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DOCTORAL THESIS

**EFFECTS OF ENVIRONMENTAL NOISE EXPOSURE AROUND  
TAN SON NHAT AIRPORT ON COMMUNITY HEALTH**

「タンソンニャット空港周辺における環境騒音曝露が住民の健康に及ぼす影響」

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# *Contents*

ACKNOWLEDGEMENT .....	4
LIST OF PUBLICATIONS .....	5
LIST OF TABLES .....	7
LIST OF FIGURES.....	8
CHAPTER 1: INTRODUCTION .....	11
1.1 Background of the Study .....	11
1.1.1 Noise Exposure–Response Relationships and Policy Frameworks .....	11
1.1.2 Health Outcomes Associated with Environmental Noise Exposure.....	13
1.1.3 Noise in Hospital Settings and Occupational Health Implications for Health-Care Personel .....	13
1.2 Study Area and Context Framework .....	14
1.3 Research Gaps and Scientific Significance .....	14
1.4 Research Objectives and Hypotheses .....	15
1.5 Organization of the Dissertation.....	15
1.6 Scope, Assumptions and Limitations .....	16
1.7 Definitions of Key Terms .....	17
References.....	19
CHAPTER 2: GENERAL METHODOLOGY.....	21
2.1 Noise Measurement .....	21
2.2 Noise Estimation.....	22
2.3 Statistical Analysis.....	23
2.3.1 Multiple Regression Analysis .....	23
2.3.2 Structural Equation Modeling.....	24
2.4 Health Indices and Outcome Measures .....	25
References.....	26
CHAPTER 3: NOISE EXPOSURE AND COMMUNITY RESPONSES AROUND TAN SON NHAT AIRPORT.....	29
3.1 Introduction.....	29
3.2 Methods .....	30
3.2.1 Study Design and Survey Areas.....	30
3.2.2 Noise Exposure Assessment .....	31
3.2.3 Questionnaire Survey .....	32

3.3	Results.....	33
3.3.1	Demographic Characteristics of Respondents .....	33
3.3.2	Change in Flight Operations and Noise Levels .....	34
3.3.3	Exposure-Annoyance Relationships .....	37
3.3.4	Exposure-Sleep Disturbance Relationships .....	38
3.3.5	Influence of Non-Acoustic Factors .....	39
3.4	Discussions .....	52
	References.....	53
CHAPTER 4: NOISE MONITORING AND HEALTH ASSESSMENT AT HOSPITAL NEAR TAN SON NHAT AIRPORT .....		55
4.1	Introduction.....	55
4.2	Methods .....	57
4.2.1	Study Design .....	57
4.2.2	Noise Exposure Assessment .....	58
4.2.3	Self-Reported Health Outcomes via Questionnaire Survey.....	59
4.2.4	Health Index Monitor.....	60
4.3	Results.....	62
4.3.1	Noise Exposure Levels.....	62
4.3.2	Associations Between Noise Exposure and Self-Reported Health Outcomes.....	67
4.3.3	Health Monitoring Outcomes.....	73
4.4	Discussions .....	81
4.5	References.....	83
CHAPTER 5: CONCLUSIONS.....		86
CHAPTER 6: FUTURE RESEARCH DIRECTIONS .....		88
6.1	Study Background .....	88
6.2	Objectives of Future Research .....	88
6.3	Proposed Methodological Approaches .....	88
6.4	Expected Outcomes and Scientific Contributions .....	89
6.5	Summary.....	90
	References.....	90
APPENDICES.....		91

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## LIST OF PUBLICATIONS

1. Models of Aviation Noise Impact in the Context of Operation Decrease at Tan Son Nhat Airport  
Author(s): Tran Thi Hong Nhung Nguyen, Thu Lan Nguyen, Bach Lien Trieu, Makoto Morinaga, Yasuhiro Hiraguri, Takashi Morihara, Yosiaki Sasazawa, Tri Quang Hung Nguyen and Takashi Yano  
Name of Journal: International Journal of Environment Research and Public Health (IJERPH)  
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2. Assessing Annoyance and Sleep Disturbance Related to Changing Aircraft Noise Context: Evidence from Tan Son Nhat Airport  
Author(s): Thu Lan Nguyen, Tran Thi Hong Nhung Nguyen, Makoto Morinaga, Yasuhiro Hiraguri, Takashi Morihara  
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3. Noise Monitoring and Health Assessment at a Hospital near Tan Son Nhat Airport: Associations between Aircraft and Road Traffic Noise, Sleep Quality, and Health Outcomes  
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4. Preliminary Survey on the Effects of Indoor Noise in the Hospital Located Close to Tan Son Nhat Airport  
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5. The Impact of Confounding Factors on Moderating Short-Term Responses to Noise: A Follow-Up Study Conducted at a Hospital near Tan Son Nhat Airport  
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## LIST OF TABLES

Table 1. The questions and scales used to assess annoyance, sleep disturbance and insomnia in the surveys. (Table structure adapted from [32,33]).....	32
Table 2. Demographic Data of Respondents (TSN survey data per [32,33]).....	33
Table 3. The average number of daily flight operations (ADS-B and Flight logs; 2019–2020 summarized in [32]; 2023 update from [33]).....	34
Table 4. Estimated aircraft noise levels (2019–2023), with measured values shown in parentheses for 2019. (INM v7.0; model–measurement verification for 2019 per [32]; extended estimates for 2023 per [33]).....	35
Table 5. The multiple logistic regression of annoyance (Generalized R2: 0.1445; AUC: 0.7596), (based on TSN datasets [33]) .....	40
Table 6. The multiple logistic regression of insomnia (Generalized R2: 0.0875; AUC: 0.7019), (based on TSN datasets [33]) .....	41
Table 7. Questions and evaluation scales for measuring moderating variables in the model. model design per [32,33].....	43
Table 8. Parameter estimates of the structural equation model for noise annoyance (Data adapted from SEM outputs in [32,33]).....	50
Table 9. Parameter estimates of the structural equation model for insomnia (Data adapted from SEM outputs in [32,33]).....	51
Table 10. Noise measurement locations within Military Hospital 175 (Adapted from under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah_223_25.) .....	58
Table 11. Questions and evaluation scales for measuring the outcomes of insomnia [34–36]....	60
Table 12. Summary of HRV indices analyzed in this study (Adapted from article under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah_223_25, and r[34,36]).....	61
Table 13. Average A-weighted noise level at patient areas in three years [34–36]. .....	63
Table 14. Average A-weighted noise level at staff areas in three years [34–36]. .....	64
Table 15. The average number of daily flight operation in three years (source: by author).....	64
Table 16. Estimated aircraft noise exposure levels at the surveyed hospital from (2022–2024) (Adapted from the article under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah_223_25.).....	65
Table 17. Data on personal and attitudinal, and self-rated health variables (2022-2023-2024) (Survey data collected and compiled by the authors; adapted from article under review, Nguyen et al., 2025, Noise & Health and [34,35]). .....	67
Table 18. Bivariate likelihood ratio test for potential predictors of insomnia. Each variable was individually tested for its association with self-reported insomnia using the likelihood ratio chi-square test (source: by author). .....	69
Table 19. The multiple logistic regression of insomnia (Generalized R2: 0.1764; AUC: 0.77039). (Adapted from article under review, Nguyen et al., 2025, Noise & Health.) .....	71

Table 20. Bivariate likelihood ratio test for potential predictors of annoyance. Each variable was individually tested for its association with self-reported insomnia using the likelihood ratio chi-square test (source: by author). .....72

Table 21. The multiple logistic regression of annoyance (Generalized R2: 0.3116; AUC: 0.91039). .....73

Table 22. Distribution of patients by sex and age group for sleep quality analysis [36]......74

Table 23. Distribution of staff by sex and age group for sleep quality analysis [36]. .....74

## LIST OF FIGURES

Figure 1. Tan Son Nhat Internation Airport (Prepared by the author.).....11

Figure 2. Exposure–response relationship between aircraft-noise level ( $L_{den}$ ) and %Highly Annoyed (%HA). Blue lines = HYENA and 1996–2006 data; red curve = EU reference function; gray bands = 95 % confidence intervals. (Source: HYENA Study [4]; EU Guideline Data; adapted from WHO 2018[1].).....12

Figure 3. Example of modeled flight tracks and noise contours at Tan Son Nhat Airport (INM 7.0) (Prepared by author).....23

Figure 4. Study Plan of Community Surveys around Tan Son Nhat Airport ( Prepared by the author) .....30

Figure 5. Map of survey sites (Sites 1-12) (Base map prepared by the author; site layout adapted from [32]; updated with 2023 survey coverage from [33]).....31

Figure 6.Noise contours of TSN Airport delineate the areas exposed to day-evening-night noise levels exceeding 55 dB across all survey periods (Contours computed with INM v7.0; 2019–2020 presentation per [32]; 2023 update per [33]).....36

Figure 7.Noise contours of TSN Airport delineate the areas exposed to nighttime noise levels exceeding 40 dB across all survey periods (Contours computed with INM v7.0; 2019–2020 presentation per [32]; 2023 update per [33]).....36

Figure 8. Comparison of  $L_{den}$  –% HA relationships for each survey, with WHO (2018) reference for comparison. (Logistic fits per survey; WHO curve shown for reference only). [1,32,33] .....37

Figure 9. Comparison of  $L_{night}$  –%ISM relationships for each survey, (Logistic fits per survey; WHO curve shown for reference only). [1,32,33] .....39

Figure 10. The structural equation model (SEM) developed by integrating the questionnaire items from all the survey, (developed and refined based on TSN dataset in [32,33]).....45

Figure 11. The impact structure in the estimated noise annoyance model in the 2019,2020 and 2023 surveys using chi-square, GFI, CFI, and RMSEA statistics: chi-square = 446.203,  $p < 0.01$ ,  $df = 126$ , GFI = 0.932, CFI = 0.906, and RMSEA = 0.052. Statistically significant paths and standardized regression weights were annotated with ( $p < 0.05$ ). The non-significant paths are represented by dashed lines. The explained variances are annotated for each variable. (Model developed from TSN datasets in [32,33]). .....48

Figure 12. The impact structure in the estimated insomnia model in the 2019,2020 and 2023 surveys using chi-square, GFI, CFI, and RMSEA statistics: chi-square = 348.733,  $p < 0.01$ ,  $df = 126$ , GFI = 0.945, CFI = 0.930, and RMSEA = 0.043. Statistically significant paths and standardized regression weights were annotated with ( $p < 0.05$ ). The non-significant paths are represented by dashed lines. The explained variances are annotated for each variable. (Model developed from TSN datasets in [32,33]). .....50

Figure 13. Military Hospital 175’s location (Adapted from the article under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah\_223\_25.) .....57

Figure 14. Noise measurement locations within surveyed hospital. (Source: article under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah\_223\_25.) .....59

Figure 15. Participants wore the Bittium Faros 180 wearable ECG recorder during sleep. The monitor is attached to the anterior chest using adhesive electrodes, allowing continuous recording of ECG and RR-intervals overnight [34,36]. .....61

Figure 16. Noise contours of TSN Airport delineate the areas exposed to day-evening-night noise levels exceeding 55 dB across all surveyed hospital. (Adapted from article under review, Nguyen et al., 2025, Noise & Health.).....66

Figure 17. Noise contours of TSN Airport delineate the areas exposed to nighttime noise levels exceeding 45 dB across all surveyed hospital. (Adapted from article under review, Nguyen et al., 2025, Noise & Health.) .....67

Figure 18. Comparison of noise levels across sleep stages of all patients (Source: article under review, Nguyen et al., 2025, Noise & Health.).....75  
.....75

Figure 19. Comparison of noise levels across sleep stages of all staff (Source: article under review, Nguyen et al., 2025, Noise & Health.).....75

Figure 20. Spearman’s correlation heatmap showing relationships between environmental noise indices ( $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$ ) and HRV parameters (SDNN, RMSSD, LF, HF, LF/HF ratio, DFA  $\alpha 1$ , DFA  $\alpha 2$ ) among hospital staff ( $n = 8$ ) (source: by author). .....76

Figure 21a. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Time & frequency domain indices (SDNN, RMSSD, LF, HF, LF/HF ratio) among hospital staff ( $n = 8$ ). (Source: article under review, Nguyen et al., 2025, Noise & Health.).....77

Figure 21b. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Nonlinear indices (SD1, SD2, DFA  $\alpha 1$ , DFA  $\alpha 2$ ) among hospital staff ( $n = 8$ ). (Source: article under review, Nguyen et al., 2025, Noise & Health.).....78

Figure 22. Spearman’s correlation heatmap showing relationships between environmental noise indices ( $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$ ) and HRV parameters (SDNN, RMSSD, LF, HF, LF/HF ratio, DFA  $\alpha 1$ , DFA  $\alpha 2$ ) among patient ( $n = 4$ ) (source: by author). .....79

Figure 23a. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Nonlinear indices (SD1, SD2, DFA  $\alpha 1$ , DFA  $\alpha 2$ ) among patient ( $n = 4$ ). (Source: article under review, Nguyen et al., 2025, Noise & Health.).....80

Figure 23b. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Nonlinear indices (SD1, SD2, DFA  $\alpha$ 1, DFA  $\alpha$ 2) among patient (n = 4). (Source: article under review, Nguyen et al., 2025, Noise & Health.).....81

Figure 24. Proposed framework linking environmental noise, vegetation (NDVI), and community responses in residential and hospital settings.....89

## CHAPTER 1: INTRODUCTION

### 1.1 Background of the Study

Environmental noise has become one of the most pervasive pollutants in modern cities. Unlike air or water pollution, it is invisible yet continuously present, affecting millions of people in their daily lives. According to the World Health Organization (WHO, 2018), environmental noise is now recognized as the second most serious environmental threat to human health after air pollution [1]. Long-term exposure to transportation noise—particularly from aircraft, road traffic, and railways—has been associated with annoyance, sleep disturbance, hypertension, cardiovascular and metabolic disorders, and reduced mental well-being [12–14]. Among these sources, aircraft noise is particularly intrusive because of its intermittency and strong low-frequency components, which can easily penetrate buildings and disturb rest even at moderate levels. Consequently, aircraft noise can induce both psychological stress and physiological dysregulation, contributing to long-term health risks.

