 8 hours a day or 40 hours a week (8).

Untreated hearing loss has serious risk on the psychology of workers who are constantly exposed to noise. Psychological effects that may arise such as shame, guilt and anger, feelings of humiliation, concentration problems, insecurity, and less confident (9).

Along with the development and modernization in the industrial sector, health problem caused by noise becomes one of the important issues that must be observed. The impact of noise on hearing loss does not only occur in the industrial sector, especially among the workers. The workers in the entertainment sector are also at risk of the undesired effects. Especially then when the loudspeaker in the entertainment field was introduced in the era of the '60s, many overseas research indicates that musicians and discotheques workers were exposed to loud music constantly throughout the work shift and putting their hearing at risk. The current music development and entertainment go rapidly. Places of entertainment are increasing and has become the need of citizens to release tension and stress. Some activities of modern life often make noise as an integral

part. Every night millions of young people around the world go to discotheques and listen to loud music. Royal National Institute for Deaf People (RNID), an honorary British institution that examines the problem of deafness, surveyed a number of nightclubs that turns noise levels up to 120 dBA. Ears of young children were exposed to noise above the threshold for hours even to the extent RNID stamped on it as a group of young people who were indifferent and deaf (10).

According to Hendarmin (1990) who conducted an investigation on the level of danger caused by loud disco music (between 100-110 dBA) shows that loud music can damage one's hearing. Especially if the sounds exceeds the normal limit that can be tolerated by ear. The magnitude of the sound to the ears are varied depending on the intensity and duration, the amount of duration and sensitivity of each, including the age of the listener (10).

Disc Jockey, bartenders and waiters who are constantly exposed to loud music from the loud speaker are prone to hearing loss. Research conducted by the Ministry of Manpower of Singapore 1996 amplifiers proves that music played in discotheques can cause hearing loss not only to the visitors, but also to its workers. Of the 43 workers in 5 discotheque exposed to 90-94 dBA sound throughout the work shift (average exposure of 5.1 hours/day), significantly demonstrated hearing loss early stage/ESHL (Early Sensorial Hearing Loss) 41.9% and complained of tinnitus by 21% (10).

Tarakan is a city located in the province of North Borneo which is also the latest province in Indonesia. Tarakan will become one of the metropolitan city as a haven for tourists. As a stopover town for granted Tarakan will provide a wide range of entertainment that can be reached by tourists and locals. Nightclub is one sector of the entertainment industry that will grow rapidly in the future. The data and information about the noise level that occurs in nightclubs, especially in Tarakan city still very poor and there had been no noise-related research ever done before. This data can be used as a reference in preventing diseases that cause deafness, so the noise level that occurs can be reduced to a minimum.

Nightclubs is job one living in sub welcomes largely accepted by society workers, some workers are just high school graduate or graduate from lower level of education who do not aware of the dangers caused by the noise. Noisy effects are known to exist two types of non-auditory effects that include physiological disorders, psychological disorders, communication disorders and auditory effects that include temporary and permanent hearing loss (11).

1.2 Research Question

- a. What is the level of noise exposure at nightclub in Tarakan City, Indonesia?
- b. What is the level of hearing loss among nightclub worker in Tarakan City, Indonesia?
- c. What is a relationship between noise exposure and hearing loss among nightclub workers in Tarakan City, Indonesia?

1.3 Research Objectives

1.3.1 General Objective

To find out the relation between noise exposure and hearing loss among nightclub workers in Tarakan City, Indonesia.

1.3.2 Specific Objective

- a. To classify into levels of occupational noise exposure on the nightclub in Tarakan City, Indonesia.
- b. To classify into levels of hearing loss among nightclub workers in Tarakan City, Indonesia.
- c. To determine sign and symptoms of hearing loss among nightclub workers in Tarakan City, Indonesia.
- d. To assess risk factors can influence hearing loss among nightclub workers in Tarakan City, Indonesia.

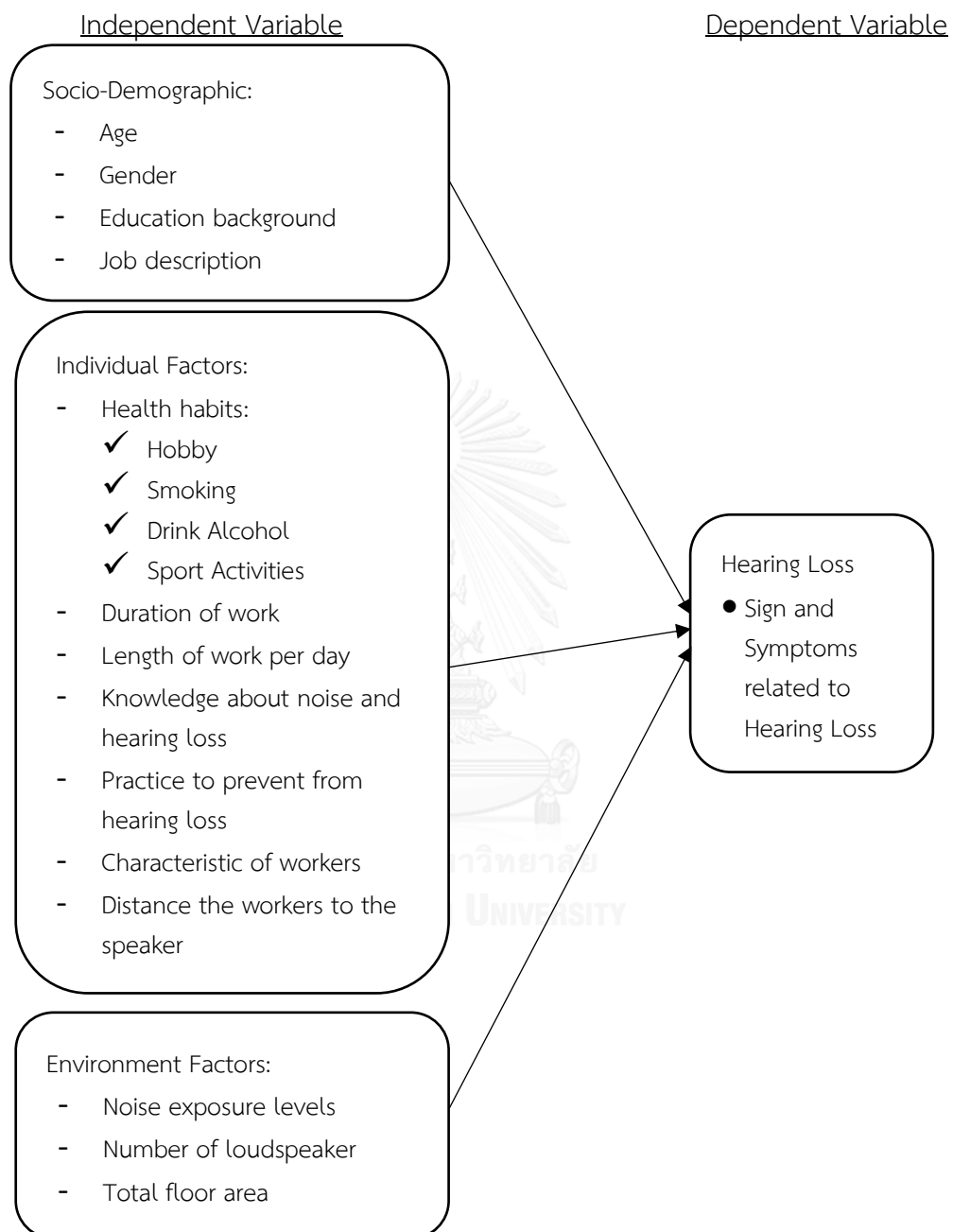
1.4 Research Hypothesis

Ha = There is a relationship between noise exposure against hearing loss among nightclub workers in Tarakan City, Indonesia.

Ho = There is no relationship between noise exposure against hearing loss among nightclub workers in Tarakan City, Indonesia.

1.5 Conceptual Framework

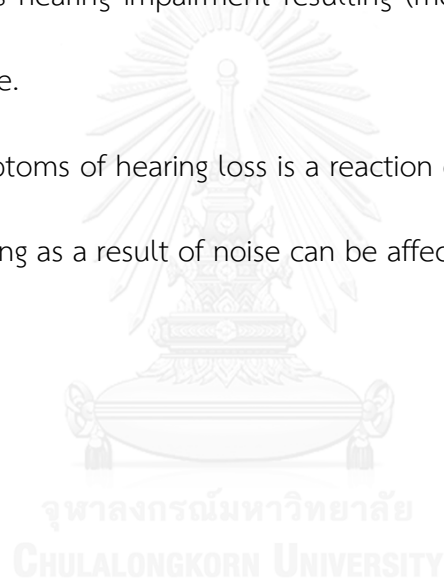
Figure 1 Conceptual Framework



1.6 Operational Definitions

- a. Socio-demographic refers to the age of the workers, gender, educational background, and job description the workers at nightclub in Tarakan City, Indonesia.
- b. Health habits refers to question asking about daily life of the workers. In this case if they do exercise routines, smoking habit, drinking alcohol, and their hobbies related to the loud sounds (ex. Diving, shooting, race car/motorbike, attend to concert music, play games, play music at music studio, listening music using earphones or headphones).
- c. Duration of working time starting from scratch to work in a nightclub until this study will be conducted.
- d. Length of work per day calculated from the first hour to come to work until the work is completed.
- e. Knowledge, refers to respondent's knowledge about noise and hearing loss.
- f. Practice refers to how the workers prevent their ears in order to avoid hearing loss. Is it their wearing ear protectors, went to the doctor to check up ear regularly, attend to the workshop about noise and the effect of noise, or other questions concerning the workers protect their ears from hearing loss.
- g. Characteristic the workers refers to their activities during the work whether their just settle on one position or movement.

- h. Distance the workers to speaker calculated based on where is they work with a nearby speaker distance.
- i. Noise exposure level is the amount of pressure (energy) emitted by a source of sound, as the noise intensity (perceived as loudness).
- j. Number of speakers in each nightclub.
- k. Total floor area each nightclub in meter.
- l. Hearing loss is hearing impairment resulting (measuring by audiometer) from noise exposure.
- m. Sign and symptoms of hearing loss is a reaction caused growing especially the sense of hearing as a result of noise can be affect to hearing loss.



CHAPTER II

LITERATURE REVIEW

This literature of hearing loss as a result of noise at nightclub workers in Tarakan City, Indonesia was presented into seventh parts as following:

1. Nightclub
2. Jobs at a Nightclub
3. Noise exposure
4. Noise-induced hearing loss
5. Noise measurement
6. The effect of noise in the workplace
7. Controlling noise exposure

2.1 Nightclub

A nightclub is an entertainment venue open later in the evening that stays open usually until the early morning hours. Most nightclubs are usually located in urban areas. The music and dance floor are big draws of these places, and they may serve some type of food as well as drinks. Food in nightclubs is often limited to appetizers and lighter fare such as chicken wings and nachos. These types of foods are popular, require minimum fuss and go well with alcoholic drinks. Some

more upscale places may feature sophisticated dishes. The food as well as the drinks served varies according to the clientele (12).

The location of a nightclub should depend on where the target customer is located such as near bars that they also attend. Clientele may go to a bar first earlier the same night. Rather than just depend on one type of clientele, however, many nightclub owners try to attract a mix of customers to ensure they can keep a full enough house to make a profit. For example, a place may want to target young professionals, office workers, tourists and college students (12).

The main difference between a nightclub and a bar is a dance floor. Whereas many bars don't have a dance floor, every nightclub is likely to have a large dance floor in the middle of the club. A disc jockey (DJ) booth is often located right near the dance floor and some dance floors also feature laser light effects. The decor and music is targeted to attract the types of clientele wanted. Many nightclubs offer drink specials for birthday parties as well as bachelor and bachelorette parties (12).

2.2 Jobs at a Nightclub

There are several jobs at nightclub as follow (13):

a. Security

The security staff at nightclubs may include door attendants and bouncers stationed throughout the interior. Door attendants restrict access by managing guest lists, enforcing dress codes and checking identification to ensure patrons are old enough to enter. Inside the nightclub, bouncers are responsible for ensuring staff and client safety. They keep an eye out for patrons who have overindulged, remove rowdy customers harassing the help and break up any fights or arguments that may occur. An attractive appearance and muscular build are often requirements for landing this job.

b. Cashier

In nightclubs that charge a cover or admission fee, a cashier is in place at the entrance to accept payment. The person in this position is generally speedy, pays attention to detail and can work an electronic cash register and credit card machine efficiently. He may wear a business casual uniform or will dress according to the aesthetic of the club.

c. Attendants

In some nightclubs, attendants are hired to work to enhance the guest service experience. In clubs located in colder climates, coat check attendants take responsibility for clients' coats, hats, scarves and umbrellas. Bathroom

attendants turn restrooms into a sanctuary offering toiletry items and refreshments while maintaining the cleanliness of the facilities. Generally, these staffers work on a tip basis, and may receive a small additional hourly or nightly wage from the house.

d. Entertainment

Although digital music has given many nightclub owners the ability to create their own sounds, DJs, musicians and dancers are commonly hired in nightclubs to provide nightly entertainment or to complement the jukebox on weekends and during special events.

e. Service Staff

The number of service staff necessary depends on the size of the nightclub and the services it offers. Bartenders prepare drinks, serving them to clients at the bar, and giving them to cocktail servers who run the drinks to clients in other parts of the club. In nightclubs that offer food in addition to drinks, additional jobs are created for food prep workers, cooks and wait staff. Cleaning jobs may be divvied among staff members, or additional bussers, dishwashers and housekeeping crews may be hired in larger establishments.

f. Management

The management staff at a nightclub may consist of an individual or a team of employees. Management responsibilities include advertising, club promotion, booking entertainment, payroll, staffing, inventory control, cash

reconciliation, and reporting profits and loss to ownership. Managers are also the go-to contact for smaller tasks like receiving shipments and big ones like accompanying inspectors for insurance claims or government permits.