In Vietnam, rapid urbanization has intensified this issue. Tan Son Nhat International Airport (TSN)—the country’s largest and busiest airport—is located only about 6 km north of central Ho Chi Minh City, surrounded by densely populated residential districts, schools, and hospitals. Frequent take-offs and landings expose nearby communities to aircraft noise that often exceeds recommended health-based limits. However, scientific evidence on its physiological and psychological effects in developing-country urban contexts remains extremely limited. Figure 1 shows the location of Tan Son Nhat International Airport and its surrounding urban context, highlighting the dense concentration of residential and healthcare facilities beneath the flight paths.

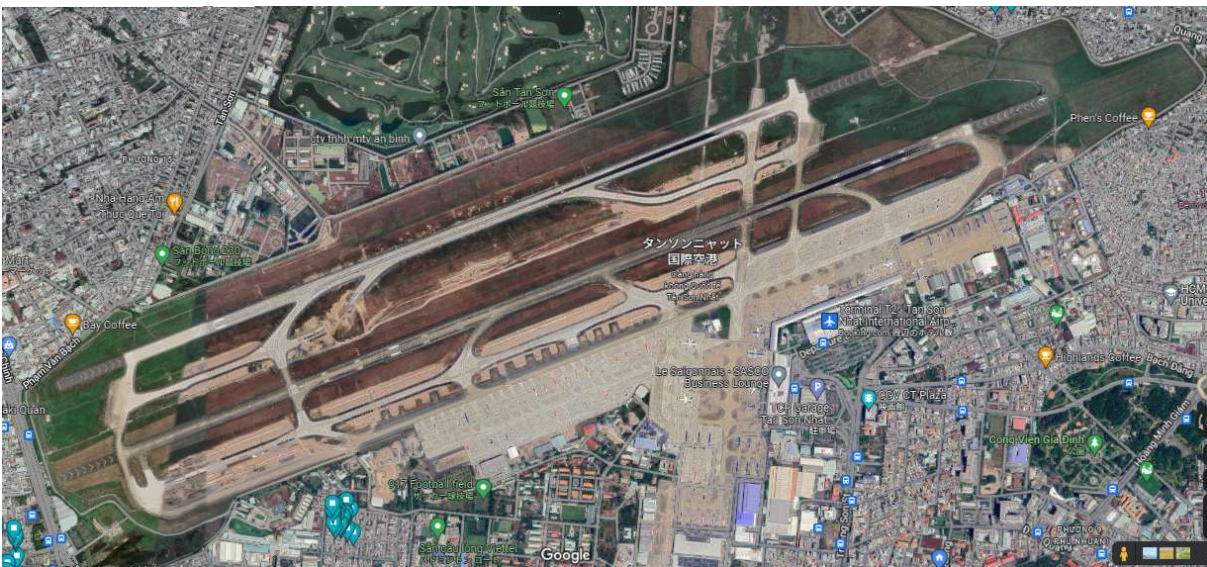


Figure 1. Tan Son Nhat International Airport (Prepared by the author.)

#### 1.1.1 Noise Exposure–Response Relationships and Policy Frameworks

Over the past two decades, large-scale epidemiological research has clarified how humans respond to environmental noise through exposure–response (E–R) relationships.

The HYENA Project (Hypertension and Exposure to Noise near Airports) identified a strong association between long-term aircraft-noise exposure and elevated blood pressure among residents near European airports [4]. Similarly, the DEBATS Study in France confirmed

significant relationships between aircraft noise ( $L_{den}$ ,  $L_{night}$ ) and both annoyance and impaired sleep quality [5, 6]. Building on these data, Miedema & Oudshoorn (2001) and Janssen & Vos (2009) developed meta-analytical E–R functions that later informed the EU Environmental Noise Directive (2002/49/EC) and the WHO Environmental Noise Guidelines (2018) [1,2,7,8]. These frameworks quantify the proportion of highly annoyed (%HA) and highly sleep-disturbed (%HSD) populations as a function of sound level, providing a foundation for health-based policy limits. According to the WHO, environmental noise should not exceed 45 dB den to minimize annoyance and 40 dB  $L_{night}$  to protect sleep [1].

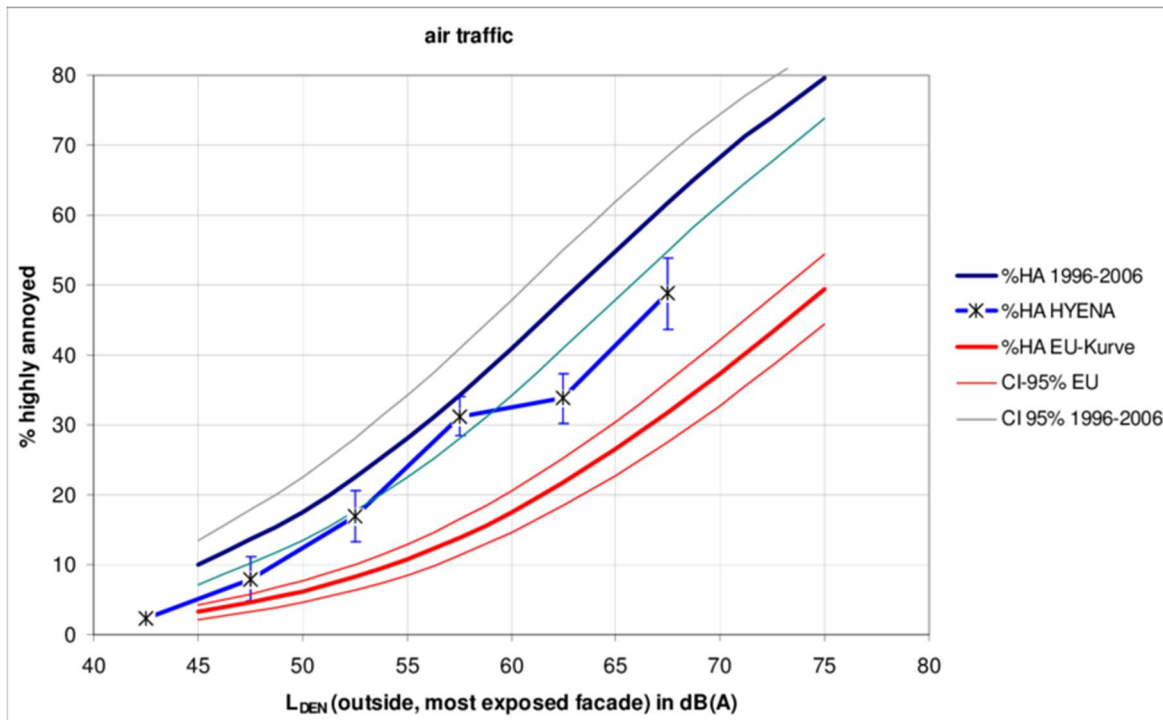


Figure 2. Exposure–response relationship between aircraft-noise level ( $L_{den}$ ) and %Highly Annoyed (%HA). Blue lines = HYENA and 1996–2006 data; red curve = EU reference function; gray bands = 95 % confidence intervals. (Source: HYENA Study [4]; EU Guideline Data; adapted from WHO 2018[1].)

As illustrated in Figure 2, the proportion of highly annoyed individuals increases sharply above 50 dB  $L_{den}$ , rising from approximately 10% at 50 dB to 40% at 60 dB. This pattern indicates that even moderate noise exposure can provoke strong emotional and physiological reactions, underscoring the need for health-based rather than purely technical noise standards.

In Japan, decades of research around Narita, Haneda, and Itami Airports have yielded detailed community E–R curves that support zoning, compensation, and urban planning policies [9-11].

Furthermore, natural-experiment studies at Haneda Airport showed that changes in flight paths immediately affected community annoyance levels [11]. By contrast, many developing countries, including Vietnam, continue to rely on engineering-based regulations. Vietnam’s national standard QCVN 26:2010/BTNMT specifies permissible levels of 70/55 dB(A) (day/night) for residential areas and 55/45 dB(A) for hospitals and schools [3]. However, actual measurements around TSN consistently exceed these limits, especially during nighttime operations, suggesting the urgent need for evidence-based policy revision.

### **1.1.2 Health Outcomes Associated with Environmental Noise Exposure**

A growing body of international evidence confirms that transportation noise contributes to both auditory and non-auditory health effects. Epidemiological studies have linked long-term exposure to environmental noise with increased risks of hypertension, ischemic heart disease, stroke, and metabolic disorders [12-14]. Sleep disturbance and annoyance are now widely recognized as key intermediate pathways linking noise exposure to cardiovascular morbidity [1,12]. From a physiological perspective, environmental noise activates the hypothalamic–pituitary–adrenal (HPA) axis and the sympathetic nervous system, resulting in elevated blood pressure, increased heart rate, and cortisol secretion. Recent studies using heart-rate variability (HRV) analysis have further demonstrated significant reductions in parasympathetic activity, as reflected by indices such as RMSSD and SDNN, among individuals exposed to high noise levels [14,15,21,22]. However, noise-related health responses are not determined by acoustic exposure alone. Contextual and non-acoustic factors, including housing quality, cultural attitudes, lifestyle, and climate, have been shown to modify individual perception and physiological sensitivity to noise. In rapidly urbanizing cities in developing countries, communities are often exposed to multiple environmental stressors simultaneously, such as traffic noise, heat, and air pollution, which may amplify vulnerability to noise-related health effects. Consequently, verifying exposure–response relationships under Vietnamese socio-environmental conditions is essential for establishing locally relevant, health-based noise guidelines. Although numerous studies have confirmed associations between environmental noise and adverse health outcomes, many have relied on conventional statistical approaches that examine isolated relationships. Such approaches provide limited insight into the complex pathways through which acoustic exposure and non-acoustic factors jointly influence community responses, underscoring the need for integrative analytical frameworks.

### **1.1.3 Environmental Noise in Hospital Settings and Occupational Health Implications for Health-Care Personnel**

Hospitals are among the most noise-sensitive environments, where acoustic comfort is essential for patient recovery, effective communication, and staff concentration. Nevertheless, numerous studies have reported that noise levels in hospital wards routinely exceed the World Health Organization (WHO) recommendations of 35 dB(A) during the day and 30 dB(A) at night [1,16,17]. Typical measurements in intensive care units and emergency departments range between 50 and 70 dB(A), levels known to disrupt sleep, delay recovery, and increase psychological and physiological stress among both patients and healthcare personnel. In recent years, research attention has increasingly shifted toward the occupational health impacts of hospital noise on medical staff. For example, Kim et al. (2024) reported that emergency-department employees exposed to ambient noise levels above 65 dB(A) experienced significantly higher burnout and turnover intention [18]. Similarly, Wang et al. (2024) found that approximately one quarter of Central Sterile Supply Department workers suffered from sleep difficulties and anxiety associated with chronic noise exposure [19]. Chung et al. (2023) further demonstrated that intensive care unit nurses and physicians exposed to continuous alarm and ventilation noise exhibited elevated fatigue and reduced cognitive performance [20]. Collectively, these findings indicate that hospital environments are not acoustically isolated from their surrounding urban context. Hospitals located near airports or major road corridors are subject to a dual exposure burden, comprising external transportation noise and internal noise generated by medical equipment and human activity. Such combined exposure may impair concentration, elevate stress

hormone levels, and interfere with physiological recovery processes. Despite these concerns, most aircraft-noise studies conducted around airports have focused primarily on outdoor exposure in residential settings. Indoor noise exposure is often inferred indirectly from outdoor measurements, even though indoor acoustic conditions are strongly influenced by building characteristics, ventilation systems, façade insulation, and internal noise sources. As a result, empirical investigations that explicitly assess indoor noise conditions and associated health responses in hospital environments affected by aircraft operations remain limited. Integrated studies combining environmental noise measurements, subjective perception, and physiological indicators are particularly scarce, especially in developing countries where hospitals are frequently embedded in dense, mixed-use urban areas.

## 1.2 Study Area and Context Framework

The research focuses on two noise-affected environments around Tan Son Nhat Airport:

- Residential survey areas (12 sites) – twelve selected sites located at varying distances and orientations from the airport runways, representing different exposure levels to aircraft and road-traffic noise.
- Military Hospital 175 – a large multi-department hospital approximately 1.2 km northeast of the main runway, comprising the Gastroenterology Department (A3), Orthopedic and Physiotherapy Department (C6), and Inpatient Ward (A2). Both patient rooms and staff resting areas face direct or reflected noise from flight operations and nearby traffic corridors. The hospital's unique location provides an opportunity to examine external noise infiltration within healthcare facilities and its consequences for sleep and recovery.

## 1.3 Research Gaps and Scientific Significance

Despite substantial international progress in understanding the health impacts of transportation noise, several critical knowledge gaps remain, particularly in developing countries such as Vietnam. Most existing studies have been conducted in Europe and Japan, where urban infrastructure, building quality, and environmental management differ greatly from those in tropical, high-density urban areas. Consequently, the exposure–response relationships and health thresholds derived from these contexts may not accurately represent populations in rapidly urbanizing Asian cities.

First, Vietnam lacks comprehensive evidence linking environmental-noise exposure to physiological and psychological health outcomes. Previous domestic research has focused mainly on physical noise mapping and acoustic measurements, with little integration of subjective perception (e.g., annoyance, sleep quality) or physiological indicators such as heart-rate variability (HRV). Without such multidisciplinary evidence, national noise policies remain largely engineering-based, relying on outdated or non-health-oriented standards (QCVN 26:2010/BTNMT).

Second, health-care facilities, although categorized as special noise-sensitive areas, have received minimal attention in environmental-noise studies. Hospitals near airports or major roads are exposed to both external transportation noise and internal hospital equipment noise, creating a dual exposure condition that may affect both patients' recovery and staff's well-being. However, integrated assessments combining environmental monitoring, perception surveys, and physiological data in hospital settings are still scarce, particularly in developing-country contexts [16,18-20].