2.3 Noise Exposure

Sound or voice is received as a stimulus to the nerve cells of the listener's ears. It is a longitudinal wave generated by the vibrations of the sound source or sound and the wave propagates through the medium of air or other conductors. When the sound is not desired and considered to be disruptive, the sound is stated as noise. So the noise is an undesired sound. In order to protect the health of workers, noise is defined as an unwanted noise/voice derived from the tools during the construction process within a certain level that can cause hearing loss (8).

The properties of noise which are important in the workplace are (14):

a. Frequency

Frequency as a function in periodic time, the reciprocal of the period. The unit is hertz (Hz). Frequency is the rate at which the source produces sound waves, i.e. complete cycles of high and low pressure regions. In other words, frequency is the number of times per second that a vibrating body completes one cycle of motion.

b. Sound Pressure

Sound pressure is the amount of air pressure fluctuation a noise source creates. We "hear" or perceive sound pressure as loudness. Sound pressure also depends on the environment in which the source is located and the listener's distance from the source. Root-mean-square instantaneous sound pressure at a point during a given time interval. Unit, Pascal (Pa).

c. Sound Pressure Level

It is difficult to work with the broad range of common sounds pressures (0.00002 Pa - 20 Pa). To overcome this difficulty we use decibel (dB, or tenth (deci) of a Bel)). The decibel or dB scale is more convenient because it compresses the scale of numbers into a manageable range.

The decibel is named after Alexander Graham Bell, the Canadian pioneer of the telephone who took great personal interest in the problems of deaf people. Sound pressure converted to the decibel scale is called sound pressure level (Lp).

d. Sound Power

The sound power is the sound energy transferred per second from the noise source to the air. A noise source, such as a compressor or drum, has a given, constant sound power that does not change if the source is placed in a different environment. Power is expressed in units called watts (W). Like sound pressure, sound power (in W) is usually expressed as sound power levels in dB.

e. Sound Intensity Level

Ten times the logarithm to the base ten of ratio of the intensity of a given sound in a stated direction to the reference sound intensity of 1 picoWatt per square meter (pW/m^2).

In the workplace, noise is classified into two types of large groups (15):

a. Noise remains separated into two types:

1) Noise with cut off frequency (discrete frequency noise)

This noise in the form of "tones" is purely on various frequency, for example engine noise, fan noise, and so on.

2) Broad band noise

Equally interrupted noise frequency and broad band noise are equally classified as fixed noise (steady noise). The difference is that the broad band noise occurs at a frequency of more varied (not "tone" of the pure).

b. Unfixed noise (unsteady noise) is further divided into three types:

1) Fluctuating noise

A noise which is always changing during a certain time span.

2) Intermittent noise

In accordance with the translation, intermittent noise is a noise that is disjointed with various amount, for example, the traffic noise.

3) Impulsive noise

Impulsive noise is generated by the sounds of high intensity (deafening) in a relatively short time, for example, the sound of an explosion of firearms and a tool alike.

The most appropriate exposure measurement for occupational noise is the A-weighted decibel (dBA), usually averaged over an 8-hour working day ($L_{Aeq,8h}$). There is a strong correlation between this parameter and the ability of the noise hazard to damage the human hearing. It is frequently measured in the workplace, and is also the most commonly used epidemiological measurement of exposure.

2.4 Noise-Induce Hearing Loss

The human ear is divided into three main parts; the outside (outer ear), the middle (middle ear) and the inside (inner ear). The third part has different components with each function and each responses to the continuous sound waves generated in the surroundings.

The outer ear consists of the earflap and the human ear canal with a length less than 2 cm. The main functions of the outer ear canal is as the initial entry of sound waves from the air into the human auditory system.

The second part, the middle one (middle ear), consists of the eardrum (Eardrum) and three other bones; the hammer (malleus), anvil (incus), and stirrup (stapes). The middle part of the human ear, is in the back of the eardrum associated

with the nose through the eustachian tube (the direction of the entry of sound waves from the outer ear canal is regarded as the front of the eardrum).

Physically, eardrum may be perforated because of some physical trauma, like punctured by objects tapered in deeply to reach the eardrum, fractured skull, noise blast, charcoal sparks in the welding process, or chemical splash. In addition to these traumatic causes, the holes in the eardrum can also be perforated because of an infection in the middle ear that extends up to the eardrum. When this happens, the blood will flow out of the ear.

The damage in the ear holes causes disturbances in the system of human hearing and is usually not followed with pain. Most cases are the temporary hearing loss. Generally, a perforated eardrum can heal on its own during the healing process if the ear safe from intruding objects including water. However, if the eardrum is severely injured, a special surgery named tympanoplasty is needed.

Sound waves reach the eardrum will create vibrations in the eardrum membrane. The vibration will be transferred to the three bones; the hammer (malleus), anvil (incus), and stirrup (stapes). They are connected in the middle ear that will move the fluid (liquid such as water) in the hearing organ-shaped snail (cochlea) into the inner ear.

Furthermore, this fluid movement will thrill thousands of fine hairs shaped cells (hair cells) in the inner ear that converts the vibrations received into impulses for the nerve of hearing. Through the auditory nerve, the impulses sent to the brain

is translated into the sounds we hear. Lastly, the sound will be "arrested" by the human brain for about 0.1 seconds.

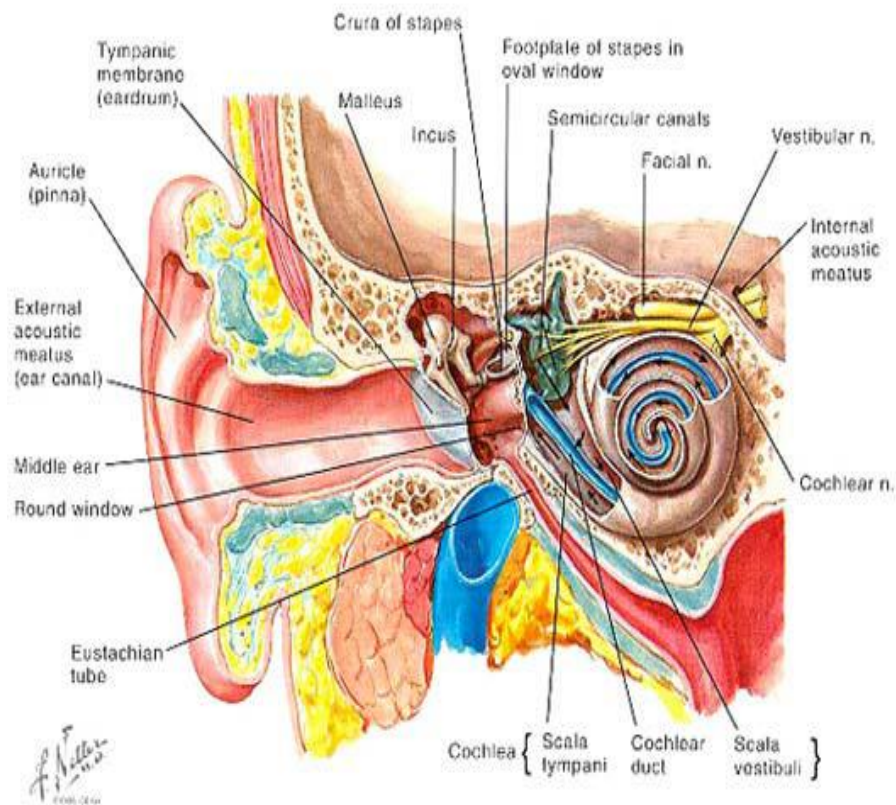


Figure 2 Anatomy of the human ear

Photo by: google document

Disorders of the ear, either in the outer ear, middle ear, and the inner ear can cause deafness. There are three known types of hearing loss (15):

a. Conductive hearing loss

This irregularity is classified as a type of mechanical problems (mechanical hearing loss) that attacks the outer and middle ear. The membrane of the eardrum and the three main bones (hammer, anvil, and stirrup) will barely

vibrating or not vibrating at all. As the result, one will be difficult to hear anything.

b. Sensorineural hearing loss

As the name implies, sensorineural hearing loss is classified as a problem in the sensor system, and not a mechanical problem. Sensorineural hearing loss is caused by irregularities in the inner ear, specifically the cochlea.

c. Mixed hearing loss

The combined deafness is caused by a combination of conductive deafness and nerve deafness. If both conduction threshold indicates the loss / hearing loss, but the loss of a greater portion of the air conduction.

The degree of hearing loss according to:

Table 1 Definition of Hearing Impairment^a (7)

	Grade of hearing impairment	Audiometric ISO value^b	Performance
0	No impairment	≤ 25 dB (better ear)	No, or very slight, hearing problems. Able to hear whispers.
1	Slight impairment	26 – 40 dB (better ear)	Able to hear and repeat words spoken in normal voice at 1 m.
2	Moderate impairment	41 – 60 dB (better ear)	Able to hear and repeat words using raised voice at 1 m.
3	Severe impairment	61 – 80 dB (better ear)	Able to hear some words when shouted into better ear.
4	Profound impairment, including deafness	≥ 8 dB (better ear)	Unable to hear and understand even a shouted voice

- a Source: based on WHO (1991).
- b International Organization for Standardisation, average of 500, 1000, 2000, 4000 Hz

2.5 Noise Measurement

There are two ways to conduct the noise measurement (16):

- a. Direct measurements

This measurement tool is used on the Sound Level Meter. This tool can measure the intensity of noise between 40-130 dBA at a frequency between 20-20000 Hz. Prior to the measurements, the contour folder location of the sound source and its surroundings must be made. Furthermore, the time of the Sound Level Meter measurement is installed at a height of \pm (140-150 m) or as high as the ears are located.



Figure 3 Sound Level Meter

Photo by: google document

The electrical signal from the transducer is fed to the pre-amplifier of the sound level meter and, if needed, a weighted filter over a specified range of frequencies. Further amplification prepares the signal either for output to other instruments such as a tape recorder or for rectification and direct reading on the meter. The rectifier gives the RMS value of the signal. The RMS signal is then exponentially averaged using a time constant of 0.1 s ("FAST") or 1 s ("SLOW") and the result is displayed digitally or on an analog meter (17).

In some cases, the sound level meter does not include a logarithmic converter. The scale on the indicating device is then exponential so that the linear signal may be read in dB. In this case, the dynamic range of the display is usually restricted to 10 to 16 dB and the precision of the reading is rather poor. In the case of intermittent noise, the user must constantly adjust the amplifier to adapt the output signal to the dynamic range of the display. When a log converter is used, the display scale is linear in dB and its dynamic range is usually much greater. This type of display has the advantage of providing the same precision at any level and permitting a much better appreciation of the range of fluctuations of the noise to be measured. In this regard, digital displays are less useful (17).

The specifications of sound level meters are given in IEC 60651 for 4 types 0, 1, 2, 3 differing by the measurement precision. The measurement precision is reduced as the type number increases, affecting manufacturing costs

significantly. The IEC 60651 standard specifies the following characteristics: a) directional characteristics, b) frequency weighting characteristics, c) time weighting, detector and indicator characteristics, and d) sensitivity to various environments (17).

The type 0 sound level meter is intended as a laboratory reference standard. Type 1 is intended especially for laboratory use, and for field use where the acoustical environment has to be closely specified and controlled. The type 2 sound level meter is suitable for general field applications. Type 3 is intended primarily for field noise survey applications. The frequency response for all types is defined from 10 Hz to 20000 Hz with a higher accuracy at frequencies from 100 Hz to 8000 Hz (17).

Type 2 and type 3 sound level meters usually include only the A-weighting network and the FAST and SLOW response. Models with AC outlets should be chosen as they make it possible to record the noise on a magnetic tape recorder for further analysis. They are usually equipped with a diffuse field piezoelectric or electret microphone (17).

Type 0 and 1 sound level meters are often much more versatile with the possibility of measuring vibrations or inserting octave or one third octave band filters. They usually make it possible to measure a non-weighted signal (FLAT response) as well as an A-weighted and a C-weighted signal. They come with a

choice from a variety of condenser microphones of different sensitivities and characteristics (17).

As previously seen, the evaluation of impulses involves the determination of the peak level and the duration of the impulse. Some precision sound level meters are equipped with a circuit that makes it possible to measure the peak level: the time constant used in this case is about 50ms and a circuit is included to hold the instantaneous level. After recording the peak value, the meter must be reset in order to read another value (17).

Some sound level meters offer the possibility to measure the equivalent A-weighted level $L_{Aeq,T}$ according to the equal energy principle. This can be done in two ways. In the first, the integrating period is prefixed (in some cases, 60 seconds) and the instrument computes the $L_{Aeq,T}$ level progressively: intermediary readings are then irrelevant and the user may only record the final value. In the second type, the integrating period is not fixed and the instrument actually gives the $L_{Aeq,T}$ level computed during the time elapsed since it was started. This type is of more use than the first one as the user does not have to define before hand the integrating time to be used (17).

b. Measurement on Sound Receiver

This type of measurement is intended to determine how the average intensity of the sound is received by the workers during work hours. It is based on the experience that not all of the workers are working in the same place at

the same time. So that workers are not receiving sound from a sound source is high. Thus this type of measurement is intended to reduce the effects of noise exposure per person

Dosimeter is a device used to measure the noise levels experienced by workers during their shift. This tool can measure the noise occurred during a shift of 8, 10, 12 hours, or more. The dosimeters mounted on the waist belt and a small microphone placed near the ear (≤ 10 cm). Dosimeter measures the amount of sound heard during the work shift. Sound level meters and dosimeters will show the results in the form of numbers that can be compared with a maximum limit rule (85 dBA for 8 hours shifts, 40 hours per week - the limit will be lower for longer working time).



Figure 4 Personal Noise Dosimeter

Photo by: google document

Decibels are measured on a special scale, called logarithmic, which means that each additional 3 decibel sound intensity is doubled. In other words, an increase from 90 dBA to 93 dBA means that the sound is two times louder than 90 dBA, an increase from 90 dB to 96 dBA means that the sound is four times louder than 90 dBA. The important thing to remember is a small increase in the decibel means a huge increase in loudness and the more severe the damage which can resulting in the ear.

2.6 The Effect of Noise in the Workplace

Noise causes various disorders (18), they are:

a. Physiological Disorders

In general, high-pitched noise is very annoying, especially when disjointed or which come suddenly. These disorders can increase the blood pressure (mmHg), pulse, constricting the peripheral blood vessels especially in the hands and feet, and can cause pale and sensory disorders.

b. Psychological disorders

Psychological disorders may include discomfort, lack of concentration, insomnia, and short-temper. If the noise is received in a long time, it can cause psychosomatic illnesses such as gastritis, stress, fatigue, and others.

c. Communication Disorders

Communication disorders usually cause the masking effect (sound cover clear hearing) or the disturbance of sound clarity. One must shout to the other in order to communicate. This disorder can lead to disruption of work, and human error since one cannot hear the signal or alarm. This communication disorders indirectly risk the work safety.

d. Impaired balance

Very high noise can create the impression of one walking adrift, which is caused by the physiological disorders such as dizziness (vertigo) or nausea.

e. Effects on hearing

The effect on the hearing is the most serious disorder since it can cause deafness. Deafness is progressive. At first, it is temporary and will soon recover if one is keep away or the ears are protected from the source of noise. Otherwise, the hearing will be lost permanently and will not recover nevertheless.

Threshold shift is the precursor of NIHL, the main outcome of occupational noise. It corresponds to the permanent increase in the threshold of hearing that may be followed by tinnitus. Since hearing impairment is usually gradual, the affected workers will not notice any changes in their hearing ability until a large threshold shift has occurred. Noise-induced hearing impairment occurs predominantly at higher frequencies (3000-6000 Hz), with the largest effect at 4000

Hz. It is irreversible and increases severely due the continuous noise exposure. The consequences of NIHL include (7):

- a. Social isolation
- b. Impaired communication with coworkers and family
- c. Decrease ability to monitor the work environment (warning signals, equipment sounds)
- d. Increased injuries from impaired communication and isolation
- e. Anxiety, irritability, decreased self-esteem
- f. Lost work productivity
- g. Expenses for workers' compensation and hearing aids

2.7 Controlling Noise Exposure

In principle, the control of noise in the workplace consists of (16):

- a. Source
 - 1) Technical control

Technical control is conducted on the source of noise, media of noise and the distance traversed between the source of noise and the workers. Noise control at the source is highly effective and should be conducted at the highest noise source in any possible means.

- 2) Redesigning the equipment to reduce the speed of moving equipment, adding muffler on the input or output of an effluent, replacing outdated tools with newer and well-designed equipment.

- 3) Performing repairs and maintenance by replacing parts of the voiceless equipment and lubricate all the moving parts.
- 4) Isolating the equipment in a manner to keep the source of the worker / receiver down, shutting down the machine or making a barrier for the machine.
- 5) Reducing the source of noise to the road by providing rubber pads to reduce vibration caused by the metallic equipment, reducing the fall of some object by creating a bath or using the belt wheel.
- 6) Adding insulation to the noise-absorbing material in the workspace. The damper can be installed on the walls of a noisy room.

b. Self

- 1) Administrative control

These controls include the rotation of workers exposed to noise at high intensity to a place with lower noise intensity or by reducing the noise exposure by using protective gears.

- 2) Using Protective Equipment

The control depends on the selection of the right equipment for a certain noise level, eligibility and the cares of the equipment.

Types of Protective Equipment:

- a) Ear plugs. It inserted in the ear until it closes tightly so that the noise does not reach the tympanic membrane. Ear plugs can reduce noise till 30 dB.
- b) Ear muff. It covers the entire external ear and used to reduce noise till of 40-50 dB.
- c) Helmet (enclosure). It covers the entire head and used to reduce the maximum noise 35 dB.



CHAPTER III

RESEARCH METHODOLOGY

The study aims to find out noise exposure that can cause to hearing loss among nightclub workers in Tarakan City, Indonesia. The explanation of the method was presented into 11 part as follow:

1. Study design
2. Study area
3. Study population
4. Sample and sample size
5. Sampling technique
6. Measurement tools
7. Validity and reliability
8. Data collection
9. Data analysis
10. Ethical consideration



3.1 Study Design

This research was cross-sectional study. Period of this study during June 2016.

3.2 Study Area

The study was conducted in North Borneo Province, Indonesia. North Borneo has 4 municipalities or “Kabupaten” (Bulungan, Nunukan, Malinau, and Tana Tidung), and 1 cities (Tarakan City). The data was obtained from 5 nightclubs in Tarakan City.



Figure 5 Map of Indonesia

Photo by: google document

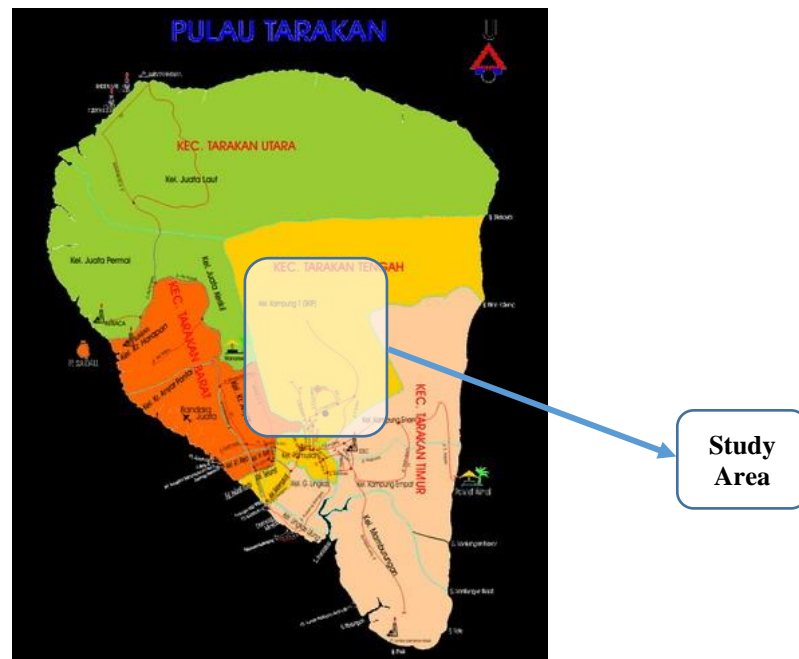


Figure 6 Map of Tarakan Island, Indonesia

Photo by: google document

3.3 Study Population

The target population was conducted at nightclub workers in Tarakan. According Labor offices there are 144 workers working at nightclub. A total 4 nightclubs are located in Central Tarakan, and 1 in East Tarakan (19).

a. Inclusion Criteria

- 1) Both male and female workers will be participating in this study.
- 2) Nightclub worker who work inside nightclub as a Disk Jockey (DJ), bartenders, ladies club, cashier, operator, waiters, manager, and dancer within 6 months.
- 3) Work at nightclub with full time job.
- 4) Willing to fill the informed consent.

b. Exclusion Criteria

- 1) Traumatic ear deformity
- 2) Acute or chronic dizziness
- 3) Pain or discomfort in the ear
- 4) Workers who work outside noise-exposed area (away from the exposure)
(as a security and cleaning service).

3.4 Sample and Sample Size

Sample estimation was calculated by using the Formula of Taro Yamane (20).

The formula to calculate the sample size as follow:

$$n = \frac{N}{1 + N e^2}$$

Which is valid were:

n = is the sample size

N = is the population size

e = is the significant level (0.05)

$$\begin{aligned} n &= \frac{N}{1 + N e^2} \\ &= \frac{144}{1 + 144 (0.05)^2} \\ &= 106 \end{aligned}$$

In this study, the estimated calculation at least 106 workers and 10% was added to prevent data losing. And the total sample size is 117 workers.

Table 2 Total Sample Size

No	Nightclub	Total Number of workers	N=sample size from each nightclub
1	Nightclub A	48	$48 \times 117 / 144 = 39$ workers
2	Nightclub B	31	$31 \times 117 / 144 = 25$ workers
3	Nightclub C	22	$22 \times 117 / 144 = 18$ workers
4	Nightclub D	19	$19 \times 117 / 144 = 15$ workers
5	Nightclub E	24	$24 \times 117 / 144 = 20$ workers
TOTAL		144	117 workers

3.5 Sampling Technique

The sampling technique used in this study was proportional random sampling. Sampling is done by taking the proportion of subjects from each stratum or region (in this study every nightclub) was determined by the number of subjects in each stratum or region (21). To pick up sample size from population in each nightclub the researcher was used drawing technique. Sampling technique was described by this figure:

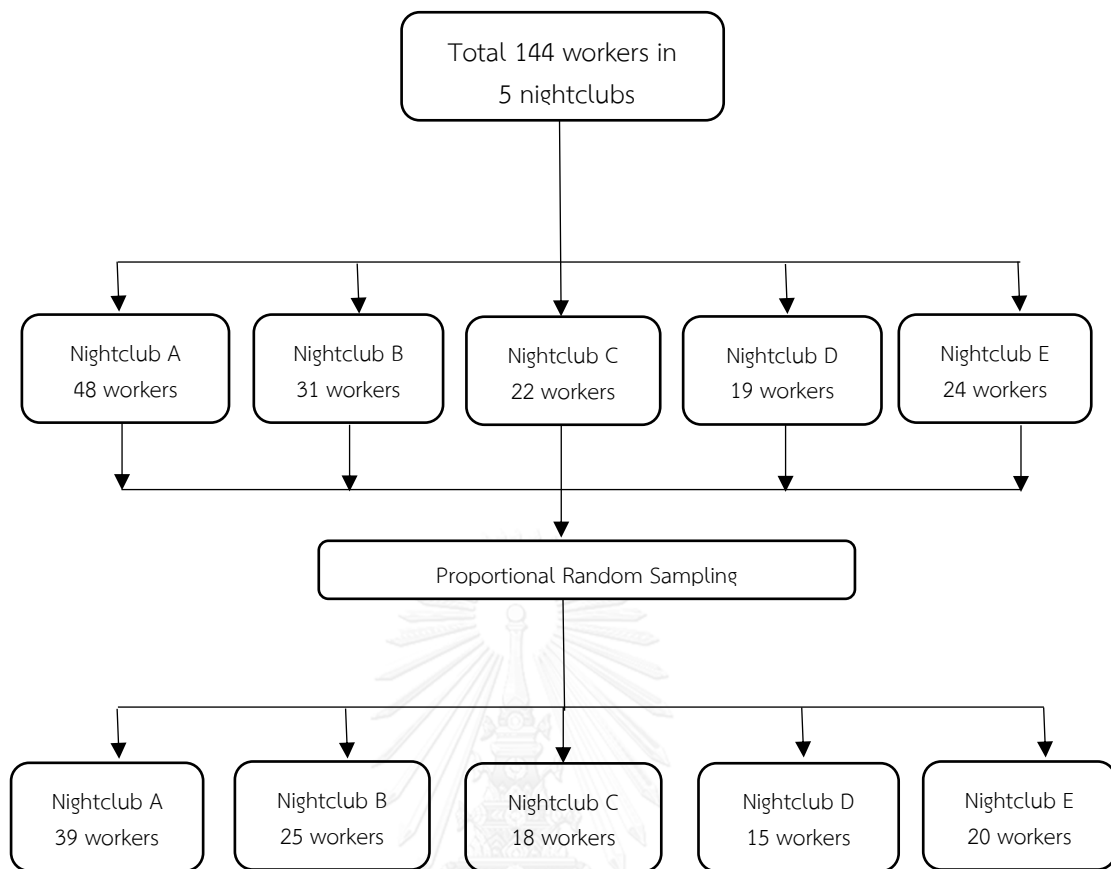


Figure 7 Sampling Technique

3.6 Measurement Tools

As for the measurement in this study was used 3 methods: (1) a measuring instrument about noise intensity (Sound Level Meter), (2) hearing loss test (Audiometry), (3) the questionnaires and observation sheet as a data supplement as well.