Finally, non-acoustic factors such as housing characteristics, stress, and individual sensitivity have been shown internationally to mediate the effects of noise on health [12,13], yet they have not been systematically examined in Vietnam. Understanding how these factors interact with objective exposure is essential for developing context-specific, evidence-based noise management strategies.

This thesis addresses these gaps through two complementary contributions. From a methodological perspective, the community-based analysis applies structural equation modeling (SEM) to simultaneously examine the direct and indirect relationships among aircraft-noise exposure, non-acoustic factors, and community responses, thereby advancing conventional exposure–response analysis. From a contextual and empirical perspective, the hospital-based investigation extends aircraft-noise research from outdoor residential environments to indoor hospital settings by integrating indoor and outdoor noise monitoring with subjective sleep assessments and objective physiological indicators derived from wearable ECG-based measurements.

By combining these approaches, the study provides understanding of aircraft-noise impacts across different environments and exposure pathways, supporting the development of health-based noise guidelines and sustainable urban and hospital planning strategies in Vietnam. This research therefore addresses these gaps by adopting a multidisciplinary approach that integrates acoustic, social, and physiological perspectives. By examining both residential communities and hospital environments around Tan Son Nhat Airport, the study aims to generate locally relevant evidence that can inform future health-based noise guidelines and contribute to sustainable urban and hospital planning in Vietnam.

#### **1.4 Research Objectives and Hypotheses**

The overall purpose of this study is to evaluate the effects of environmental noise exposure on sleep and health in both community and hospital settings near Tan Son Nhat Airport, while advancing current assessment approaches through both methodological and contextual extensions. Specific objectives are:

- To assess and estimate environmental-noise exposure across residential and hospital sites using standardized acoustic indices ( $L_{Aeq}$ ,  $L_{den}$ ,  $L_{night}$ ) and temporal analysis.
- To investigate subjective responses, including perceived annoyance, sleep disturbance, and self-rated health—through structured questionnaire surveys.
- To apply a structural equation modeling (SEM) framework in the community-based analysis to clarify the direct and indirect relationships between noise exposure, non-acoustic factors, and subjective health responses.
- To examine physiological responses to noise by monitoring sleep stages (wake, light, deep, REM) and heart-rate-variability (HRV) parameters obtained from wearable electrocardiogram (ECG) devices, reflecting autonomic-nervous-system (ANS) activity.
- To integrate acoustic, social, and physiological datasets to identify the mechanisms through which environmental noise affects human health and to provide evidence for effective noise management and hospital design strategies in Vietnam.

#### **1.5 Organization of the Dissertation**

This thesis consists of six chapters:

- Chapter 2 – Methodology:

This chapter presents the overall research framework, study sites, and data collection methods. It describes the procedures for environmental-noise measurement and estimation, questionnaire surveys, and physiological monitoring using wearable ECG devices. The analytical techniques used to process and integrate acoustic, subjective, and physiological datasets are also detailed.

- Chapter 3 – Noise Exposure and Community Responses around Tan Son Nhat Airport:

This chapter examines aircraft-noise exposure and community responses in residential areas surrounding Tan Son Nhat Airport based on data from 12 survey sites. In addition to analyzing spatial and temporal patterns of noise exposure and conventional exposure–response relationships, this chapter applies structural equation modeling (SEM) to investigate the complex interactions among aircraft noise, non-acoustic factors, annoyance, sleep disturbance, and self-rated health. This chapter represents the methodological contribution of the thesis.

- Chapter 4 – Noise Monitoring and Health Assessment at Hospital Near Tan Son Nhat Airport:

This chapter focuses on a hospital-based investigation and constitutes the core contextual and empirical contribution of the thesis. It integrates indoor and outdoor noise monitoring with questionnaire surveys and ECG-based physiological measurements to evaluate the effects of environmental and hospital noise on patients and healthcare personnel. Relationships between noise exposure, sleep quality, and heart-rate-variability (HRV) indices are examined to assess autonomic responses and nocturnal recovery under real-world indoor conditions.

- Chapter 5 – Conclusion

This chapter summarizes and integrates the main findings from the community-based analysis (Chapter 3) and the hospital-based investigation (Chapter 4). It highlights the complementary methodological and empirical contributions of the thesis and discusses their implications for health-based noise management and planning.

- Chapter 6 – Further Study

This chapter outlines future research directions focusing on the relationship between urban greenness and community well-being. Using remote-sensing indicators such as the Normalized Difference Vegetation Index (NDVI), future work will explore how green factors—including vegetation coverage, tree density, and landscape quality—may help mitigate the perceived and physiological impacts of environmental noise. This approach aims to promote healthier and more sustainable urban environments through an integrated assessment of noise, greenery, and community health.

## 1.6 Scope, Assumptions and Limitations

This thesis focuses on assessing the impacts of environmental noise exposure on sleep and health in communities and a hospital environment located near Tan Son Nhât International Airport. The scope of the study is defined by the geographical context, the selected study sites, and the applied methodological framework.

First, the community-based analysis is limited to residential areas surrounding Tan Son Nhât Airport and is based on cross-sectional survey data. While structural equation modeling (SEM) is employed to examine complex relationships and indirect pathways among noise exposure, non-acoustic factors, and health-related responses, causal inferences cannot be fully established.

Nevertheless, the SEM framework provides valuable insights into potential mechanisms underlying noise-related health effects in real-world urban settings.

Second, the hospital-based investigation focuses on a single large hospital located near the airport. Although this limits the generalizability of the findings to other healthcare facilities, the selected hospital represents a typical noise-sensitive environment exposed to both external aircraft noise and internal hospital noise sources. The detailed indoor and outdoor noise monitoring, combined with physiological measurements, offers in-depth evidence of actual noise exposure pathways and health responses within hospital settings.

Third, physiological data, including sleep-stage information and heart-rate-variability indicators, were collected using wearable ECG-based devices. While wearable technologies enable continuous and non-invasive monitoring under real-life conditions, they may not capture all aspects of clinical sleep disorders or long-term health outcomes. However, these measurements are suitable for evaluating short-term physiological responses and autonomic nervous system activity related to noise exposure.

Despite these limitations, the defined scope allows for a focused and integrated assessment of aircraft-noise impacts across residential and hospital environments. The findings provide locally relevant evidence that contributes to methodological advancement and empirical understanding of noise-related health effects in developing urban contexts.

### 1.7 Definitions of Key Terms

Abbreviation / Term	Full Term	Description
TSN	Tan Son Nhat International Airport	The main international airport serving Ho Chi Minh City, Vietnam.
Sound Pressure Level (SPL)	—	A logarithmic measure of the effective pressure of a sound relative to a reference value, expressed in decibels (dB). The reference sound pressure in air is 20 $\mu\text{Pa}$ ( $2 \times 10^{-5}$ Pa), corresponding to the approximate threshold of human hearing at 1,000 Hz.
dB (Decibel) Scale	—	A logarithmic scale used to express sound pressure level. A twofold increase in sound energy raises the level by 3 dB, while a tenfold increase raises it by 10 dB, perceived as roughly twice as loud.
A-weighting (dB(A))	—	A frequency weighting applied to sound measurements to approximate the human ear's sensitivity to different frequencies. Most environmental noise measurements are expressed in dB(A).

$L_{Amax}$	Maximum A-weighted Sound Pressure Level	The highest instantaneous A-weighted sound level recorded within a given measurement period. Often used to describe peak noise events such as aircraft flyovers.
$L_{Amin}$	Minimum A-weighted Sound Pressure Level	The lowest instantaneous A-weighted sound level recorded during a given period, reflecting background quietness.
$L_{Aeq}$	Equivalent Continuous A-weighted Sound Level	The energy-averaged sound level over a specified time period, representing the total acoustic energy as if it were a steady sound.
$L_{eq}$	Equivalent Continuous Sound Level	Similar to $L_{Aeq}$ but measured without frequency weighting. When the A-filter is applied, it becomes $L_{Aeq}$ .
$L_{den}$	Day–Evening–Night Level	A 24-hour average A-weighted sound level incorporating time penalties: +5 dB for evening and +10 dB for night-time noise to reflect increased sensitivity during those periods. Commonly used for long-term environmental noise assessment.
$L_{dn}$	Day–Night Level	Similar to $L_{den}$ but applies only the +10 dB night-time penalty, excluding the evening adjustment.
$L_{night}$	Night-time Noise Level	The average A-weighted sound level during night hours (typically 21:00–06:00), used for evaluating sleep disturbance.
WHO	World Health Organization	UN agency responsible for global public-health guidelines, including the 2018 Environmental Noise Guidelines.
QCVN 26:2010/BTNMT	Vietnamese National Technical Regulation on Noise	Defines maximum permissible noise levels for different land-use categories (residential, industrial, and special areas).
HRV	Heart Rate Variability	Variation in the time intervals between consecutive heartbeats; an indicator of autonomic nervous system (ANS) balance and stress regulation.
ECG	Electrocardiogram	A recording of the heart's electrical activity used for HRV analysis.

ANS	Autonomic Nervous System	Controls involuntary physiological functions, including heart rate and sleep regulation.
CAAV	Civil Aviation Authority of Vietnam	The national agency supervising aviation operations, air-traffic management, and airport safety in Vietnam.

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## CHAPTER 2: GENERAL METHODOLOGY

### 2.1 Noise Measurement

To eliminate background noise and focus on aircraft noise, select data that corresponds to aircraft noise by comparing the peak of each event with take-off or landing time according to flight log data provided by the Civil Aviation Authority of Vietnam. The number of flight events was also counted based on this flight log data.

Some noise metrics such as  $L_{Aeq}$ ,  $L_{dn}$ ,  $L_{den}$  were calculated to analyze noise exposure level.

$$L_{Aeq} = 10 \frac{1}{T} \sum 10^{\frac{L_{AE}}{10}}$$

Where  $L_{AE}$  is the measured dB level of a single noise event over a period of one second.

- Daytime Average Noise Level ( $L_{Aeq,d1}$  or  $L_{d1}$ )

$$L_{d1} = 10 \frac{1}{57600} \sum 10^{\frac{L_{AE}}{10}}$$

$L_{AE}$  is  $L_{Aeq}$ 's during the period from 6:00 to 22:00

- Daytime Average Noise Level ( $L_{Aeq,d2}$  or  $L_{d2}$ )

$$L_{d2} = 10 \frac{1}{43200} \sum 10^{\frac{L_{AE}}{10}}$$

$L_{AE}$  is  $L_{Aeq}$ 's during the period from 6:00 to 18:00

- Evening Average Noise Level ( $L_{Aeq,e}$  or  $L_e$ )

$$L_e = 10 \frac{1}{14400} \sum 10^{\frac{L_{AE}}{10}}$$

$L_{AE}$  is  $L_{Aeq}$ 's during the period from 18:00 to 22:00

- Nighttime Average Noise Level ( $L_{Aeq,n}$  or  $L_n$ )

$$L_n = 10 \frac{1}{28800} \sum 10^{\frac{L_{AE}}{10}}$$

$L_{AE}$  is  $L_{Aeq}$ 's during the period from 22:00 to 6:00

- 24-hour Average Noise Level ( $L_{Aeq,24h}$  or  $L_{24h}$ ) is defined in terms of average noise level during 24-hour period of a day.

$$L_{24h} = 10 \frac{1}{86400} \sum 10^{\frac{L_{AE}}{10}}$$

$L_{AE}$  is  $L_{Aeq}$ 's during the period from 0:00 to 23:59

- Day-night Average Noise Level ( $L_{dn}$ ) is applied a 10dB penalty to nighttime noise level.

$$L_{dn} = 10 \frac{1}{86400} \left( 57600 \times 10^{\frac{L_{d1}}{10}} + 28800 \times 10^{\frac{L_n+10}{10}} \right)$$

- Day-Evening-Night Average Noise Level ( $L_{den}$ ) is applied a 5dB penalty to the evening noise level and a 10dB penalty to nighttime noise level.

$$L_{den} = 10 \frac{1}{86400} \left( 43200 \times 10^{\frac{L_{d2}}{10}} + 14400 \times 10^{\frac{L_e+5}{10}} + 28800 \times 10^{\frac{L_n+10}{10}} \right)$$

## 2.2 Noise Estimation

In this study, the noise contour map calculation was performed for Tan Son Nhat International Airport (TSN Airport) using the Integrated Noise Model (INM) [1], a standardized tool developed by the U.S. Federal Aviation Administration (FAA) to evaluate long-term average aircraft noise exposure. The INM is based on the SAE AIR 1845 algorithm [2], which uses Noise–Power–Distance (NPD) data to estimate received noise levels based on aircraft type, thrust setting, operating mode, and source–receiver geometry. The model can output both noise contours and point-based noise levels. Information on airport operations, runway use, flight track geometry, and the number of aircraft movements per track was required as model inputs. However, such detailed operational data were not fully available for TSN Airport due to technical and security restrictions. Therefore, field measurements were conducted to supplement the necessary information, and additional flight data were retrieved from FlightRadar24 [4] to validate the operational patterns and aircraft types observed during the measurement period.

Flight-track data for civil aircraft were obtained using an Automatic Dependent Surveillance–Broadcast (ADS-B) receiver installed near the airport area. While ADS-B effectively captured flight paths and altitudes of civil aircraft, it could not detect military operations, as most military aircraft lack ADS-B transmitters. The Noise–Power–Distance (NPD) data, representing the relationship between the noise level and the slant distance from the aircraft to the receiver, were mainly taken from the INM database [1]. However, several aircraft types operating at TSN were not represented in the default dataset. For such cases, site-specific data obtained from field measurements and the verified aircraft list from FlightRadar24 [4] were used to refine aircraft categorization and operational inputs to the model.

Based on flight records and ADS-B data, daily aircraft operations were classified into day (06:00–18:00), evening (18:00–22:00), and night (22:00–06:00) periods according to ICAO definitions [2]. Each aircraft type was assigned to its corresponding runway and operation period, and the processed data were entered into INM to generate daily noise contour maps. From these outputs, day–evening–night average noise levels ( $L_{den}$ ) and night-time noise levels ( $L_{night}$ ) were obtained.