3.6.1 Sound Level Meter (SLM)

Digital type 2 Sound Level Meter 840029 (the tool is available in the laboratory) was placed in a fixed position behind the bar closest to the dance floor in each nightclub. The SLM was calibrated using a sound calibrator by Institute of Health Science Muhammadiyah Samarinda. The SLM recorded the noise level in the bar area to establish a noise level trend. The SLM was switched on 23:00, 01:00, and 03.00 in order to calculate a representative L_N (L_n =noise in the night) (22).

Noise measuring device used to measure the intensity of noise in the workplace, as for how the sound level meter is as follows (23):

a. Preparation Tool

- 1) Install the battery in place.
- 2) Press the power button.
- 3) Check the line mark on the monitor to determine the battery is in good condition or not.
- 4) Calibration with calibrator, so the numbers correspond with the numbers on the monitor calibrator.

b. Measurement

- 1) Select the sector in the position:
 - a) Fast: for this type of continuous noise
 - b) Slow: for this type for disjointed noise/impulsive

- 2) Select range noise intensity
- 3) Specify the location of measurement
- 4) Each measurement site was observed with approximately 3 times the readings, the measurement results are shown on the monitor numbers.
- 5) Record the measurement and calculate of noise (L_N).

$$L_N = 10 \cdot \text{Log } 1/8 (T_5 \cdot 10^{0,1 \cdot L_5} + T_6 \cdot 10^{0,1 \cdot L_6} + T_7 \cdot 10^{0,1 \cdot L_7}) \text{ dBA.}$$

Where:

T_5 : 2 hours the first time range

T_6 : 3 hours the second time range

T_7 : 3 hours the third time range

L_5 : Noise taken at 23:00 as a represent at 22.00-24.00

L_6 : Noise taken at 01:00 as a represent at 24.00-03.00

L_7 : Noise taken at 03:00 as a represent at 03.00-06.00

Table 3 Duration of action permitted by the Indonesian government by the labor minister decision No. 51/Men/1999 of the maximum noise limit in the workplace (24)

Contact duration in a day	Average noise limit
16 hours	82 dBA
8 hours	85 dBA
4 hours	88 dBA
2 hours	91 dBA
1 hour	94 dBA
30 minutes	97 dBA
15 minutes	100 dBA
7.5 minutes	103 dBA
3.75 minutes	106 dBA
1.88 minutes	109 dBA
0.94 minutes	112 dBA
28.12 seconds	115 dBA
14.06 seconds	118 dBA
7.03 seconds	121 dBA
3.52 seconds	124 dBA
1.76 seconds	127 dBA
0.88 seconds	130 dBA
0.44 seconds	133 dBA
0.22 seconds	136 dBA
0.11 seconds	139 dBA
Not allowed	

3.6.2 Audiometry

Audiometric tests were performed after a lapse 14 hours from the last exposure to noise to allow recovery from any temporary threshold shift. Advice was given to all respondents on this issue at least 1 week prior to audiometry.

Hearing levels of 25 and 40 dB hearing loss are often used as a screening criteria for mild and moderate hearing loss. For the purposes of this study, hearing loss was classified into: mild (> 25 to 40 dB), moderate (> 40 to 55 dB) and severe (> 55 dB) measured over the conventional frequencies mentioned above.

Measurement used to determine the hearing of workers, in this study using the tool audiometer (Oscilla SM930) and inspection data sheets, while the steps are as follows:

- a. The introduction of the tone on labor, labor prompted press the button when the tone.
- b. Hearing screening carried out successively from the frequency of 500Hz, 1000Hz, 2000Hz, 3000Hz, to 4000Hz.
- c. At any given frequency sound intensity ranging from 40-50 dB for normal labor then gradually raised and lowered again to the extent that the latter labor can still hear the tone is given.
- d. Examination carried out at the right and left ear.

e. Results of the reports on the data sheet.

To determine hearing loss calculation formula used air conduction in the frequency of 500Hz, 1000Hz, 2000Hz, 3000Hz, and 4000Hz on average.

3.6.3 Questionnaire

The structure questionnaire is developed to collect the data. The core questionnaires were consisted by three parts as follow:

a. Socio-Demographic

The first part of questionnaire identified personal information of respondents including age of the workers, gender, education background, and job description. Detail explanation of each items as follows:

- 1) Age was collected by providing the blank space (opened answer) for worker to fill out their age. The results of the answer was classified based on the mean value (the distribution of data is normal). The age of respondent start from 19-60 years old. The mean value is 25 years old.
- 2) Gender was classified into male and female.
- 3) Education background question used five multiple choices answer from no education to graduate college.

4) Job description was classified into eight options: Disk Jockey (DJ), bartenders, ladies club, cashier, operator, waiters, manager, and dancer.

b. Individual Factors

1) Health habits question is the behavior of health workers every day. In this case if they do exercise or no, smoking habit, drinking alcohol, and their hobbies. The questions are closed question and has a multiple choice to answer. Some question was collected by provides the blanks space.

2) Duration of work at nightclub was collected by providing the blank space (opened answer) for worker to fill out their work duration. The measurement is done by calculating the average duration of their work in a nightclub since the first time till this research was taken (the distribution of data is normal). The mean value of duration of work at nightclub is 10.97 month (11 month).

3) Length of work day was collected by providing the blank space (opened answer) for worker to fill out their duration of work every day. The measurement is done by calculating the average length of their daily work (the distribution of data is normal). The mean value of length work day is 6.65 hours (7 hours).

4) Knowledge about noise and hearing loss

These part asking the respondent's knowledge about noise and hearing loss (temporary or permanent hearing loss) with 14 items question or statement (positive question/statement). Categorical responses such as "true" (benar), "false" (salah) and "do not know" (tidak tahu) were used for knowledge items. For knowledge item, '2' marks for correct response, '1' mark for don't know, and '0' mark for incorrect response. To determine knowledge of noise and hearing loss, the researcher use Bloom cut off point (Bloom, 1956). The scores vary from 0 to 28 points and were classified into 3 levels as follow:

- < 60% or 0-17 points: Low levels
- 60-80% or 18-22 points: Moderate levels
- > 80% or 23-28 points: High levels

5) Practice to prevent from hearing loss

Consists of 10 items a statement (positive statement) indicatory that workers protect their ears from hearing loss. As for practice, the responses were "tidak pernah" (never), "jarang" (seldom), "sering" (frequent) and "selalu" (always). Item scores '0', '1', '2', and '3' were given for 'never', 'seldom', 'frequently' and 'always'. The

results of the answer were classified based on the mean value (the distribution of data is normal) as follows:

- ≤ 6.812 point : Poor practice
- > 6.812 point : Good practice

c. Sign and symptoms of Hearing Loss

The core question questionnaire were consisted by two parts. The first part identified history of hearing problems (6 items) and the second part identified sign and symptom hearing problems (6 items).

1) History of hearing problems

The answers were formed by ordinal scale including yes and no. The scoring method as follow:

- 1 point = Yes
- 0 point = No

To determine history of hearing problems, the results of the answer were classified based on the mean value (the distribution of data is normal) as follows:

- ≤ 1.36 point : Low history of hearing problems
- > 1.36 point : High history of hearing problems
- 0 points : Don't have history of hearing problems

2) Sign and symptom of hearing problems

Six questions adopted from National Institute on Deafness and Other Communication Disorders (NIDCD) (2014) were used to measure sign and symptom of hearing problems (25). The answers were formed by ordinal scale including yes and no. The scoring method as follow:

- 1 point = Yes
- 0 point = No

To determine sign and symptom of hearing problems, the results of the answer were classified based on the mean value (the distribution of data is normal), were classified into 2 levels:

- ≤ 3.13 point : Low sign and symptom of hearing problems
- > 3.13 point : High sign and symptom of hearing problems
- 0 point: Don't have sign and symptom of hearing problems

3.6.4 Observation

a. Individual Factors

- 1) Characteristic the workers refers to their activities during the work whether their just settle on one position or movement.
- 2) Distance the workers to speaker calculated based on where is they work with a nearby speaker distance.

b. Environment Factors

- 1) Number of speakers in each nightclub.
- 2) Total floor area each nightclub in meter.

3.7 Validity and Reliability

In this study, the researcher were used a sound level meter from Institute of Health Science Muhammadiyah Samarinda and audiometry from Occupational Health and Safety Centers laboratory's that has been tested and calibrated which the tools with good condition and suitable to be used.

For the questionnaire, the content validity was assessed by two experts from Occupational field. And for reliability test, the researcher was conducted pilot to 20 workers which is not included respondents form each nightclub in Tarakan City. Where the researcher were taken 10 workers from nightclub in other city, and 10 workers from others workplace who work with high noise levels. The Cronbach's Alpha test was used for reliability test. The Cronbach's Alpha test was 0.928 for knowledge, 0.915 for practice, 0.945 for hearing problem, and 0.853 for sign and symptom of hearing problems.

3.8 Data Collection

The data was collected through self-report. It was taken place in June 2016.

The procedure of data collection as follow:

- a. A formal letter from College of Public Health Science sent to all of nightclubs in Tarakan to seek permission collection the data.
- b. The researchers asked the help of a technician from Occupational Health and Safety Centers laboratory's for measuring power of hearing the workers.
- c. The researchers doing validity and reliability test to known which each questions on that questionnaire are valid or not.
- d. The researcher and the technician (assistant researcher) visited the nightclub to collect the data. To prevent interference working activities, the data collection carried out before work.
- e. Noise exposure level measurements were performed 3 times. While for measuring power of hearing each worker by calling one by one and then carried out checks on the left and right of ear.
- f. The researcher disseminated the questionnaires to all workers then, the workers fill in all of the questions which approximately take 15 minutes.
- g. After finishing fill out the questionnaire, finishing performing noise measurement and inspection hearing power of every workers, the researcher re-examine the data held was full before leaving the study site.

3.9 Data Analysis

The researcher was analyzed by SPSS version 16 software program. Univariate analysis is used to describe central tendency (mean), maximum and minimum, and mode of each variable by percentage.

Chi Square Test was used to measure association between Noise levels and each independent variables against Hearing Loss. In case, the data didn't comply with Chi Square minimum assumption, the Fisher Exact test was performed. Binary Logistic Regression was used to assess the risk factors which influence hearing loss. The significant association was define as p value less than 0.05.

3.10 Ethical Consideration

The study had minimal risk to the subject since the hearing loss were somewhat stigmatized behavior in to the company. Therefore, the researcher measurement of hearing during the data collection in order to prevent worker from any sanction. In addition, the questionnaire were in anonymous format hence all information were surely confidential. The study obtained ethical approval from Institute of Research and Community Service, Atma Jaya Catholic University of Indonesia No: 532/III/LPPM-PM.10.05.06/2016 on June 16, 2016.

CHAPTER IV

RESULTS

The research was conducted among five nightclub workers in Tarakan City, Indonesia. The data was collected from June 16th to June 23th 2016. A total of 117 workers participated in this survey. This chapter described socio-demographic, individual characteristic, environmental characteristic and noise level in each nightclub, level of hearing loss, sign and symptom of hearing problems, knowledge and practice level, and association between independent variables (socio-demographic, individual factors, and environment factors) against dependent variable (hearing loss).

4.1 Socio-Demographic

The table 4 indicated characteristic socio-demographic of respondent. A total of 74.4% workers were categorized as ≤ 25 years old. The average of age respondents are 25 years old. Over half (67.5%) respondents were woman while the male gender subjects were 32.5%. In terms of education level, almost three-quarter of subject (74.4%) was graduated from high school. The majority of respondents (41.9%) worked as a ladies club.

Table 4 Characteristic Socio-Demographic

Characteristics	Level	n=117	Percentage (%)
Age	≤ 25 years old	87	74.4
	≥ 26 years old	30	25.6
<i>Mean: 24.99</i>		<i>SD: 6.103</i>	<i>Min: 19</i>
			<i>Max: 60</i>
Gender	Male	38	32.5
	Female	79	67.5
Education	Secondary School	24	20.5
	High School	87	74.4
	Graduate School	6	5.1
Job Description	Disk Jockey (DJ)	6	5.1
	Operator	9	7.7
	Dancer	15	12.8
	Ladies Club	49	41.9
	Bartender	8	6.8
	Cashier	9	7.7
	Waiters	17	14.5
	Manager	4	3.4

4.2 Individual Characteristic

From table 5 total of 97 respondents (82.9%) from 117 respondents had hobbies associated with loud noise may cause hearing loss. A majority of 66 respondents (56.4%) had a hobby of listening to music with headset/earphone when they are not working. Even they listened till asleep. Only 28 workers who do not smoke while 89 workers are active smokers. Table 7 also says that only 12 respondents who did not consume alcohol, while 105 respondents consumed

alcohol every day. A total of 89 workers never do physical activity. And most of them (80 respondents) worked in a nightclub with a vulnerable period of 0-11 months.