The resulting contours provided a quantitative basis for evaluating community and hospital exposure to aircraft noise around TSN Airport and for validating measurement-based results presented in later chapters.

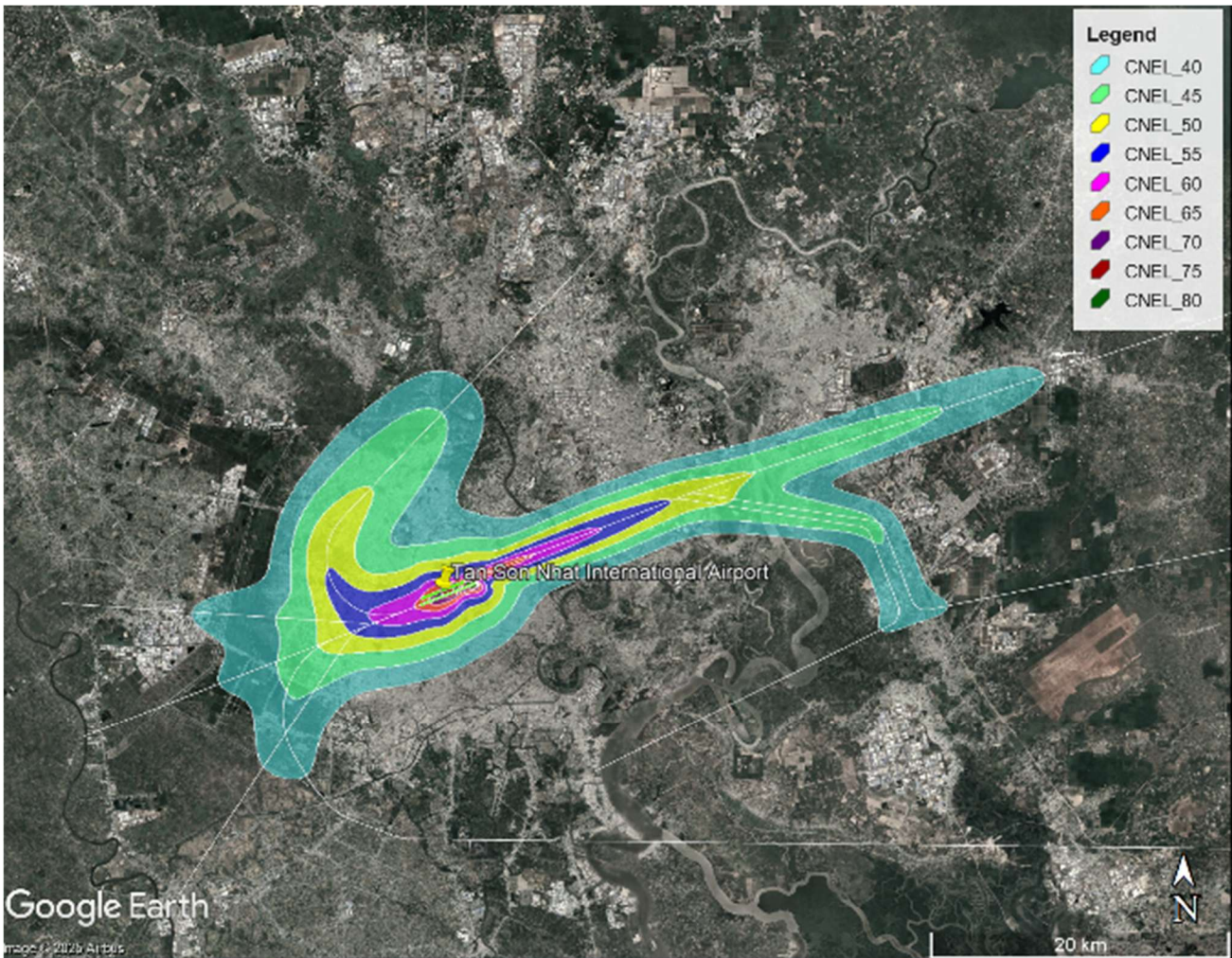


Figure 3. Example of modeled flight tracks and noise contours at Tan Son Nhat Airport (INM 7.0) (Prepared by author)

## 2.3 Statistical Analysis

### 2.3.1 Multiple Regression Analysis

Statistical analyses were performed using the JMP statistical software package [5]. The multiple logistic regression model was applied to examine associations between aircraft noise exposure, community responses, and health outcomes of respondents living around TSN Airport.

JMP is a suite of computer programs for statistical analysis developed by the JMP Division of SAS Institute. It was first launched in 1989 for the Macintosh system and later rewritten for Windows. JMP is widely used in research, quality control, design of experiments, and data visualization across science, engineering, and social sciences [6,7].

Logistic regression is a statistical model that, in its basic form, uses a logistic function to model a binary dependent variable, although many more complex extensions exist. In regression analysis, logistic regression (or logit regression) estimates the parameters of a logistic model (a form of binary regression). Mathematically, a binary logistic model has a dependent variable with two possible values, such as pass/fail, which is represented by an indicator variable, where the two values are labeled "0" and "1". In the logistic model, the log-odds (the logarithm of the odds) for the value labeled "1" is a linear combination of one or more independent variables ("predictors"); the independent variables can each be a binary variable (two classes, coded by an indicator

variable) or a continuous variable (any real value). The corresponding probability of the value labeled "1" can vary between 0 (certainly the value "0") and 1 (certainly the value "1"), hence the labeling; the function that converts log-odds to probability is the logistic function, hence the name. The unit of measurement for the log-odds scale is called a logit from the logistic unit, hence the alternative names. Analogous models with a different sigmoid function instead of the logistic function can also be used, such as the probit model; the defining characteristic of the logistic model is that increasing one of the independent variables multiplicatively scales the odds of the given outcome at a constant rate, with each independent variable having its own parameter; for a binary dependent variable, this generalizes the odds ratio. The description of logistic regression models and odds ratio interpretation follows standard formulations commonly used in epidemiological and biostatistical studies [8,22].

The odds ratio (OR) is the odds of disease among exposed individuals divided by the odds of disease among unexposed individuals. In other words, OR measures the association between exposure (i.e., vibration, noise) and outcomes (i.e., high annoyance) [8].

The ratio of the odds of an event occurring in one group to the odds of it occurring in another group is counted by the equation below.

$$OR = (a.d)/(b.c)$$

Where a is number of people that had a disease outcome

b is number of people that didn't have a disease outcome

c is number of people unexposed to the risk

d is number of people that had disease outcome (among those unexposed to the risk)

If  $OR=1$ , there is no association between exposure and outcome

$OR>1$ , there is a positive relationship between exposure and outcome.

$OR<1$ , there is a negative relationship between exposure and outcome.

### 2.3.2 Structural Equation Modeling

The Structural Equation Model (SEM) technique is a multivariate statistical method that integrates multiple regression and factor analysis to examine relationships among both observed and latent variables [9]. In SEM, Confirmatory Factor Analysis (CFA) is used to evaluate how well the measured variables represent the underlying unobserved constructs, thereby testing the theoretical model fit to the observed data. Each latent variable is assumed to be associated with a specific set of measured indicators.

In this study, SEM was applied to investigate the effects of aircraft noise reduction and non-acoustic factors on community responses. The correlations between acoustic and non-acoustic variables were modeled to identify both direct and indirect pathways influencing annoyance and sleep disturbance. Annoyance was conceptualized as a multidimensional construct combining emotional, attitudinal, cognitive, and behavioral responses to environmental noise [10].

Furthermore, night-time environmental noise has been shown to affect sleep, including both immediate physiological effects and self-reported sleep quality [11]. The objective was to establish a unified model to compare community responses to aircraft noise before and after noise exposure changes, and to clarify the perceived benefits of noise reduction among residents of Ho Chi Minh City.

The SEM analyses were conducted using IBM SPSS AMOS Version 26 software (IBM Corp., New York, USA) [12]. AMOS (Analysis of Moment Structures) is specifically designed to perform SEM by providing graphical modeling tools and parameter estimation procedures that handle complex relationships more effectively than conventional regression analysis. Unlike standard SPSS procedures, AMOS can estimate intermediate (mediating) and multiple dependent variables simultaneously, making it well suited for modeling the interdependencies among acoustic and psychological factors.

Model performance was assessed using the Goodness-of-Fit indices, which determine whether the proposed model adequately represents the observed data. Four commonly reported indices were used:

- Chi-square ( $\chi^2$ ) — tests the difference between observed and estimated covariance matrices.
- Goodness-of-Fit Index (GFI) reflects the proportion of variance accounted for by the estimated population covariance; values  $\geq 0.90$  indicate a good fit [13];
- Comparative Fit Index (CFI) compares the fit of the target model to an independent baseline model; values  $\geq 0.90$  denote acceptable fit and  $\geq 0.95$  excellent fit [14];
- Root Mean Square Error of Approximation (RMSEA) measures the discrepancy per degree of freedom, with values  $\leq 0.08$  representing an acceptable fit and  $\leq 0.05$  indicating a close fit [15].

These indices collectively ensure that the developed SEMs accurately describe the relationships between aircraft noise exposure, non-acoustic mediators, and health-related responses of residents around TSN Airport.

## 2.4 Health Indices and Outcome Measures

All response data were coded in binary form (1 = positive, 0 = negative) for statistical analyses. Multiple logistic regression models were then applied to examine the relationships between aircraft noise levels and these health-related response variables.

### *Annoyance*

Annoyance was assessed using an 11-point numerical scale (0 = “not at all” to 10 = “extremely”) proposed by the *International Commission on Biological Effects of Noise (ICBEN)*, with wording consistent with *ISO 15666* except that the evaluation period referred to “the last one month” instead of “the last 12 months” [19,20].

The percentage of highly annoyed respondents (%HA) was calculated as the proportion of individuals who selected 8, 9, or 10 on the scale.

**Thinking about the last 4 months or so, what number from 0 to 10 best shows how much you are bothered, disturbed, or annoyed by aircraft noise?**

0	1	2	3	4	5	6	7	8	9	10
Not at all								Extremely		

### *Insomnia*

Sleep-disturbance questions followed the framework of the *International Institute of Sleep* (Kuwano et al., 2014) [21]. Respondents reported the frequency of each symptom using three

categories:

1 = Occasionally, 2 = Once or twice a week, 3 = More than three times a week.

Sleep-related effects were defined as follows [16-18]:

- **Difficulty initiating sleep:** Trouble falling asleep  $\geq 3$  times/week and daytime sleepiness  $\geq 3$  times/week.
- **Difficulty maintaining sleep:** Trouble returning to sleep after awakening  $\geq 3$  times/week and daytime sleepiness  $\geq 3$  times/week.
- **Premature waking:** Early awakening  $\geq 3$  times/week and daytime sleepiness  $\geq 3$  times/week.
- **Feeling of light overnight sleep:** Poor sleep quality the next morning  $\geq 3$  times/week and daytime sleepiness  $\geq 3$  times/week.
- **Insomnia:** Presence of any of the above symptoms.

The percentage of insomnia (%ISM) was used as an indicator of sleep disturbance.

Please answer this question concerning your sleep:  
 (1) Do you have any trouble with your sleep?

1) No

2) Yes

(2) If you answered “Yes” to the above question, please choose appropriate numbers for each item.

	1	2	3
	Occasionally	Once or twice a week	More than 3 times a week
(1) Difficult to fall asleep	( )	( )	( )
(2) When awakened during the night, it is difficult to sleep again.	( )	( )	( )
(3) Awakened early in the morning	( )	( )	( )
(4) Do not feel as having slept well the next morning.	( )	( )	( )
(5) Sleepy during daytime and cannot work well	( )	( )	( )
(6) Others (            )	( )	( )	( )

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## CHAPTER 3: NOISE EXPOSURE AND COMMUNITY RESPONSES AROUND TAN SON NHAT AIRPORT

*This chapter is primarily based on and extends the author's previously published studies reported in [32] and [33], which investigated community responses to aircraft noise exposure around Tan Son Nhat Airport using structural equation modeling.*

### 3.1 Introduction

Aircraft noise is one of the major environmental problems affecting people who live near airports. Many studies have shown that long-term exposure to aircraft noise can disturb sleep, cause annoyance, and increase risks of high blood pressure and heart disease [1–10]. Nighttime aircraft noise often interrupts sleep, reduces the amount of deep and REM sleep, and leads to tiredness during the day. Continuous exposure can also increase stress and inflammation in the body, which may harm cardiovascular health [3,7]. In addition, many residents report strong annoyance and stress from aircraft noise, which can further lower their quality of life.

The World Health Organization (WHO) recommends that nighttime aircraft noise levels ( $L_{\text{night}}$ ) should be below 40 dB to protect health [11]. Meta-analyses including more than 170,000 people worldwide have confirmed that aircraft noise exposure is related to sleep disturbance, especially at higher noise levels [12,13]. Similar patterns have been found in both European and Asian studies, suggesting that people everywhere react in comparable biological ways to aircraft noise [4,5].

Developed countries have created detailed systems to manage aircraft noise, such as night-flight restrictions, airport zoning, and sound-insulation programs [14]. However, many developing countries, including Vietnam, do not yet have special laws or policies to control aircraft noise. Although some Vietnamese data (from Hanoi, Ho Chi Minh City, and Da Nang) were used in the WHO guidelines [15–21], local results do not always match WHO standards. This shows that non-acoustic factors—like culture, lifestyle, and personal sensitivity—also affect how people feel about noise. As air traffic continues to increase in Asia, it is important to make new policies that consider both acoustic and social factors.

Tan Son Nhat International Airport (TSN), located in the center of Ho Chi Minh City, is the busiest airport in Vietnam and creates high noise exposure for nearby residents. During the COVID-19 pandemic in 2020, flight operations dropped sharply, and noise levels temporarily decreased. This unusual event offered a chance to study how reduced aircraft noise affects community health and perception. The study entitled “Models of Aviation Noise Impact in the Context of Operation Decrease at Tan Son Nhat Airport” [32] analyzed questionnaire survey data collected before the pandemic (2019) and during the period of significant operation reduction (2020). Using structural equation modeling, that study examined short-term changes in annoyance and sleep disturbance under markedly different aircraft-noise conditions and demonstrated improvements in perceived well-being during periods of reduced flight activity.

The present work, “Assessing Annoyance and Sleep Disturbance Related to Changing Aircraft Noise Context: Evidence from Tan Son Nhat Airport” [33], expands this earlier analysis by extending the observation period from 2019 to 2023, covering the pre-pandemic, pandemic, and post-pandemic recovery phases. While also applying structural equation modeling, the present study adopts an extended SEM framework by incorporating additional non-acoustic factors and

examining both direct and indirect pathways linking aircraft-noise exposure and health-related responses over changing noise contexts. This extended approach enables the investigation of not only short-term reactions to noise reduction but also more stable and evolving exposure–response mechanisms as air traffic gradually returned to normal.

By combining noise-measurement data and social-survey data within this extended analytical framework, this chapter clarifies how both acoustic exposure and individual and contextual factors jointly influence annoyance and sleep disturbance in residential communities. The findings contribute to a deeper understanding of aircraft-noise impacts in developing urban areas and provide locally relevant evidence to support more effective and health-oriented noise management strategies.

### 3.2 Methods

#### 3.2.1 Study Design and Survey Areas

The study around Tan Son Nhat International Airport (TSN) was designed as a long-term follow-up investigation to evaluate changes in aircraft noise exposure and community responses before, during, and after the COVID-19 pandemic.

The first survey was conducted in 2019, representing the pre-pandemic baseline when air traffic operated normally. After the national lockdown began in early 2020, three additional surveys were carried out to track environmental and health responses at different recovery stages:

- The second survey (approximately 3 months after the lockdown),
- The third survey (6 months after the lockdown), and
- The fourth survey (three years after the lockdown).

These repeated surveys made it possible to compare changes between periods of reduced aircraft activity and the post-pandemic recovery phase, clarifying both short-term and long-term effects of changing noise exposure on annoyance and sleep disturbance.

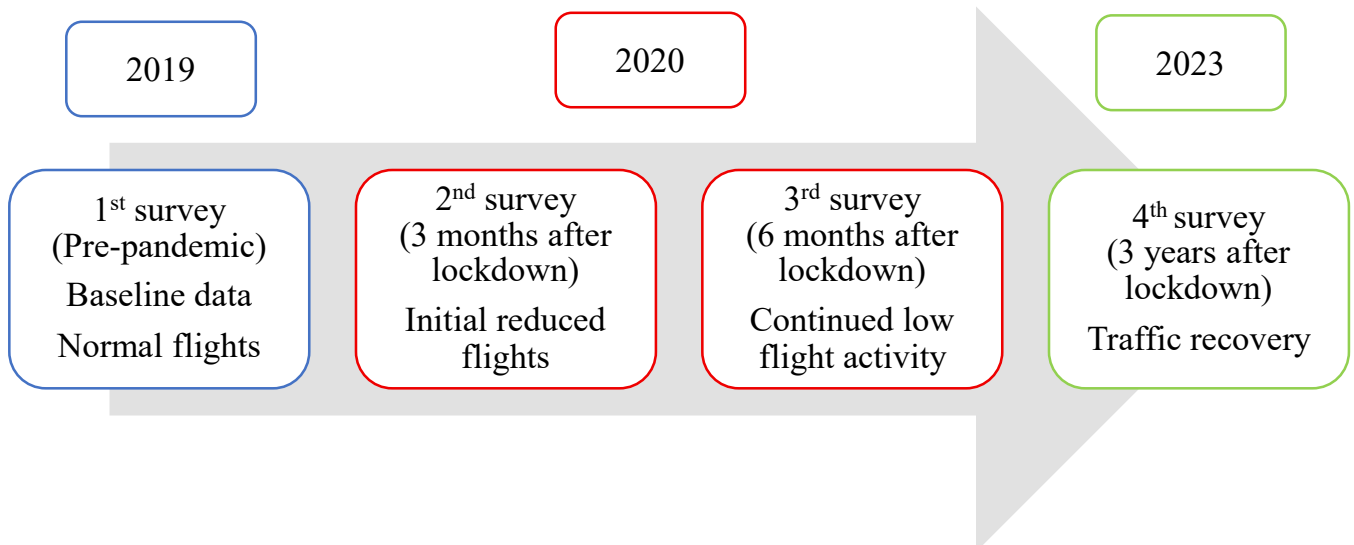


Figure 4. Study Plan of Community Surveys around Tan Son Nhat Airport ( Prepared by the author)

TSN has two parallel runways (07L–25R and 07R–25L) running in an east–west direction. A total of 12 survey sites (S1–S12) were selected to represent a wide range of exposure conditions:

- S1–S5: under the landing path,
- S6–S9: under the takeoff path,
- S10: located south of the runway, and
- S11–S12: control areas with minimal aircraft noise influence.

The sites were positioned at different distances from the runway to ensure a wide variation in measured noise levels. The 2<sup>nd</sup> and 3<sup>rd</sup> surveys focused on evaluating the health effects of temporary noise reduction, while the 4<sup>th</sup> survey (August 2023) assessed community responses after the resumption of normal flight operations.

This stepwise study design made it possible to examine how residents' perceptions changed over time and to evaluate the long-term effects of fluctuating aircraft noise exposure on annoyance, sleep quality, and health outcomes around TSN Airport.



Figure 5. Map of survey sites (Sites 1-12) (Base map prepared by the author; site layout adapted from [32]; updated with 2023 survey coverage from [33]).

### 3.2.2 Noise Exposure Assessment

Noise exposure levels for all survey periods were estimated using the Integrated Noise Model (INM) version 7.0, with calculated exposure values assigned to each household in the study area. Two key indicators were analyzed: the day–evening–night-weighted sound level ( $L_{den}$ ) and the night-time equivalent continuous sound level ( $L_{night}$ ), both derived from noise contour maps generated by the INM.

Flight operation data were obtained from the airport office using an ADS-B (Automatic Dependent Surveillance–Broadcast) system, which provided detailed aircraft route information for modeling. Because of prevailing wind conditions, most takeoffs and landings at TSN occur toward the west. The estimation was based on seven days of flight records, which were compared with seasonal averages to ensure that the data represented typical noise conditions. These flight logs, including

aircraft types, numbers, and operation times, were used to create noise contour maps and calculate average  $L_{den}$  and  $L_{night}$  values.

During the 2019 baseline survey, on-site noise measurements were carried out continuously for seven days to verify and calibrate the model results. Measurements were made using sound level meters (NL-42, RION, Tokyo, Japan) with 10-second sampling intervals. Microphones were installed on rooftops, placed 1.5 m above the surface and at least 1 m from reflecting structures, and protected with all-weather wind screens. Flight data obtained from the airport office were synchronized with the measured results to confirm the accuracy of the INM predictions. A single representative exposure value was assigned to each measurement site for comparison between predicted and observed data. For further analysis, the modeled exposure values were used as the main dataset.

### 3.2.3 Questionnaire Survey

A questionnaire survey was conducted through face-to-face interviews with one adult participant per household, carried out on weekends within the selected survey areas. Interviewers visited all residences to collect responses. The survey design followed the standards of ISO/TS 15666 [22] and aimed to investigate the impact of aircraft noise exposure together with other factors that could influence residents’ social and health-related responses.

Two main outcome variables were examined:

- i) Annoyance: Annoyance was evaluated based on the percentage of respondents who were highly annoyed (%HA), defined as those selecting 8, 9, or 10 on an 11-point numerical rating scale.
- ii) Insomnia: The Insomnia Symptom Questionnaire (ISQ) [23,24] was used to identify individuals with insomnia (%ISM). Participants were classified as having insomnia if they reported difficulty falling or staying asleep, excessive daytime sleepiness more than three times per week, and at least one additional insomnia symptom occurring more than three times per week.

In addition, information on residents’ self-reported health conditions was collected to assess the broader health effects of aircraft noise exposure around TSN Airport. The analysis compared results from multiple survey years to identify changes and trends in annoyance, sleep disturbance, and insomnia associated with varying noise levels.

Table 1. The questions and scales used to assess annoyance, sleep disturbance and insomnia in the surveys. (Table structure adapted from [32,33])

<p>Annoyance</p> <p>Question: Thinking about the last 12 months (1<sup>st</sup> survey and 4<sup>th</sup> survey)/three months (2<sup>nd</sup> survey)/four months (3<sup>rd</sup> survey), or so, what number from 0 to 10 best shows how much you are bothered, disturbed, or annoyed by aircraft noise?</p> <p>Evaluation scale: 11-point numerical scale: from 0 (not annoyed at all) to 10 (extremely annoyed)</p>
<p>Insomnia</p> <p>Question: Please answer this question regarding your sleep:</p>

(a) Do you have any trouble sleeping? No/Yes

(b) If you answered "Yes" to the above question, please choose the corresponding alternative (Alternatives: Rarely or not at all, once or twice a week, More than three times a week) for the following item: (1) Difficult to fall asleep; (2) When awakened during the night, it is difficult to sleep again; (3) Awakened early in the morning; (4) Do not feel as having slept well the next morning; (5) Sleepy during daytime and cannot work well; (6) Others

Evaluation scale: 1: have no insomnia symptom (\*), 2: have insomnia symptom

(\*) Respondents with insomnia symptoms responded affirmatively to question (a): Do you have any trouble with your sleep? And (5) sleepiness during daytime and inability to work well more than three times a week; and had experienced at least one of the other symptoms (1)– (4) more than three times per week.

### 3.3 Results

#### 3.3.1 Demographic Characteristics of Respondents

Table 2 summarizes the demographic characteristics of respondents from all surveys conducted around TSN, with response rates ranging from 28.9% to 70.8%. The June 2020 survey recorded the lowest response rate (28.9%), mainly due to the COVID-19 pandemic, which disrupted daily life and limited people’s ability to participate. Despite this fluctuation, response rates in the other surveys remained relatively high.

In all surveys, the proportion of women was slightly higher than that of men, and this trend remained consistent over time. Respondents aged over 60 years accounted for less than 30% of the total sample in all survey periods, reflecting Vietnam’s generally younger population structure.

No significant differences were found in demographic composition between the before and after surveys, indicating that the sample populations remained stable despite pandemic-related challenges. These demographic trends are consistent with the overall population profile of Vietnam, which features a young demographic and a slightly higher proportion of women [25].

Table 2. Demographic Data of Respondents (TSN survey data per [32,33])

	2019	2020 June	2020 Sep	2023Aug	Census (2019) *	
Number of respondents	502	145	519	329		
Response rate (%)	60.3	28.9	68.6	70.8		
Sex	Male	46.2	46.5	49.2	48.0	49.9
	Female	53.8	53.5	50.8	52.0	50.1
Age	<60 years old	81.9	70.6	89.9	90.9	88.1
	≥60 years old	18.1	29.4	10.1	9.1	11.9

(\*): Adapted with permission from ref. [25] Copyright by General Statistics Office of Vietnam

### 3.3.2 Change in Flight Operations and Noise Levels

Table 3 summarizes the average number of daily flights recorded during the four survey periods. The number of aircraft operations at TSN fluctuated considerably across the study timeline. In 2019, daily flight operations reached approximately 728 flights, resulting in high aircraft noise exposure levels for surrounding communities. However, following the government’s decision in March 2020 to suspend international flights due to the COVID-19 pandemic, flight activity dropped sharply.

During the second survey period (June 2020), the number of daily flights decreased to 413, and further declined to 299 by the third survey (September 2020). This additional reduction corresponded with the resurgence of COVID-19 cases in July 2020, which led to stricter domestic flight restrictions. By 2023, flight operations had nearly returned to pre-pandemic levels, approaching the 728 flights per day recorded in 2019.

Table 4 presents the estimated aircraft noise exposure levels for all survey periods, using measured 2019 data to validate the INM-based estimations. Fluctuations in flight numbers directly influenced aircraft noise levels around TSN, showing a clear reduction during the pandemic and a gradual recovery as flight operations resumed.

The noise contour maps illustrate changes in the 55 dB  $L_{den}$  area across all survey periods (Figure 6). Areas with  $L_{den} > 55$  dB were consistently broader under the departure paths, indicating higher noise levels during takeoff compared with landing. The variation in noise levels among the survey periods was also more pronounced at sites located under departure routes. In line with flight operation trends, the  $L_{den}$  contours contracted during 2020 and expanded again by 2023, confirming the recovery of aircraft activity.

Similarly, the nighttime noise maps show the spatial distribution of areas exceeding 40 dB  $L_{night}$  across the four survey periods (2019, 2020-June, 2020-September, and 2023-August) (Figure 7). Regions exceeding 40 dB  $L_{night}$  were mainly concentrated along both departure and arrival paths, but remained noticeably wider under departure routes, reflecting more intense noise emissions during takeoff.

During the year of the pandemic (2020), particularly in June and September, these contours narrowed substantially, indicating a significant reduction in nighttime noise exposure. This pattern corresponds with the sharp decrease in nighttime flight operations—from 133 flights per night in 2019 to only 37 in September 2020 (Table 3). By August 2023, the nighttime noise contours expanded again, resembling 2019 levels, consistent with the recovery of nighttime flights (145 per day).

Residential and populated areas located beneath or adjacent to these contours are therefore likely subjected to chronic nighttime noise exposure, which may contribute to sleep disturbance, annoyance, and potential long-term health impacts among nearby communities.