Table 5 Individual Characteristic

Characteristics	Level	n=117	Percentage %
Hobbies	related to high sound	97	82.9
	Not related to high sound	20	17.1
Hobbies	Not related to high sound	20	17.1
	Attend live music concert	1	0.9
	Diving	15	12.8
	Hunting or shooting	3	2.6
	Listening music	66	56.4
	Play music at studio	8	6.8
	Play video games	4	3.4
Smoke	Yes	89	76.1
	No	28	23.9
Smoke (bars in a day)	0	28	23.9
	16	49	41.9
	18	2	1.7
	20	15	12.8
	24	14	12.0
	28	3	2.6
	32	4	3.4
	40	2	1.7
<i>Mean: 14.94</i>		<i>SD: 9.644</i>	
Drink Alcohol	Yes	105	89.7
	No	12	10.3

Characteristics	Level	n=117	Percentage %
Consume	0	12	10.3
Alcohol in a day	2 liter	73	62.4
	3 liter	28	23.9
	4 liter	4	3.4
<i>Mean: 2.10</i>		<i>SD: 0.885</i>	
Time consuming	Never drink alcohol	12	10.3
	Daily	105	89.7
Doing Exercise	Yes	28	23.9
	No	89	76.12
Time to do exercise	Never do exercise	89	76.1
	Daily	11	9.4
	Weekly	17	14.5
Duration Work (month)	≤ 11 months	80	68.4
	≥ 12 months	37	31.6
<i>Mean: 10.97</i>		<i>SD: 9.715</i>	
Previous work related to high sound	Yes	3	2.6
	No	114	97.4
Work per day (hours)	≤ 7 hours per day	77	65.8
	≥ 8 hours per day	40	34.2
Length workday	3 hours	4	3.4
	5 hours	9	7.7
	6 hours	45	38.5
	7 hours	21	17.9
	8 hours	38	32.5
<i>Mean: 6.65</i>		<i>SD: 1.206</i>	
Length workday	5 days	5	4.3
	6 days	50	42.7

Characteristics	Level	n=117	Percentage %
	7 days	62	53.0
	<i>Mean: 6.49</i>		<i>SD: 0.582</i>
Workers	Settle on the position	37	31.6
Characteristic	Moving	80	68.4
Distances the	Close to the loud speaker	75	64.1
Worker to the	Far from loud speaker	42	35.9
Speaker (m)			

4.3 Environmental Characteristic

Measuring of the amount of the total floor area, the researcher used the method of observation with a meter to measure how the length and width of floor area every nightclub. Nightclub C is a nightclub which has a total floor area of the smallest with an area of 360 m², while the nightclub A as largest among 5 nightclub in Tarakan (area = 624 m²). All the nightclub use DJ as a type of music during operation. Nightclub B, C, D, and E prior to use karaoke before the DJ started, whereas before the nightclub A DJ starts, the management play music from a tape recorder. Three nightclubs (A, B, and C) have a total of eight loud speakers, while the other two nightclubs (D and E) have six loudspeaker.

Table 6 Environment Characteristics in Each Nightclub (NC)

NC Characteristic	NC A	NC B	NC C	NC D	ND E
Number of Loud Speaker	8	8	8	6	6
Total Floor Area (m ²)	624	588	360	432	368
Music Type	DJ	DJ	DJ	DJ	DJ

4.4 Noise Exposure Level

Measuring of Noise Exposure Level has been done by used one piece of equipment Sound Level Meter in 5 nightclub where researcher and assistant researcher are in the middle for measuring by 3 times and starts at 23:00 to 03:00. Record the measurement and calculate of noise (L_N). The formula was used for measuring total noise exposure is $L_N = 10 \cdot \text{Log } 1/8 (T5 \cdot 10^{0,1L5} + T6 \cdot 10^{0,1L6} + T7 \cdot 10^{0,1L7})$ dBA. Where:

T5 : 2 hours the first time range

T6 : 3 hours the second time range

T7 : 3 hours the third time range

L5 : Noise taken at 23:00 as a represent at 22:00-24:00

L6 : Noise taken at 01:00 as a represent at 24:00-03:00

L7 : Noise taken at 03:00 as a represent at 03:00-06:00

From the results of calculations using formulas, the researcher found that nightclub C had the highest noise (117.5 dBA), while the nightclub A has the lowest noise level (101.5 dBA).

Table 7 Noise Exposure Level of 5 Nightclub

NC	Exposure Level			Total Noise Exposure Level
	T1 (23.00)	T2 (01.00)	T3 (03.00)	
Nightclub A	96.2 dBA	98.1 dBA	104.5 dBA	101.5 dBA
Nightclub B	98.7 dBA	101.7 dBA	110.3 dBA	106.8 dBA
Nightclub C	106.4 dBA	117.9 dBA	119.3 dBA	117.5 dBA
Nightclub D	96.9 dBA	99.3 dBA	105.4 dBA	102.4 dBA
Nightclub E	98.7 dBA	103.4 dBA	111.5 dBA	107.9 dBA

4.5 Sign and Symptom Hearing Loss

Based on the calculation results of the research questionnaire, Table 8 shows that there were 107 respondents (91.5%) do not feel any hearing loss. While as many as 10 respondents (8.5%) felt a disturbance in their ears. A total of five respondents (4.3%) from a hearing loss feel any disturbance since the last 6 months. While four respondents (3.4%) experienced interference since one year ago. While one other respondents having trouble hearing since 2 years ago.

But on the questionnaire that asks a history of hearing problems, as many as 91 respondents (77.8%) said low history of hearing problems. While 26 respondents (22.2%) have a high history of hearing problems.

In the variable signs and symptoms of hearing loss, as much as 96 respondents (82.1%) had signs and symptoms of low to cause hearing loss. 21 respondents (17.9%) had signs and symptoms that may lead to higher hearing loss. A total of 40 respondents (34.2%) feel their hearing loss in the right ear, 28

respondents (23.9%) on the left ear, and 41.9% (49 respondents) impaired in both ears.

Table 8 Sign and Symptom of Hearing Problems

Characteristic	Level	n = 117	Percentage (%)
Felt Hearing Problem	Yes	10	8.5
	No	107	91.5
First felt Hearing Problem	Don't felt any hearing problem	107	91.5
	Last 6 months	5	4.3
	Last year	4	3.4
	Others	1	0.9
History Hearing Problem	Low history	91	77.8
	High history	26	22.2
Sign and Symptom of Hearing Problem	Low sign and symptom	96	82.1
	High sign and symptoms	21	17.9
Felt Hearing Loss in the Ear	Right Ear	40	34.2
	Left Ear	28	23.9
	Both Ears	49	41.9

4.5 Level of Hearing Loss

Table 9 is the result of the calculation of hearing loss by using a sound level meter on 117 respondents. The researcher with a technician from the Occupational Health and Safety Centers laboratory's came to every nightclub in the evening with requesting permission in advance to manager a few day before. Only a nightclub A, C, and D provide a special room to take measurements of the ear so the workers can concentrate. While ear measurements at a nightclub B and E was performed

in the hall of nightclub. All measurements have been done by calling the workers one by one in turn. One worker who measured his ears spent 5-8 minutes. A total of 104 respondents (88.9%) had hearing loss, while 13 respondents (11.1%) did not experience any hearing loss (normal). Total 104 respondents who indicated experiencing hearing loss, mostly at the level of mild (88 respondents), 15 respondents (moderate), while only one respondent who suffered hearing loss in the level of severe.

Table 9 Levels of Hearing Loss among Nightclub Workers

Category	n = 117	Percentage (%)
Normal	13	11.1
Mild	88	75.2
Moderate	15	12.8
Severe	1	0.9

4.6 Knowledge and Practice Level

Results of the 14 questions posed to 117 respondents can be concluded that the average worker had a good enough knowledge related to noise and hearing loss. Only 19 respondents who had low level knowledge of the noise and hearing loss. And on average, they can distinguish between temporary and permanent hearing loss, hearing loss.

A total of 99 respondents have a poor practice for prevent from hearing loss. Although they had a good enough knowledge but self-awareness to protect their ears from hearing loss was very poor. In addition they are also afraid to talk with

the boss or manager regarding noise in the workplace. For them, work is the most important thing comparison to their own health, especially the health of the ear. Because if they don't work, they will not receive a salary.

Table 10 Knowledge and Practice Level of Nightclub Workers

Characteristics	Level	n=117	Percentage %
Knowledge about	Low Levels	19	16.2
Noise and Hearing	Moderate Levels	81	69.2
Loss	High Levels	17	14.5
Practice to Prevent	Poor Practice	99	84.6
from Hearing Loss	Good Practice	18	15.4

4.7 Association between Socio-Demographic and Hearing Loss

Based on the result of statistical analysis to find out association between socio-demographic against hearing loss by chi-square test or fisher's exact test, there are no relation between socio-demographic (age, gender, education, and job description) against hearing loss (p-value>0.05).

Table 11 Association between Socio-Demographic against Hearing Loss

Characteristics	Level	Hearing Loss		P-Value
		Yes	No	
Age	≤ 25 years old	76	11	0.511
	≥ 26 years old	28	2	
Gender	Male	35	3	0.543
	Female	69	10	
Education	Secondary School	20	4	0.532
	High School	79	8	
	Graduate School	5	1	
Job Description	Disk Jockey (DJ)	6	0	0.544
	Operator	9	0	
	Dancer	12	3	
	Ladies Club	42	7	
	Bartender	7	1	
	Cashier	9	0	
	Waiters	16	1	
	Manager	3	1	

*= p<0.05, **= p<0.01, ***=p<0.000

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4.8 Association between Individual Factors and Hearing Loss

Of individual factors including hobbies, smoke, drink alcohol, doing exercise, duration of work, work per day, knowledge about noise and hearing loss, practice to prevent from hearing loss, workers characteristic, and distances of the workers to the loudspeaker, only five variables had been associated with hearing loss. Five variables were hobbies, smoke, drink alcohol, knowledge about noise and hearing loss, and practice to prevent from hearing loss.

Table 12 Association between Individual Factors against Hearing Loss

Characteristics	Level	Hearing Loss		P-Value
		Yes	No	
Hobbies	Related to high sound	90	7	0.009**
	Not related to high sound	14	6	
Smoke	Yes	83	6	0.013*
	No	21	7	
Drink Alcohol	Yes	96	9	0.028*
	No	8	4	
Doing Exercise	Yes	25	3	1.000
	No	79	10	
Duration Work (month)	≤ 11 months	68	12	0.060
	≥ 12 months	36	1	
Work per day (hours)	≤ 7 hours per day	68	9	1.000
	≥ 8 hours per day	36	4	
Knowledge about Noise and Hearing Loss	Low Levels	15	4	0.000***
	Moderate Levels	78	3	
	High Levels	11	6	
Practice to Prevent from Hearing Loss	Poor Practice	94	5	0.000***
	Good Practice	10	8	
Workers Characteristic	Settle on the position	35	2	0.222
	Moving	69	11	
Distances the Worker to the Speaker (m)	Close to the loud speaker	66	9	0.768
	Far from loud speaker	38	4	

*= p<0.05, **= p<0.01, ***=p<0.000

4.9 Association between Environment Factors and Hearing Loss

There are no relationship between socio-demographic against hearing loss, also happens to environment factors. None of the variables of the environment factors (distances of the worker to the loudspeaker, noise exposure level, number of loudspeaker, and the total floor area) related to the occurrence of hearing loss.

Table 13 Association between Environment Factors of Nightclub against Hearing Loss

Characteristics	Level	Hearing Loss		P-Value
		Yes	No	
Noise Exposure Levels	High Noise Exposure (> 107.22 dBA)	35	4	1.000
	Average Noise Exposure (107.22 dBA)	69	9	
Distances the Worker to the Speaker (m)	Close to the loud speaker	66	9	0.768
	Far from loud speaker	38	4	
Number of Loudspeaker	6	32	3	0.752
	8	72	10	
Total Floor Area	Large Size (> 474.4 m ²)	57	7	1.000
	Average (474.4 m ²)	47	6	

*= p<0.05, **= p<0.01, ***=p<0.000

4.10 Hearing Loss Predictors

Multiple Logistic Regression was performed by using Forward Conditional Method in order to create statistical model that can predict the probability of hearing loss. Twelve variables (Age, gender, education, job description, sport activities, duration work, length workday, characteristic workers, distance to the

loud speaker, noise exposure level, total loud speaker, and total floor area) were excluded from the test because of there are no association with hearing loss.

Table 14 Final Model Multiple Logistic Regression of Hearing Loss

Independent Variables	Adj. OR	95% CI		p value
		Lower	Upper	
Hobbies				
Related to high sound	1			
No related to high sound	0.088	0.010	0.755	0.027*
Smoke				
Yes	1			
No	0.047	0.003	0.675	0.025*
Alcohol				
Yes	1			
No	0.766	0.055	10.745	0.843
Knowledge				
Low levels	1			0.019*
Moderate levels	0.035	0.003	0.377	0.006**
High levels	0.447	0.040	5.046	0.515
Practice				
Poor practice	1			
Good practice	0.033	0.004	0.275	0.002**

*= $p < 0.05$, **= $p < 0.01$, ***= $p < 0.000$

The result revealed hobbies ($p < 0.05$), smoke ($p < 0.05$), knowledge ($p < 0.005$) and practice ($p < 0.001$) were significant predictors of hearing loss. In summary, this statistical model can predict 95.7% of hearing loss among nightclub workers in Tarakan, Indonesia.

CHAPTER V

DISCUSSIONS

This chapter would present in summarize and discussion part. The discussion would clarify the reason of findings as well as compared and contrast between others study.