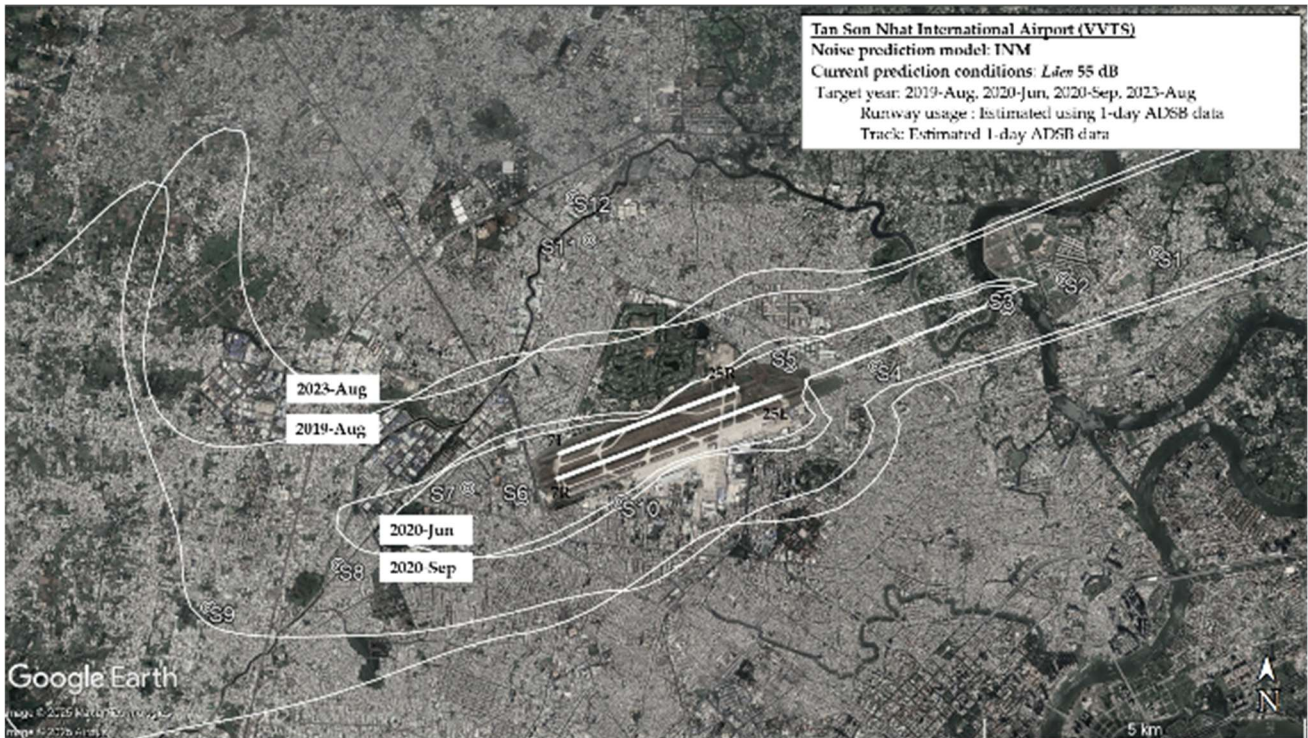
Table 3. The average number of daily flight operations (ADS-B and Flight logs; 2019–2020 summarized in [32]; 2023 update from [33]).

Time Period	Operation Models	TSN Surveys			
		2019	2020-Jun	2020-Sep	2023-Aug
Day (6:00–18:00)	Arrival	214	140	86	206

	Departure	244	166	121	223
	Total	458	306	207	429
Evening (18:00–22:00)	Arrival	73	45	35	78
	Departure	64	23	20	72
	Total	137	68	55	150
Night (22:00–6:00)	Arrival	77	20	19	76
	Departure	56	19	18	69
	Total	133	39	37	145
All day	Arrival	364	205	140	360
	Departure	364	208	159	365
	Total	728	413	299	725

Table 4. Estimated aircraft noise levels (2019–2023), with measured values shown in parentheses for 2019. (INM v7.0; model–measurement verification for 2019 per [32]; extended estimates for 2023 per [33]).

Sites	Day-Evening-Night Noise Level ( $L_{den}^a$ )				Night Noise Level ( $L_{night}^b$ )			
	2019	2020-Jun	2020-Sep	2023-Aug	2019	2020-Jun	2020-Sep	2023-Aug
1	64 (66)	61	60	63	57(59)	52	52	55
2	65(68)	61	61	64	58(61)	52	53	56
3	66(NA)	60	59	64	58(NA)	51	51	56
4	63(NA)	57	56	61	55(NA)	48	49	54
5	81(79)	76	73	79	74(72)	67	66	72
6	74(74)	71	69	67	66(67)	61	61	59
7	70(70)	65	64	65	62(63)	56	56	57
8	66(NA)	62	62	61	58(NA)	53	54	53
9	64(65)	59	60	56	56(57)	50	52	47
10	67(64)	62	65	68	60(55)	54	57	60
11	47(46)	43	43	47	40(37)	34	36	39
12	45(44)	41	41	45	38(36)	33	34	37



Note: <sup>a</sup> Day-evening-night-weighted sound pressure level ( $L_{den}$ )  
<sup>b</sup> Night-time equivalent continuous sound pressure level ( $L_{night}$ )  
 Values in parentheses for 2019 indicate measured data. "NA" = Not Available

Figure 6. Noise contours of TSN Airport delineate the areas exposed to day-evening-night noise levels exceeding 55 dB across all survey periods (Contours computed with INM v7.0; 2019–2020 presentation per [32]; 2023 update per [33]).

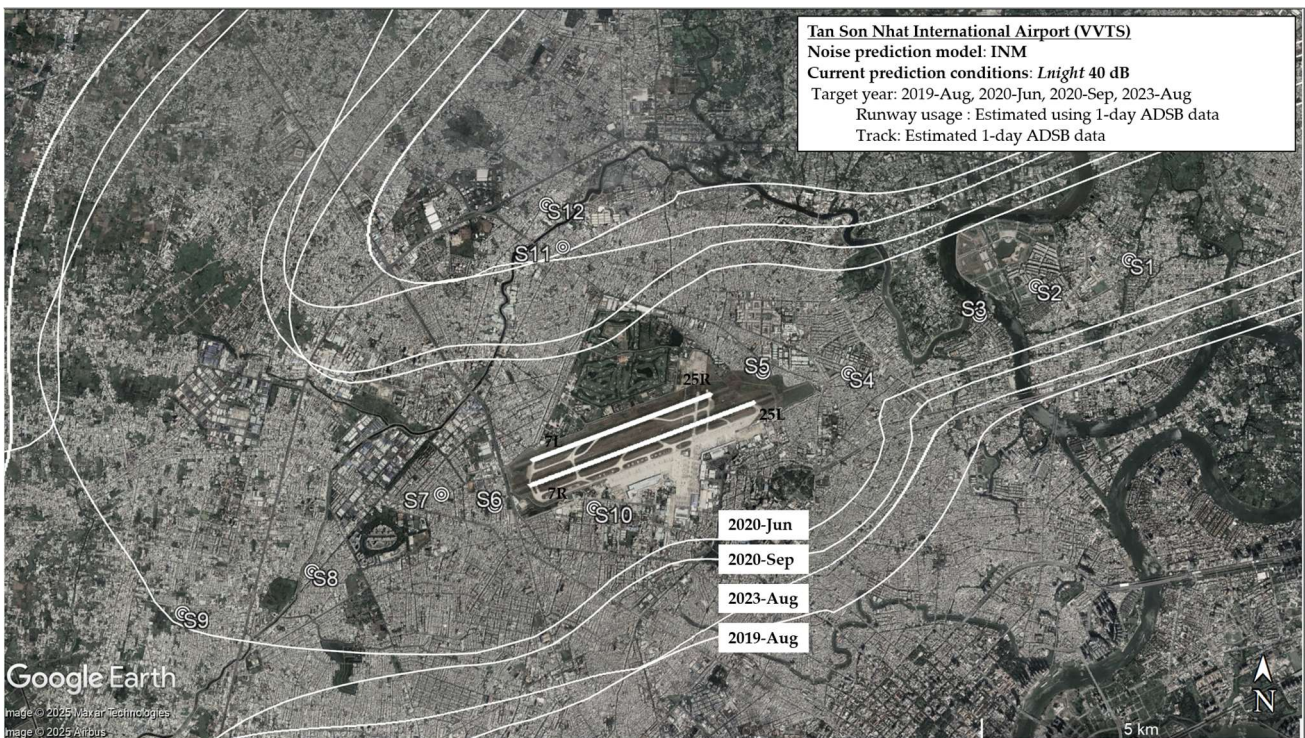


Figure 7. Noise contours of TSN Airport delineate the areas exposed to nighttime noise levels exceeding 40 dB across all survey periods (Contours computed with INM v7.0; 2019–2020 presentation per [32]; 2023 update per [33]).

### 3.3.3 Exposure-Annoyance Relationships

Figure 8 illustrates the exposure–response relationships between aircraft noise ( $L_{den}$ ) and the percentage of highly annoyed residents (%HA). Logistic regression curves were developed for each of the four survey periods at TSN and compared with the WHO (2018) reference curve.

The results show a distinct temporal variation in the  $L_{den}$ –%HA relationships across survey years. The 1<sup>st</sup> survey (August 2019) represents the pre-pandemic baseline, reflecting the typical relationship under normal flight activity. In the 2<sup>nd</sup> survey (June 2020), despite the significant reduction in  $L_{den}$  values caused by widespread flight suspensions during the COVID-19 pandemic, the %HA was unexpectedly higher than in 2019. This increase may be associated with heightened stress and uncertainty during the lockdown, as well as residents spending more time at home and becoming more aware of environmental noise.

During the 3<sup>rd</sup> survey (September 2020), the annoyance curve shifted markedly downward, especially within the 50–70 dB range, even though noise exposure levels changed only slightly. This suggests a degree of adaptation or reduced sensitivity to aircraft noise as the pandemic situation stabilized.

By the 4<sup>th</sup> survey (August 2023), the annoyance curve rose again, approaching the WHO (2018) reference pattern. This reflects both the recovery of flight operations to pre-pandemic levels and the return of community perception to typical pre-COVID responses. Overall, these temporal changes demonstrate that non-acoustic factors, such as psychological stress and lifestyle conditions, can strongly influence noise annoyance independent of actual exposure levels.

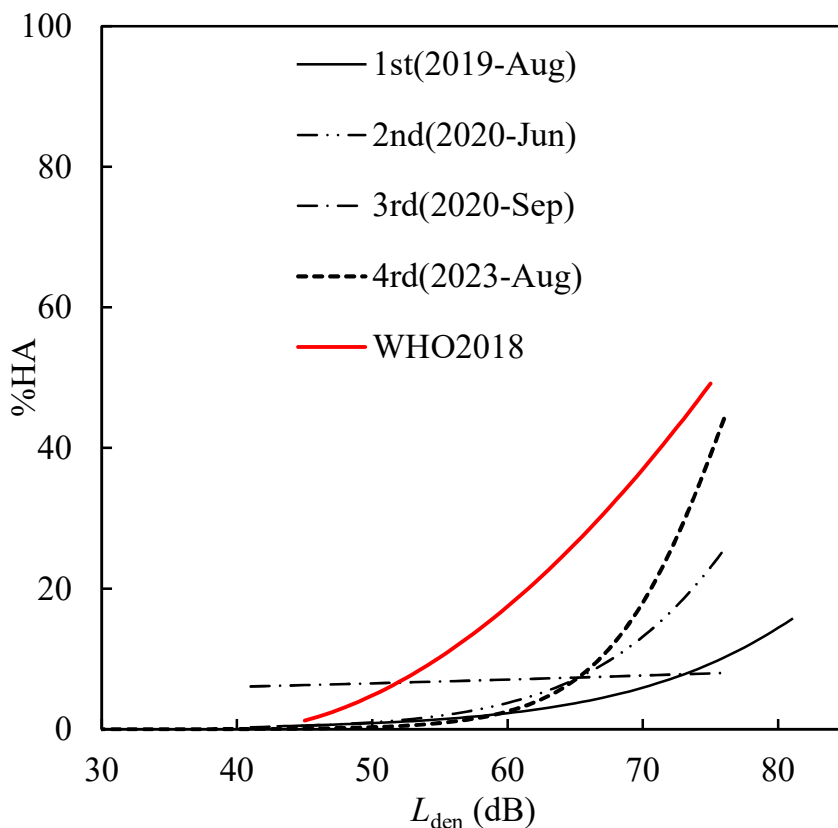


Figure 8. Comparison of  $L_{den}$ –% HA relationships for each survey, with WHO (2018) reference for comparison. (Logistic fits per survey; WHO curve shown for reference only). [1,32,33]

### 3.3.4 Exposure-Sleep Disturbance Relationships

Figure 9 shows the exposure–response relationships between night-time noise level ( $L_{\text{night}}$ ) and the percentage of respondents reporting insomnia (%ISM). The overall patterns resemble those of the %HA data, but with a few distinct differences. From the 1<sup>st</sup> to 3<sup>rd</sup> surveys, the %ISM curves remain nearly flat, suggesting that sleep disturbance was relatively insensitive to short-term changes in night-time noise levels, or that residents maintained a degree of resilience during the pandemic. In contrast, the 4<sup>th</sup> survey (August 2023) shows a marked increase in %ISM across all  $L_{\text{night}}$  levels, implying that sleep sensitivity rose substantially in the post-pandemic period. This could reflect disrupted circadian rhythms, the return to regular working hours, or persistent psychological stress following the pandemic.

The exposure–response curves obtained in this study were also compared with the WHO (2018) reference curve for highly sleep-disturbed individuals (%HSD). It should be noted that while the WHO guideline defines %HSD based on objective sleep disturbance measures, this study employed %ISM, which reflects self-reported insomnia symptoms. Therefore, the comparison serves as a qualitative indicator rather than a direct equivalence.

As shown in Figure 9, the 4<sup>th</sup> survey (August 2023) curve rises sharply with increasing  $L_{\text{night}}$ , approaching—and at higher exposure levels, even slightly exceeding—the WHO 2018 %HSD reference. This suggests that post-pandemic lifestyle adjustments may have heightened community sleep vulnerability to environmental noise. In contrast, the 2020 surveys (2<sup>nd</sup> and 3<sup>rd</sup>) display flatter response patterns, possibly due to altered daily routines and reduced cumulative exposure to transportation noise sources during COVID-19 restrictions.