5.1 Socio-demographic

Based on the results of observation the largest number of respondents with female gender because in addition to functioning as a nightclub for enjoying the music DJ, all the nightclubs in Tarakan presents karaoke and of course, guests can choose the ladies to accompany the music DJ karaoke before starting. This can be evidenced by the majority of job descriptions at a nightclub in Tarakan is a ladies club. All the ladies club from outside the region that the average educational background have just graduated from high school. For those who come from outside the region, manager provides a place to stay around the nightclub. And for those respondents who worked as a ladies club, is not allowed to leave the nightclub except Sunday they can go to just relax into existing tourist attractions in Tarakan. While male sex workers with the majority coming from Tarakan are indeed living in Tarakan.

5.2 Individual Characteristic

Nine-seven of respondents who had hobbies associated with loud noise 66 of them likes to listen to music using earphones or headphones when not at work or even listen to music after work exhausted to sleep. 15 of the other respondents have a hobby of diving, 8 respondents like to play music in the studio, 4 respondents like to play video games, 3 respondents liked the hobby of shooting or hunting, and 1 other respondents like to come to the concert music.

Only 28 workers who do not smoke while 89 other workers were active smokers. Where on average they spent more than 15 cigarettes per day and as many as 59 respondents had smoked in the period between 1-4 years, while 30 others had smoked more than 5 years.

There were 28 respondents who do sports activities and 11 of them doing physical exercise every day, while 17 respondents do sports activities only a few times a week. The average worker who works in a nightclub for 11 months and work an average of 6.65 (7 hours) a day. Nightclub B, C, D, and E require all workers to work every day and with the exception of the DJ and the manager only works a few days a week. It is inversely proportional to the nightclub A where workers have time off one day a week.

A total of 37 respondents worked just remain only in place (DJ, manager, cashier, bartender, and operators), while 80 respondents working not just sitting in one place, but always walked to serve the guests (waiters, ladies club, and dancer).

Workers close or away from the loudspeaker is calculated based on an average. Distance the workers to the loudspeaker were 10.7 m. If the employee works with a distance ≤ 11 m it means close to the loudspeaker (75 respondents) and as many as 42 other respondents far from the loudspeaker (> 12 m).

5.3 Noise Exposure Level

The measurement results show that as many as 104 respondents experienced hearing loss, and only 13 respondents who did not experience hearing loss (normal). Of the 104 respondents who experienced a hearing loss of more than 50% (88 respondents) at the level of mild, moderate 15 respondents, and only one respondent who experience severe hearing loss in the levels. Although most of them were experiencing hearing loss at a mild level, may turn to moderate or even severe. It is of course also influenced by other factors such as the length of time worked in a nightclub, and age also determine the hearing loss. If the increasing age, the risk of experiencing the hearing loss may increase. With increase in age, there are changes in hearing due to age (presbycusis) and this may add on to any existing NIHL giving the impression that older individuals suffer a greater degree of deafness than the younger workers. NIHL is a result of the total noise exposure over that person's lifetime and not just length of a single exposure to noise. The longer the exposure at excessive noise level the greater the degree of NIHL [32].

Noise is unwanted sound produced by a wide variety such as sound equipment and a variety of sounds that exist in the workplace. In this study the existing noise in nightclubs produced by DJ music through the loudspeaker. This type of noise in a nightclub is fluctuating noise where noise is continuous but the sound may increase during the time. Measurement of noise intensity at a nightclub in Tarakan City, Indonesia carried out by using the Sound Level Meter is done for 3 times and starts at 23:00 to 03:00.

The results showed that the intensity of noise at five nightclub in Tarakan City, Indonesia exceeds the threshold value determined by the Ministry of the Republic of Indonesia at 85 dB for 8 hours per day (24). The average noise at nightclub in Tarakan was 107.22 dBA where every employee works more than 6 hours per day. From the results of the examination has been conducted to determine the worker suffered hearing loss using a measuring instrument audiometer at 117 workers found that as many as 104 workers have a hearing loss, while 13 workers did not experience hearing loss (normal). The intensity of the noise affecting the hearing loss as research conducted by Gunderson in workers obtained music club workers working at a nightclub that has the highest noise sound have more symptoms of tinnitus after work and were more likely to perceive a hearing deficit after work. It also showed that recently employed individuals perceived more hearing loss after work than did the individuals who were employed longer (26).

The duration of noise exposure in a single day and duration work at nightclub may affects the occurrence of hearing loss. The average worker works more than 6 hours a day and work every day. Nancy (2008) on their research found that long-term may have become desensitized to the perception of hearing loss or tinnitus after work or they may have experienced a permanent threshold shift in hearing (27).

However, unlike in the study conducted by researchers after a statistical test to mention that there is no relationship between noise exposure and hearing loss. Besides the length of time worked and the duration of exposure in one day also did not have a significant relationship to the occurrence of hearing loss even though the workers have worked in a nightclub more than 6 months and work more than 6 hours a day. Another factor in this study that mentions the existence of a significant relationship to the occurrence of hearing loss is smoking, drinking alcohol, their hobby, knowledge about noise and hearing loss as well as the practice to prevent from hearing loss.

Duration of employment \geq 5 years exposure to 85 dBA or higher noise level can increase the risk of hearing impairment (28). Irreversible sensori-neural hearing loss can occur by long term exposure to continuous noise levels $>$ 85 dBA for 8 hours a day. Hearing loss may develop rapidly during the first 6 to 10 years at high frequencies (29). Prolonged exposure to noise gives the possibility of greater damage than the shorter exposure time (2, 4).

The longer duration of work may increase risk of the occurrence of hearing loss. The workers who work in noisy places with the intensity of noise above 85 dBA, it is possible that after five years work, 1% of workers will show some hearing loss. After 10 years of work, 3% of workers felt hearing loss. After 15 years of work, the hearing loss in workers increased to 5% (30).

From the results of previous studies, it can be concluded that the average length of work that exceeds five years with the intensity of noise over 85 dBA with a duration of working eight hours per day may cause hearing loss. While the majority of this research were 105 respondents worked in a nightclub with a span of 6-12 months. Only 11 respondents who worked more than one year, with details: 2 respondents worked for 1.5 years, 5 respondents worked for 2 years, and 4 respondents worked for 3 years. And one respondent work more than five years (working for 8 years) in a nightclub (15 years work as a DJ and 20 years work as a manager). All respondents working not more than 8 hours with an average of 6.5 hours per day.

Experience work-related noise can also affect hearing loss. However, only 3 respondents who had experience working and related with high sound (2 respondents worked in coal mines, one respondent working in the studio music). It can be concluded that there is no association between noise exposure and hearing loss.

5.4 Sign and Symptom of Hearing Loss

From the results of the questionnaire were asked to the respondents, about a hearing problem, only 10 respondents who felt hearing problems in their ears, while 107 respondents did not feel their hearing problem. It is inversely proportional to the measurement results of hearing loss in which the 13 respondents who did not experience hearing loss in which 104 respondents indicated experiencing hearing loss. Of the 10 respondents who felt their hearing problem, 5 of them felt since the last 6 months, 4 respondents felt hearing problems since last year, and 1 other respondents felt since two years ago.

A total of 96 respondents have signs and symptoms of low against the occurrence of hearing loss, and 21 others have signs and symptoms are high. Signs and symptoms that indicated experiencing hearing loss is, some of them feel the pain in the ear, felt ring, roaring, or buzzing in a long time after work and sensitive to noise. 40 respondents felt the presence of hearing loss in the right ear, 28 respondents on the left ear, and 49 respondents felt a disturbance in both ears.

Hearing loss can be experienced by workers who are complaints related to noise exposure levels and frequencies based on the results of audiometric examination. Hearing complaints initially be temporary and would soon recover when away from the noise source. However, when continuous work in noisy places, hear the power will be lost permanently and will not recover.

The decline in temporary hearing threshold is loss of function of a temporary hearing, which recovered after free from noise exposure while. Time for the decline in temporary hearing threshold may vary, depending on the intensity and duration of exposure to noise. The higher the intensity and the longer the duration of exposure, the greater the decline in hearing threshold transient.

The Temporary Threshold Shift (TTS) patients if given enough rest, power will recover his hearing was perfect. The recovery time hearing threshold value begins as soon as 14 hours free from noise exposure. When the hearing function decline of less than 30 dB, then the recovery of hearing threshold value will usually occur within 13 hours. Meanwhile, when a decline in hearing function of more than 50 dB, recovery occurs after the first day of free noisy [33].

If the break is not enough time and labor re-exposure to the original noisy, and this situation is ongoing, the temporary deafness will increase every day, then become permanent deafness. To diagnose TTS measurements need to be done twice audiometric before and after workers exposed to noise. Previous workers kept away from noisy places for at least 14 hours [34].

The severity due to noise depends on the intensity of noise, noise characteristics, the total exposure received, and also the sensitivity of the individual. When the noise exposure is too long, a month or a year, or at a higher level, then the hearing threshold will not be back to normal. This is what is referred

to as a reduction in permanent hearing threshold due to noise (Permanent Threshold Shift).

It is said that to change the Temporary Threshold Shift (TTS) become Permanent Threshold Shift (PTS) takes noisy work environment for 10-15 years, but it depends also on the level of noise and a person's sensitivity to loud noises [35].

PTS usually occurs around the frequency of 4000 Hz and slowly increased and spread to surrounding frequencies. PTS early without complaint, but if it has spread to the lower frequencies (2.000 and 3.000 Hz) complaints will arise. At first, someone will find it difficult to hold a conversation in a crowded place, but when it has spread to the lower frequency then there will be difficulty in hearing sounds very weak. Notch starts at 3,000-6,000 Hz frequency, and after some time audiogram picture becomes flat at a higher frequency. Hearing loss at 4,000 Hz frequency will continue to grow and settle down after 10 years and then progress to be slower [35].

Six questions had been given to the respondents about the signs and symptoms of hearing problem. A total of 117 respondents felt dizzy in the head when listening to loud noise. 108 respondents felt pain in their ears. 107 respondents are very sensitive when you listen to the small voice. Signs and symptoms are only present in no more than 20 respondents were: 16 respondents felt the ring, roaring, or buzzing in their ears after working for a long time, 13

respondents felt fullness or stuffiness on their ears, and only 5 respondents felt noise on their ears.

The result of the calculation using the Sound Level Meter were five nightclub exceeded the Threshold Limit Value. The average noise on the fifth nightclub is 107.22 dBA. All the nightclub use this type of music DJ with only nightclub A which operates from 10:30 PM until 03.00 AM. While the nightclub B, C, D, and E began operating at 10:00 PM until 03:30 AM. Noise exposure all nightclub changing all the time and the highest peak on 0:30 AM were DJ was performed. Whereas before the DJ started, nightclub B, C, D, and E provide karaoke for guests where the average noise exposure of 96 dBA. Unlike the case with the only nightclub A DJ plays music through recordings.

5.5 Levels of Hearing Loss

Hearing impairment, deafness, or hearing loss refers to the inability to hear things, either totally or partially. Symptoms may be mild, moderate, severe or profound. A patient with mild hearing impairment may have problems understanding speech, especially if there is a lot of noise around, while those with moderate deafness may need a hearing aid. Some people are severely deaf and depend on lip-reading when communicating with others. Hearing loss refers to a diminished ability to hear sounds like other people do, while deafness refers to the inability to understand speech through hearing even when sound is amplified. Profound deafness means the person cannot hear anything at all; they are unable

to detect sound, even at the highest volume possible. Degree of hearing impairment: a person's severity of hearing impairment is categorized by how much louder than "usual levels" sound volumes need to be set at before they can detect a sound. Degree of deafness: any degree of deafness means the person cannot understand speech through hearing at any level of amplification. If a person is profoundly deaf, they cannot detect sounds at any volume. Some people define profoundly deaf and totally deaf in the same way, while others say totally deaf is the end of the hearing spectrum (31).

A hearing loss can happen when any part of the ear is not working in the usual way. This includes the outer ear, middle ear, inner ear, hearing (acoustic) nerve, and auditory system. Hearing loss can result from damage to structures and/or nerve fibers in the inner ear that respond to sound. This type of hearing loss, termed "noise-induced hearing loss," is usually caused by exposure to excessively loud sounds and cannot be medically or surgically corrected. Noise-induced hearing loss can result from a one-time exposure to a very loud sound, blast, or impulse, or from listening to loud sounds over an extended period (32).

Noise-induced hearing loss can be temporary or permanent. Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after period of rest. Generally, prolonged exposure to high noise levels over a period of time gradually causes permanent damage (33). An initial hearing loss may be temporary first and develop to the permanent hearing loss (14).

Hearing loss is measured in decibels hearing level (or dBHL). This number represents the softest level you or your child can hear. Hearing level can be measured for pure tone sounds, as well as for speech sounds, and can be reported for both ears (bilateral) or for each ear individually (unilateral). The amount of hearing loss someone has is ranked as mild, moderate, severe, or profound. For the purposes of this study, hearing loss was classified into: mild, moderate, and severe. Audiometric test were performed for measuring level of hearing loss after 8 hours from the last exposure to noise to allow recovery from any temporary threshold shift.