Across all four surveys around TSN, both %HA and %ISM values remained consistently lower than the WHO (2018) reference curves, despite noticeable temporal variations. This finding aligns with previous studies conducted in stable noise environments [5], but in the case of TSN, the results likely reflect contextual influences. Since TSN is located within the dense urban core of Ho Chi Minh City, residents are regularly exposed to high background noise, particularly from road traffic, which may increase tolerance and reduce perceived disturbance from aircraft noise.

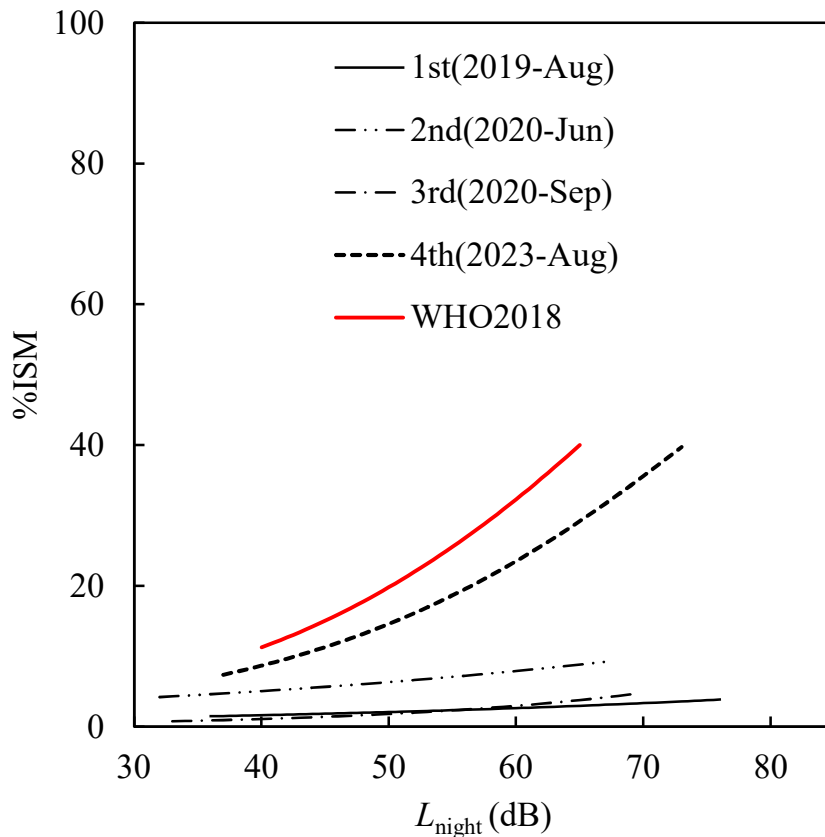


Figure 9. Comparison of  $L_{\text{night}}$  – %ISM relationships for each survey, (Logistic fits per survey; WHO curve shown for reference only). [1,32,33]

### 3.3.5 Influence of Non-Acoustic Factors

#### 3.3.5.1 Multiple logistic regression models

To further explore the patterns of exposure-response relationships, the TSN survey model incorporated non-acoustic factors to examine how residents' reactions to noise changed over time and explain why lower annoyance and insomnia responses were observed compared to WHO 2018 reference curves. Multiple logistic regression models were constructed to examine the effects of non-acoustic factors. Data on non-acoustic factors collected in the surveys include residential environment, individual characteristics, and attitudes, all believed to influence reactions to aircraft noise. All statistical analyses were conducted using JMP 13.0. It should be noted that the data from the second survey conducted in June 2020 were not included in the analysis, as the low response rate produced an insufficient and statistically unreliable dataset compared to the other survey waves.

Initially, analyses were conducted by incorporating independent variables comprising both noise levels and non-acoustic factors. The goal was to create models that offer the best overall measure of fit for data obtained at TSN, including variables significantly related to the likelihood of annoyance and insomnia. Consequently, separate models were developed for the TSN surveys, with different variables used to construct each regression model (Tables 5 and 6). Only non-acoustic factors that showed significant associations with annoyance and insomnia were retained in the final models, while basic demographic attributes such as age and gender were excluded due to lack of significance.

In this analysis, the dependent variable was binary (1 = “highly annoyed”/ 0 = “not highly annoyed” or 1 = “have insomnia symptom”/0 = have no insomnia symptom”). The independent variables included a continuous variable for noise exposure ( $L_{den}/L_{night}$ ) and other nominal (dummy-coded) non-acoustic variables. To examine changes in annoyance and insomnia over time, the survey year was included as a nominal variable. Specifically, the outcomes from the 3<sup>rd</sup> and 4<sup>th</sup> surveys were compared against the 1<sup>st</sup> survey, which served as the reference category. This approach allowed the analysis to identify whether significant differences in annoyance or insomnia existed in later surveys relative to the baseline (1<sup>st</sup> survey), without assuming a linear trend across all survey years.

(i) Annoyance model:

Non-acoustic factors such as short residence duration ( $p \leq 0.05$ ), poor views ( $p \leq 0.001$ ), and small floor area ( $p \leq 0.001$ ) were associated with higher prevalence of annoyance. These findings indicate that residential conditions and visual environment play an important role in shaping noise annoyance responses. Regarding survey factors, the 3<sup>rd</sup> survey (September 2020) showed a marginally significant increase in the likelihood of being highly annoyed compared to the 1<sup>st</sup> survey ( $p \leq 0.05$ ), while the 4<sup>th</sup> survey (2023) did not show a statistically significant difference. A key finding was the interaction between noise exposure and survey factors ( $L_{den} \times Survey$ ). The interaction term between  $L_{den}$  and the 3<sup>rd</sup> survey was statistically significant ( $p \leq 0.05$ ), and the interaction with the 4<sup>th</sup> survey was even more significant ( $p \leq 0.01$ ). These results indicate that the effect of survey year on annoyance varies with the noise level: as noise exposure decreases, the effect of the survey factor increases, and vice versa. Notably, the negative coefficient for the interaction with the 3<sup>rd</sup> survey suggests that the influence of survey-related factors was stronger at lower noise levels.

These findings point to complex, time-dependent factors influencing annoyance, and suggest that even in contexts of reduced noise exposure (e.g., in 2020 and 2023), other environmental or social variables may sustain or elevate annoyance levels.

Table 5. The multiple logistic regression of annoyance (Generalized R2: 0.1445; AUC: 0.7596), (based on TSN datasets [33])

Item	Category	Estimate	Std Error	p-Value	Odds Ratio	Lower 95%CI	Upper 95%CI
Intercept		-8.023	1.495	<.0001			
$L_{den}^a$		0.090	0.022	<.0001	1.094 <sup>b</sup>	1.048	1.142
Survey factor	1 <sup>st</sup> survey				1		
	3 <sup>rd</sup> survey	0.419	0.216	*	2.864	1.298	6.317
	1 <sup>st</sup> survey				1		
	4 <sup>th</sup> survey	0.215	0.240	0.3697	2.336	0.982	5.554
$L_{den}^a \times Survey$ factor	3 <sup>rd</sup> &1 <sup>st</sup>	-0.088	0.028	*			
	4 <sup>th</sup> &1 <sup>st</sup>	0.071	0.033	**			

Duration of residence	>5 years				1		
	≤5 years	-0.357	0.157	*	2.042	1.106	3.773
View from home	Good				1		
	Bad	-0.645	0.175	***	3.633	1.833	7.202
Floor area	>50 m <sup>2</sup>				1		
	≤50 m <sup>2</sup>	0.611	0.160	***	0.295	0.158	0.551

<sup>a</sup> Day-evening-night-weighted sound pressure level. <sup>b</sup> Odds ratio in 1 dB change.

$p$ -Value  $\leq 0.05 = *$ ,  $p$ -Value  $\leq 0.01 = **$ ,  $p$ -Value  $\leq 0.001 = ***$

(ii) Insomnia model:

The insomnia (ISM) model showed that night-time noise exposure ( $L_{\text{night}}$ ) had a significant effect on the prevalence of insomnia ( $p \leq 0.05$ ), indicating that even modest increases in night-time noise were associated with a higher likelihood of reporting insomnia symptoms. While the survey factor for the 3<sup>rd</sup> survey (2019) was not statistically significant, the 4th survey (2023) showed a significant increase in the prevalence of insomnia compared to the 1st survey ( $p \leq 0.01$ ), suggesting that contextual factors following the pandemic may influence sleep outcomes. However, the interaction between noise exposure and survey factors ( $L_{\text{night}} \times \text{Survey}$ ) were not significant, indicating that the influence of night-time noise on insomnia did not vary significantly across survey years. Among the non-acoustic variables, several showed significant associations with insomnia. Participants who reported being sensitive to heat were significantly more likely to report insomnia ( $p \leq 0.05$ ), and those who spent more than 15 hours per day at home were also at greater risk ( $p \leq 0.05$ ). In addition, respondents with a bad view from home were significantly more likely to report insomnia symptoms ( $p \leq 0.01$ ). These findings highlight that non-acoustic environmental and lifestyle factors—such as increased time at home due to pandemic-related restrictions and thermal sensitivity—may contribute to sleep disturbances, even in the context of an objectively quieter acoustic environment.

Table 6. The multiple logistic regression of insomnia (Generalized R<sup>2</sup>: 0.0875; AUC: 0.7019), (based on TSN datasets [33])

Item	Category	Estimate	Std Error	$p$ -Value	Odds Ratio	Lower 95%CI	Upper 95%CI
Intercept		-5.118	1.143	<.0001			
		0					
$L_{\text{night}}^a$		0.046	0.020	*	1.047 <sup>b</sup>	1.007	1.088
Survey factor	1 <sup>st</sup> survey				1		

	3 <sup>rd</sup> survey	-0.470	0.282	0.0961	0.835	0.318	2.189
	1 <sup>st</sup> survey				1		
	4 <sup>th</sup> survey	0.759	0.249	**	2.855	1.221	6.674
$L_{\text{night}}^a$ x Survey factor	3 <sup>rd</sup> &1 <sup>st</sup> survey	0.026	0.030	0.3844			
	4 <sup>th</sup> &1 <sup>st</sup> survey	0.008	0.027	0.7533			
Heat sensitivity	Not sensitive				1		
	Sensitive	-0.410	0.208	*	2.270	1.004	5.131
Length of time spent at home	Under 15hours				1		
	Over 15 hours	-0.388	0.176	*	2.174	1.090	4.337
View from home	Good				1		
	Bad	-0.533	0.191	**	2.901	1.372	6.134

<sup>a</sup> Night-time equivalent continuous sound pressure level. <sup>b</sup> Odds ratio in 1 dB change.

$p$ -Value  $\leq 0.05 = *$ ,  $p$ -Value  $\leq 0.01 = **$ ,  $p$ -Value  $\leq 0.001 = ***$

### 3.3.5.2 Structural equation model

The structural equation modeling (SEM) method was applied to understand the complex relationship between social responses to noise and various factors. The SEM model was constructed by integrating questionnaire items from all surveys conducted at TSN. Initially, separate SEM models were constructed for 2019, 2020, and 2023 datasets to examine how the relationships among variables evolved over time. Based on these individual models, a process of refinement was undertaken to identify the most influential and consistent factors across years. This led to the development of a unified model that captures the structural relationships between noise exposure, mediating factors, and health-related outcomes. Table 7 presents the questions

and evaluation scales used for measuring moderating variables in the model. Figure 10 illustrates the final structural equation model (SEM) that fit all the surveys. In this model, latent variables (represented by ellipses) refer to parameters that are not directly observed but inferred from measurable indicators, while observed variables (represented by rectangles) are derived directly from survey responses. In the SEM model, noise level ( $L_{den}$  and  $L_{night}$ ) was included as an exogenous exposure variable. Mediating factors, such as living conditions and health status, were modeled to reflect the pathways through which noise exposure may affect outcomes like annoyance and insomnia.

Table 7. Questions and evaluation scales for measuring moderating variables in the model. model design per [32,33]

Latent Variable	Observed Variable	Question	Scale
	Length of time at home	Thinking about the last four months, how long in a day do you stay at home?	1: Under 8 hours 2: 8-15 hours 3: Over 15h hours
	Stress	Thinking about the amount of stress in your life, how stressful would you say that most days are?	0: Not at all to 10: Extremely
Health	Self-rated health	In general, would you say your health is...?	1: Excellent 2: Very good 3: Good 4: Fair 5: Poor
	Exercises	How often do you engage in physical activity over 30 min?	1: Almost everyday 2: 4–5 times a week 3: 2–3 times a week 4: About once a week 5: Once or twice a month 6: Not at all
Sensitivity		In daily life, how sensitive are you to the following climatic factors and environmental conditions	
	Noise	Noise	1: Not at all to 5: Extremely

	Odors	Odors	1: Not at all to 5: Extremely
	Vibration	Vibration	1: Not at all to 5: Extremely
	Please evaluate your living area according to the following items:		
Living conditions	Green space	Green space?	1: Extremely good to 5: Extremely bad
	Street sceneries	Street scenery?	1: Extremely good to 5: Extremely bad
	View	View?	1: Extremely good to 5: Extremely bad