5.6 Risk Factors can Influence Hearing Loss

Results of statistical analysis using Chi-Square shows that hobby related with loud sound, smoking, drinking alcohol, knowledge about noise and hearing loss, and practice to prevent from hearing loss is a factor associated with hearing loss (p value <0.05). After testing by Binary Logistic regression was obtained four variables that significantly affect to the occurrence of hearing loss. As for the 4 variables are discussed as follows:

5.6.1 Hobby and Hearing Loss

Hobbies were contributed to the hearing status of workers. Related noisy hobbies that add noise exposure to workers certainly increase hearing loss. Some research suggests that related noisy hobbies like listening to loud

music can lead to deafness. Royal National Institute for Deaf People (RNID), an honorary British institution that examines the issue of deafness, conducted a survey on a number of nightclubs, it turns out the noise levels up to 120 dBA. Ear nightclub visitors are exposed to noise which is well above the threshold for hours. The noise generated from the sound Walkman using ear phone constantly with maximum volume equivalent to the drilling machine whose intensity reaches 96 dBA.

Meanwhile, according to the National Safety Council some hobbies workers can affect the occurrence of hearing loss, such as a hobby related to the environment of high pressure such as diving, hobbies associated with exposure to high noisy e.g. shooting with firearms, racing bike / car, listening to music loud and others (34).

The results showed that 97 respondents had a hobby that relates to noise. Among them listen to music using the ear phone is a hobby type most favored by respondents (66 respondents), as many as 15 respondents liked the hobby of diving, 8 respondents liked the hobby of playing music in the studio, 4 respondents like to play video games, 3 respondents prefer hunting with a rifle, and only one respondent who liked like watching a concert event.

If all this noise in a nightclub in Tarakan reached an average of 107 dBA, then the habit hobby workers use ear phones to listen to music, the ear for hearing-impaired workers will be higher. Frequency of listening to music has a close relation to the risky behaviors that can lead to hearing loss trigger.

5.6.2 Smoke and Hearing Loss

Smoking implications as ototoxic material directly due to the effects of nicotine or cause ischemia through the production of carboxy-hemoglobin, blood vessels spasm, blood viscosity or also through arteriosklerotik. Influency blood circulation system in cochlear organ caused by smoking is the cause of hearing loss in high frequency progressive and most often occurs in old age.

In the study conducted Mizoue (2002) examined the effects of smoke and noise on hearing loss through 4,624 health checks of data steelworker in Japan. The results showed a significant picture of the form of interruption of hearing at high frequencies due to smoking with risk three times greater (35).

The synergistic effect of smoking, noise exposure and age on hearing loss, found in the study, is consistent with the biological interaction. Furthermore, it is possible that distinct ototoxic substances in the chemical composition of mainstream smoke may synergistically affect hearing when in combination with noise exposure (36).

A total of 89 respondents of 117 workers at a nightclub were smoked. The study says that the average worker spends as much as smoking 15 cigarettes a day. And on average, they had smoked 3-4 years. Long-term smoking with occupational noise exposure > 85 dBA had a higher risk of hearing impairment when compared with non-smokers (37).

5.6.3 Knowledge about Noise and Hearing Loss and Practice to Prevent from Hearing Loss

Hearing conservation programs are integrated in management policy in each industry. This program has many elements that are required to be adhered to by employers as well as employees (38, 39). The elements that are instituted in this program should be sustainable for continuous success in curbing hearing loss due to noise. This in turn will reduce compensation claims from the employees and reduce financial loss of the company. One of the barriers to success of this program was poor cooperation from management together with poor knowledge and understanding among the employees. Thus, continuous education with training regarding importance of this program should be imparted both to employees and employers (40).

The health education is so vital, since it gives information on effects and prevention of hearing loss. The continuous education can also influence these employees towards positive attitudes and practices in preventing

hearing loss. The education and training should be given at least once in 2 years.

Practice to Prevent from hearing loss also is important in maintaining the health of the ear, for example none of the workers who wear ear plugs when working with the reasons for the use of ear plug debilitating work and difficult to communicate. Away from the source of noise, it is also the right solution to reduce noise exposure. This is evidenced as much as 81 respondents who have knowledge about noise and hearing loss were at an average level. And as many as 99 respondents have a poor practice or prevent the occurrence of hearing loss.

5.7 Limitation

The study subjected some limitations which may have implications to outcome. The research has some other limitation including:

- a. The number of sample compare to total national population as a nightclub workers was quite small.
- b. Ideally, where a nightclub had more than floor area, a SLM would have been placed in each area.
- c. Data from self-administered questionnaires may pose lots of missing data.
- d. This research relied on honesty of respondents. There is no chance to confirm the respondent's answer were correct. The respondents should come at laboratory and doing a test to obtain more precise information of hearing loss.

- e. The absence of standard and valid questionnaires related to noise and hearing loss are suitable to serve as a questionnaire in this study.

5.8 Recommendations

After doing these research, the researcher had a recommendation for the management of a nightclub, for local government, and for further research, and it was explained as follows:

5.8.1 Recommendation for Nightclub Management

It is expected that the management of a nightclub or owner to pay more attention on the health of workers as well and not just take profits. Since health workers are also important and a nightclub cannot operate without the workers.

Paying attention to the health of workers, especially the health effect to the ear, can be made by routine ear measuring periodically so it will be easier to detect whether the worker is experiencing hearing loss or not. The management should had measuring the ears of workers before they start work also became one of the main things.

Provide training or include workers in a seminar about the noise problem has also become important. Because by knowing the impact of noise is causing hearing loss, workers may be more concerned about the health of their ears.

Nightclub management should provide time resting in when the workers were work, so the workers can rest their ears a few moments of exposure to noise. Using a system of job rotation is also one good solution to be applied by the management.

5.7.1 Recommendation for Local Government

The government should do more routine in measuring the noise exposure level in every nightclub. Because the entertainment industry is an industry with little forgotten by the government. Also provide a workshop or training on occupational health issues.

Governments also have a role to play by developing and enforcing strict legislation on recreational noise, and by raising awareness of the risks of hearing loss through public information campaigns.

5.7.2 Recommendation for Further Research

In further research the researcher expected to provide more than one of Sound Level Meter when it will take measurements. Since each worker has a job description that is different and of course the noise exposure different as well. However this study is very important because, given the limited research conducted in a nightclub, especially in Indonesia.

Besides using SLM as a noise measurement, personal noise dosimeter is also needed to measure noise exposure level received by each workers when they are working.

When the researcher measuring the noise, the researcher should consider and calculate according to noise contour mapping.



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APPENDIX
QUESTIONNAIRE

Instruction

- Please, **do not write your name on this questionnaire**. Hence, nobody will be able to identify who has completed this particular form.
 - Please Read each questions carefully before answering it.
 - Chose the answer that best describes what you believe and feel to be correct.
 - Chose only **one** answer for each question.
 - If you have to change your answer, don't worry; just erase it completely, without leaving marks.
 - For choice questions, please mark "√" in the provided box.
 - For essay questions, please fill in the dots with the right answer.
 - This is not a test; **therefore there are no "right" or "wrong" answers.**
-
-

Part I

Personal Information

1. How old are you? years old
2. What is your gender?
 - Male
 - Female
3. What is the highest education that obtained by yours?

<input type="checkbox"/> No education	<input type="checkbox"/> High School
<input type="checkbox"/> Primary School	<input type="checkbox"/> Graduate College
<input type="checkbox"/> Secondary School	

4. What is your job description?

- | | | |
|---|-----------------------------------|----------------------------------|
| <input type="checkbox"/> Disk Jockey (DJ) | <input type="checkbox"/> Cashier | <input type="checkbox"/> Manager |
| <input type="checkbox"/> Bartender | <input type="checkbox"/> Operator | <input type="checkbox"/> Dancer |
| <input type="checkbox"/> Ladies Club | <input type="checkbox"/> Waiters | |

Part II

Factors Related with Hearing Loss

A. Health Habits

1. Whether your hobby associated with loud noise?

Yes

No

If YES.

2. What is your hobby related to the loud noise may cause hearing loss?

- Attend live music concert
- Play video games
- Hunting or Shooting
- Listen to music through headphones or earphones
- Attend race cars/motorcycle
- Play music at studio
- Diving
- Others (please specify)

3. Have you ever smoked cigarettes?

Yes

No

If YES.

How many cigarettes do you spend in a day?bar/day

How long do you smoke?years

4. Are you drink alcohol?

Yes

No

If YES.

How much you consume every day? liter

How often do you drink alcohol?

Daily

Monthly

Weekly

Seldom

5. Whether you do sports activities?

Yes

No

If YES.

How often do you do sport activities?

Daily

Monthly

Weekly

Seldom

B. Duration of Work at Nightclub

1. How long do you work at nightclub?month

2. Before you work at nightclub, do you work in the workplaces that have high noise intensity?

Yes

No

If YES.

Please specify kind of work that you are working

C. Length of Work day

1. How many hours do you work per day? Hours

2. How many days do you work per week? Day/week

D. Knowledge about Noise and Temporary or Permanent Hearing Loss

No	Items	True	False	Don't know
1.	Noise can cause temporary hearing loss.			
2.	Noise can cause permanent hearing loss.			
3.	Temporary or permanent hearing loss may not occur if a worker is not exposed to loud noise and not exposed many times to a noisy environment in nightclub.			
4.	Hobbies like shooting, scuba diving, listen to loud music, race cars/motorcycle or another hobbies related to loud sound may cause temporary hearing loss.			
5.	Hobbies like shooting, scuba diving, listen to loud music, race cars/motorcycle or another hobbies related to loud sound in the long time and many time may cause permanent hearing loss.			
6.	If people expose to noise, men are the higher risk to get hearing loss than woman.			
7.	There is medicine available to treat temporary hearing loss due to noise.			
8.	There is no medicine available to treat permanent hearing loss due to noise.			
9.	Temporary or permanent hearing loss can be prevented by wearing ear protective equipment.			
10.	Temporary hearing loss due to noise can recovery back to normal if a person have no longer exposed to noise.			
11.	Permanent hearing loss due to noise cannot recovery back to normal if a person have a longer exposed to noise.			
12.	Smoking can cause temporary hearing loss.			
13.	Smoking when working in noisy environment can increase risk of permanent hearing loss.			
14.	There is the law in Indonesia to protect workers from hazardous noise at workplace.			

E. Practice to Prevent from Hearing Loss on Nightclub

No	Item	Never	Seldom	Frequently	Always
1.	I always wearing to ear plug to protect my ear when I am working.				
2.	I have ear examination done by doctor to detect hearing loss.				
3.	I always checked my ears periodically during work at nightclub.				
4.	During my work, I stay away from noise source such as amplifier, and stage.				
5.	I am not smoking when I am working in nightclub.				
6.	I avoid hobby related to loud sound.				
7.	I attend health education to know effects of noise and others education (such as: seminar, workshop, training) related to noise exposure.				
8.	I get information about safety and health from organization, or any institution regarding noise exposure and the effects.				
9.	I talk to my boss regarding how to reduce noise level in the nightclub.				
10.	When I have break time, I am going to outside of nightclub to protect my ears from the noise source.				

Notice:

Never : Never do it

Seldom : Do it only a few time

Frequently : Do it almost every time

Always : Always do every time

Part III

Sign and Symptoms of Hearing Loss (NIDCD)

A. Do you feel have a hearing problem in your ears?

Yes

No

If **YES**,

When did you first begin to experience your hearing problem?

Last month Last 6 months others

Last 3 months Last years

B. History of Hearing Problems

Please indicate your answer by check “Yes” or “No”.

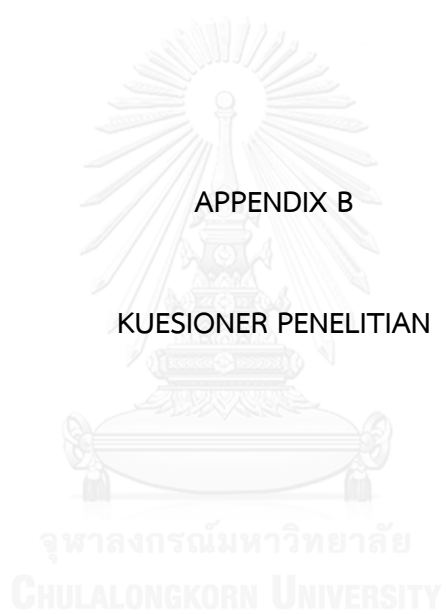
No	History of Hearing Loss	Yes	No
1.	Does your family have a history of hearing problems?		
2.	Have you been exposed to loud noises over a long period of time?		
3.	Have you ever had ear surgery?		
4.	Do you use large amounts of caffeine?		
5.	Have you had an ear trauma or head injury prior to hearing loss?		
6.	Is your hearing problem getting worse?		

C. Sign and Symptoms of Hearing Problems

Please indicate your answer by check “Yes” or “No”. Put an “X” in either blank for ear involved.

No	Sign and Symptoms	Yes	No
1.	Do you felt Noise in your ears?		
2.	Do you felt Fullness or stuffiness in your ears?		
3.	Do you felt Pain in your ears?		
4.	Is it your ears can heard sensitive or small sound?		
5.	Do you felt dizziness when you heard a loud noise?		
6.	Do you felt ring, roaring or buzzing in your ears after you work in a long time?		

Question	Right Ear	Left Ear	Both Ears
Felt Hearing Problem in your ears?			



APPENDIX

KUESIONER

Petunjuk Pengisian Kuesioner

- **Jangan menuliskan nama anda pada lembar kuesioner.** Oleh karena itu, tidak ada yang akan mengidentifikasi siapa saja yang telah menyelesaikan kuesioner ini.
- Bacalah setiap pertanyaan secara cermat sebelum anda menjawabnya.
- Pilihlah jawaban yang menurut Anda merupakan jawaban yang paling tepat.
- Pilihlah hanya **SATU** jawaban dari setiap pertanyaan.
- Jika Anda ingin mengganti jawaban, coretlah jawaban Anda dan kemudian gantilah dengan jawaban yang baru.
- Pada pertanyaan pilihan, berilah tanda “v” pada kotak yang tersedia.
- Pada pertanyaan isian, isilah titik-titik yang tersedia dengan jawaban yang tepat.
- Ini bukanlah sebuah tes, **sehingga tidak ada jawaban yang “benar” atau jawaban yang “salah”.**

Bagian I

Informasi Pribadi

1. Berapa umur Anda? tahun
2. Apa jenis kelamin Anda?
 - Laki-laki
 - Perempuan
3. Apa pendidikan terakhir Anda?

<input type="checkbox"/> Tidak Sekolah	<input type="checkbox"/> SLTA/SMA/MA
<input type="checkbox"/> Sekolah Dasar	<input type="checkbox"/> Perguruan Tinggi
<input type="checkbox"/> SLTP/SMP/Mts	

4. Ditempat kerja Anda, Anda bekerja sebagai?

- | | | |
|---|-----------------------------------|----------------------------------|
| <input type="checkbox"/> Disk Jockey (DJ) | <input type="checkbox"/> Kasir | <input type="checkbox"/> Manager |
| <input type="checkbox"/> Bartender | <input type="checkbox"/> Operator | <input type="checkbox"/> Dancer |
| <input type="checkbox"/> Ladies Club | <input type="checkbox"/> Waiters | |

Bagian II

Faktor-faktor yang Berhubungan dengan Penurunan Daya Dengar

A. Perilaku Kesehatan

1. Apakah Anda memiliki hobi yang berhubungan dengan suara keras/bising?

- Ya
 Tidak

Jika YA.

2. Hobi apa yang Anda sukai yang berhubungan dengan suara bising atau yang dapat menyebabkan gangguan pendengaran?

- Mendatangi live konser musik
 Bermain video games
 Berburu/Menembak
 Mendengarkan music dengan menggunakan Earphones atau Headphone
 Datang ke arena balap mobil/motor
 Bermain musik di studio
 Menyelam
 Lainnya (tolong sebutkan)

3. Apakah Anda pernah merokok?

- Ya
 Tidak

Jika YA.

Berapa batang rokok yang Anda habiskan dalam 1 hari?batang/hari

Sudah berapa lama Anda merokok?years

4. Apakah Anda mengonsumsi Alkohol?

Ya

Tidak

Jika YA.

Berapa banyak Alkohol yang Anda habiskan dalam satu hari? liter

Seberapa sering Anda meminum Alkohol?

Setiap hari

Sekali dalam sebulan

Sekali dalam seminggu Kadang-kadang

5. Apakah Anda melakukan aktivitas olahraga?

Ya

Tidak

If YA.

Seberapa sering Anda melakukannya?

Setiap hari

Sekali dalam sebulan

Sekali dalam seminggu Kadang-kadang

B. Lama Bekerja di Kelab Malam

1. Sudah berapa lama Anda bekerja di kelab malam? bulan

2. Sebelum Anda bekerja di kelab malam, apakah Anda pernah bekerja di tempat kerja yang memiliki suara bisng?

Ya

Tidak

If YA.

Tolong sebutkan jenis/tempat kerja Anda

C. Lama Waktu Bekerja dalam satu hari

1. Berapa jam Anda bekerja dalam satu hari? Jam

2. Berapa hari Anda bekerja dalam satu minggu? Hari per Minggu

D. Pengetahuan Tentang Kebisingan, dan Penurunan Daya Dengar Sementara atau Penurunan Daya Dengar Tetap

No	Pernyataan	Benar	Salah	Tidak Tahu
1.	Kebisingan dapat menyebabkan Penurunan Daya Dengar Sementara.			
2.	Kebisingan dapat menyebabkan Penurunan Daya Dengar Tetap.			
3.	Penurunan Daya Dengar Sementara atau Tetap tidak akan terjadi apabila pekerja tidak bekerja dalam waktu yang lama di tempat yang memiliki suara kebisingan yang tinggi seperti kelab malam.			
4.	Hobi seperti menembak, menyelam, mendengarkan music keras, balapan mobil/motor dan hobi lain yang berhubungan dengan suara kebisingan yang tinggi dapat menyebabkan penurunan daya dengar "sementara".			
5.	Hobi seperti menembak, menyelam, mendengarkan music keras, balapan mobil/motor dan hobi lain yang berhubungan dengan suara kebisingan yang tinggi dapat menyebabkan penurunan daya dengar "tetap".			
6.	Pria memiliki resiko tinggi mengalami penurunan daya dengar dibandingkan dengan wanita.			
7.	Ada obat yang tersedia untuk mengobati penurunan daya dengar "sementara".			
8.	Tidak ada obat yang tersedia untuk mengobati penurunan daya dengar "tetap".			
9.	Penurunan daya dengar sementara atau tetap dapat dicegah dengan menggunakan alat pelindung telinga.			
10.	Penurunan daya dengar "sementara" dapat kembali normal jika seseorang tidak lagi terkena kebisingan.			
11.	Penurunan daya dengar "tetap" tidak dapat kembali normal apabila seseorang kembali terkena kebisingan.			
12.	Merokok dapat menyebabkan penurunan daya dengar sementara.			
13.	Merokok ketika bekerja di lingkungan yang memiliki suara kebisingan tinggi dapat meningkatkan resiko penurunan daya dengar.			
14.	Ada hukum yang dikeluarkan Dinas Tenaga Kerja di Indonesia untuk melindungi pekerja dari bahaya kebisingan di tempat kerja.			

E. Praktek dalam Mencegah Penurunan Daya Dengar di Kelab Malam

No	Pernyataan	Tidak Pernah	Jarang	Sering	Selalu
1.	Saya selalu menggunakan pelindung telinga untuk melindungi telinga saya ketika saya bekerja.				
2.	Saya telah menyelesaikan pemeriksaan telinga oleh dokter untuk mendeteksi penurunan daya dengar.				
3.	Saya selalu memeriksakan telinga saya secara rutin ketika bekerja di kelab malam.				
4.	Ketika bekerja, saya selalu menjauhi sumber kebisingan seperti pengeras suara.				
5.	Saya tidak merokok ketika bekerja di kelab malam				
6.	Saya menghindari hobi yang berhubungan dengan suara yang bising/keras.				
7.	Saya mengikuti pendidikan kesehatan untuk mengetahui efek dari kebisingan. (seperti: seminar, workshop, dan pelatihan)				
8.	Saya mendapatkan informasi tentang keselamatan dan kesehatan kerja dari organisasi atau berbagai institusi tentang paparan kebisingan dan efeknya bagi indera pendengaran.				
9.	Saya berbicara dengan boss saya terkait dengan bagaimana mngurangi kebisingan di tempat kerja.				
10.	Ketika mempunyai waktu istirahat pada saat bekerja, saya pergi keluar untuk melindungi telinga saya dari sumber kebisingan.				

Keterangan:

Tidak Pernah : Tidak pernah melakukannya sama sekali

Jarang : Melakukannya hanya beberapa kali

Sering : Melakukannya hampir setiap waktu

Selalu : Selalu melakukan setiap waktu

Bagian III

Tanda dan Gejala Penurunan Daya Dengar (NIDCD)

A. Apakah Anda merasakan gangguan pendengaran di telinga Anda?

Ya

Tidak

Jika **YA**,

Kapan pertama kali Anda merasakannya?

Bulan lalu

6 bulan yang lalu

Lainnya

3 bulan yang lalu

Tahun lalu

B. Riwayat Gangguan Pendengaran

Silahkan jawab pertanyaan berikut ini dengan memberikan tanda "v" pada kolom "Ya" atau "Tidak".

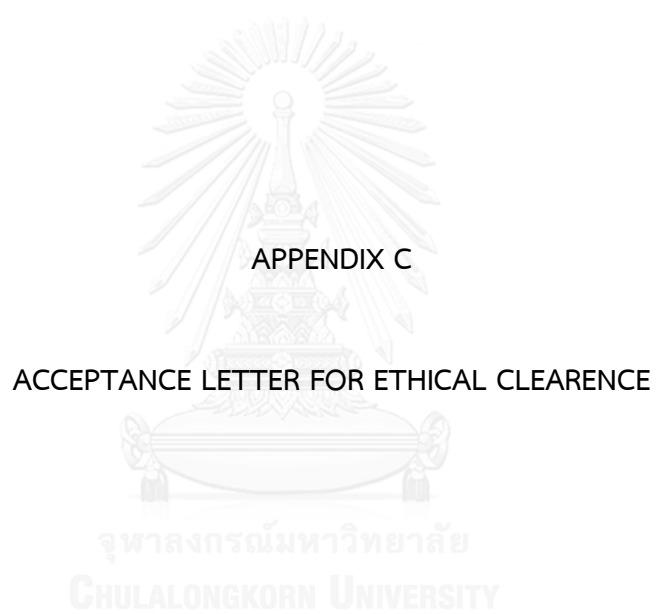
No	Riwayat Gangguan Pendengaran	Ya	Tidak
1.	Apakah keluarga Anda memiliki riwayat masalah pendengaran?		
2.	Apakah Anda terkena suara keras/bising dalam jangka waktu yang panjang?		
3.	Apakah Anda pernah mengalami operasi telinga?		
4.	Apakah Anda mengonsumsi Kafein dalam jumlah yang besar?		
5.	Apakah anda memiliki trauma telinga atau cedera kepala sebelum mengalami gangguan pendengaran?		
6.	Apakah gangguan pendengaran Anda semakin parah?		

C. Tanda dan Gejala Gangguan Pendengaran

Silahkan jawab pertanyaan berikut ini dengan memberikan tanda "v" pada kolom yang disediakan.

No	Tanda dan Gejala	Ya	Tidak
1.	Apakah Anda merasakan bisung di telinga Anda?		
2.	Apakah Anda merasa telinga Anda tersumbat oleh sesuatu?		
3.	Apakah Anda merasa sakit di telinga Anda?		
4.	Apakah telinga Anda dapat mendengar suara kecil/suara yang sensitive?		
5.	Apakah Anda mengalami pusing bila mendengar suara keras/bisung?		
6.	Apakah telinga anda terasa berdengung dalam waktu yang lama setelah selesai bekerja?		

Pertanyaan	Telinga Kanan	Telinga Kiri	Kedua Telinga
Telinga manakah yang Anda rasakan memiliki gangguan?			





UNIVERSITAS KATOLIK INDONESIA
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16 Juni 2016

Nomor: 532/III/LPPM-PM.10.05/06/2016

Kepada Yth
Khresna Febrianto
Chulalongkorn University
Thailand

Hal. : Persetujuan *Ethical Clearance*

Dengan hormat,

Setelah melakukan *peer review* terhadap proposal penelitian berjudul:

" Occupational Noise Exposure and Assessing Hearing Loss of Nightclub Workers in Tarakan City, Indonesia"
(Principal Investigator: Khresna Febrianto)

dengan ini kami sampaikan bahwa Komisi Etika Penelitian Universitas Katolik Indonesia Atma Jaya menyatakan bahwa proposal laik etik untuk dilaksanakan, sesuai masukan dari Tim Komisi Etika Penelitian terlampir.

Diharapkan setelah pelaksanaan, Saudara dapat memberikan laporan beserta uraian pelaksanaan penjaminan aspek etika penelitian tersebut.

Demikian kami sampaikan, atas perhatian dan kerjasamanya kami ucapkan terima kasih.

Hormat kami

Dr. Alexander Seran, M. Sc.
Ketua Komisi Etika Penelitian Unika Atma Jaya



Work Plan and Time Schedule

Administration	2015			2016						
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Literature Review	■	■	■							
Proposal writing			■	■						
Tools trial						■	■			
Proposal defense							■			
Data collecting								■		
Data analyzing								■	■	
Conclusion								■	■	
Discussion									■	
Thesis Final defense										■
Finish										■

Research Budget

Topic	Estimated Cost (Bath)
Research fees	10,000
Photocopy	5,000
Borrowing the tools	10,000
Salary research assistant	1,500
Travel Allowance	15,000
Printing and binding of the research	4,000
Payment for Ethical Approval	3,000
Total Cost	48,500

VITA

The researcher in this study named Kresna Febriyanto. His nickname is Boy. He was born in Bunyu Island, North Borneo-Indonesia, february 20th 1993. He is the first child of 2 siblings. His sister named Rani Nur Afifah. He is the son of couple Rudy Pudjut Harianto and Siti Rohani.

He started education at elementary school of Utama 2 Tarakan. Since he was a child, he really love math and hate English. After graduated from elementary school, he registered himself as a student at junior high school of 1 Tarakan. After 3 years he continued to senior high school of 1 Tarakan. When he was graduated from senior high school, he likes to go traveling in several places in Indonesia. And he realized that by learning English, he could be anywhere.

Then, he was graduated for Bachelor Degree program from Institute of Health Sciences Muhammadiyah Samarinda on the major of Public Health especially Occupational Health and Safety. Now he is a student of College of Public Health Sciences, Chulalongkorn University. His major is Public Health especially Environment and Occupational Health. After graduated he will be as a lecture at Institute of Health Sciences Muhammadiyah Samarinda. He hopes one day he will be a good safety officer who can improving workers healthy in Indonesia.

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