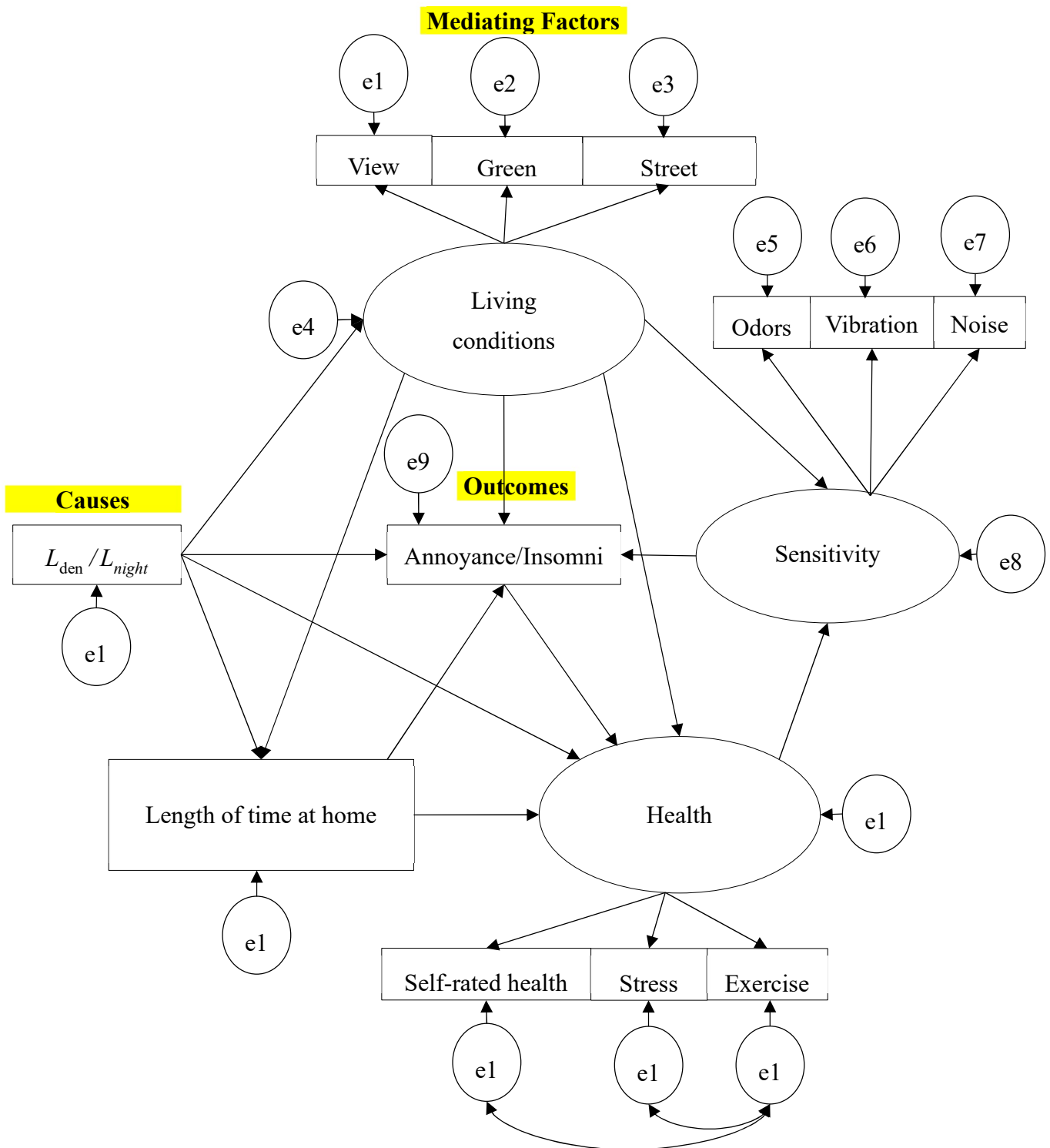


Figure 10. The structural equation model (SEM) developed by integrating the questionnaire items from all the survey, (developed and refined based on TSN dataset in [32,33]).

Key components of the model include:

- Noise Exposure  $L_{den}$  and  $L_{night}$ : Used as the primary exposure metric, reflecting day-evening-night noise levels and nighttime noise levels.

- Living Conditions: A latent construct inferred from residents' evaluations of their view, access to green space and street sceneries, from their house. These environmental quality indicators help explain how surroundings influence noise perception and tolerance.
- Health: This latent factor is constructed from responses related to Stress, self-rated health, and exercises concern, providing an overall picture of residents' well-being.
- Sensitivity: Comprising noise sensitivity, vibration sensitivity, and odor sensitivity, this factor captures individual predispositions to environmental stimuli, which may amplify the effects of noise exposure.
- Length of time at home: An observed variable based on the number of hours residents spend at home. This behavior was influenced by lockdowns during the pandemic and affects the level of noise exposure, thereby having direct implications for sleep and annoyance outcomes.
- Outcomes: The two primary reported outcomes—annoyance and insomnia—are observed factors reflecting the social and health responses to aircraft noise.

(i) Annoyance model:

The structural equation modeling results (Figure 11 and Table 8) depicts how the pathways influencing noise annoyance evolved over three phases: before the COVID-19 pandemic (2019), during the pandemic (2020), and in the recovery phase (2023). Key statistical indicators show good model fit ( $\chi^2 = 446.203$ ,  $p < 0.01$ ,  $df = 126$ ,  $GFI = 0.932$ ,  $CFI = 0.906$ , and  $RMSEA = 0.052$ ), confirming the model's reliability across all three years.

In 2019 Model (Pre-Pandemic), direct effect of noise ( $L_{den}$ ) on annoyance was statistically significant (Estimate = 0.105,  $p < 0.001$ ). Living conditions influenced sensitivity ( $p < 0.001$ ), which in turn influenced annoyance ( $p < 0.001$ ). The direct effects of noise, sensitivity, living conditions, and annoyance on health were significant. Under normal circumstances, annoyance was largely determined by the physical noise levels and sensitivity

In 2020 Model (Post-Pandemic), the direct effect of  $L_{den}$  on annoyance was statistically significant ( $p = 0.031$ ). Length of time at home emerged as a significant predictor of annoyance (Estimate = 1.003,  $p < 0.001$ ), reflecting lockdown conditions and increased home confinement. Living conditions and sensitivity had no significant influence, possibly because unusual pandemic constraints overrode contextual evaluations. During COVID-19, annoyance became less influenced by environmental or acoustic factors and more shaped by personal lifestyle disruptions and increased noise exposure due to time spent at home.

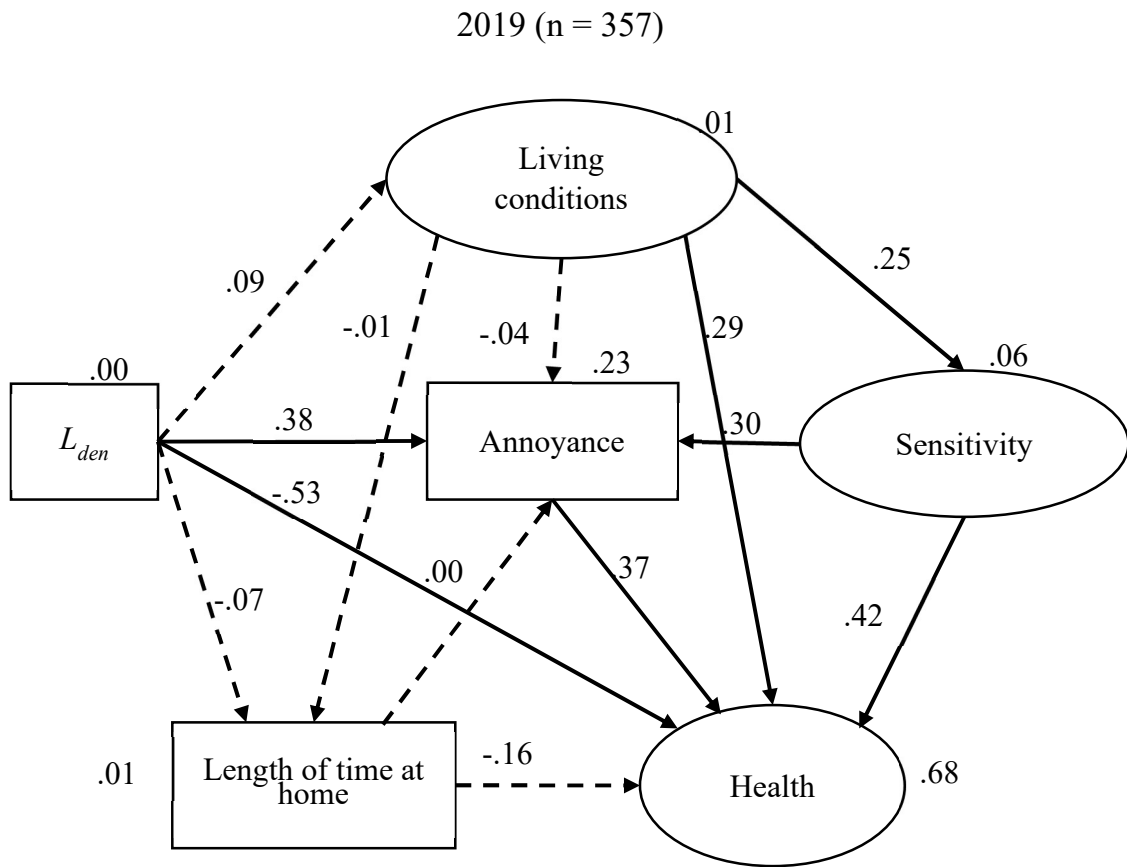
In 2023 Model (Post-pandemic Recovery), the direct path from  $L_{den}$  to annoyance re-emerged as significant (Estimate = 0.122,  $p < 0.001$ ), indicating a partial return to pre-pandemic perception patterns. Length of time at home also remained significant (Estimate = 0.342,  $p = 0.012$ ), suggesting lingering effects of changed living routines. Health was significantly effected by sensitivity, annoyance, and length of time at home, though the direct path from  $L_{den}$  to remained non-significant.

The annoyance model suggests that under normal circumstances, residents' reactions to aircraft noise were more strongly shaped by their perceptions of the surrounding environment and their personal susceptibility to environmental stimuli. During the pandemic, health concerns and length of time spent at home became significant factors influencing annoyance. The COVID-19 outbreak led to lifestyle changes, including increased time spent indoors and heightened health awareness.

In this context, annoyance became less associated with general environmental conditions and more influenced by health-related stressors and domestic exposure. The annoyance response in the recovery phase reflects a hybrid pattern: objective noise exposure has regained influence, but pandemic-induced behavioral changes still contribute, particularly through increased noise exposure at home.

(ii) Insomnia model:

The structural equation modeling (SEM) in Figure 12 reveal how factors contributing to insomnia changed before, during, and after the COVID-19 pandemic. Key statistical indicators show good model fit ( $\chi^2 = 348.733$ ,  $p < 0.01$ ,  $df = 126$ ,  $GFI = 0.945$ ,  $CFI = 0.930$ , and  $RMSEA = 0.043$ ), confirming the model's reliability across all three years. Table 9 shows parameter estimates of the model for insomnia



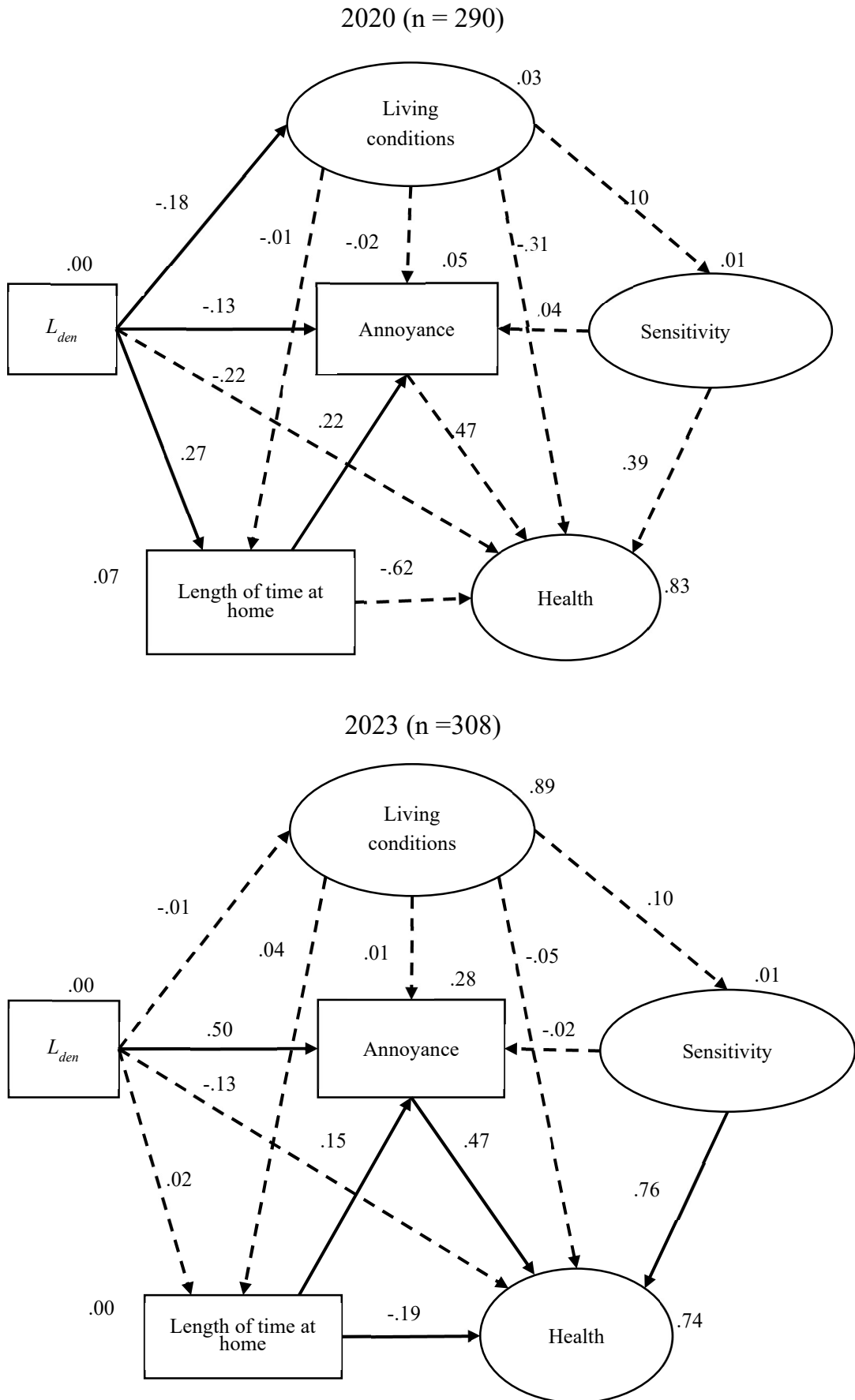
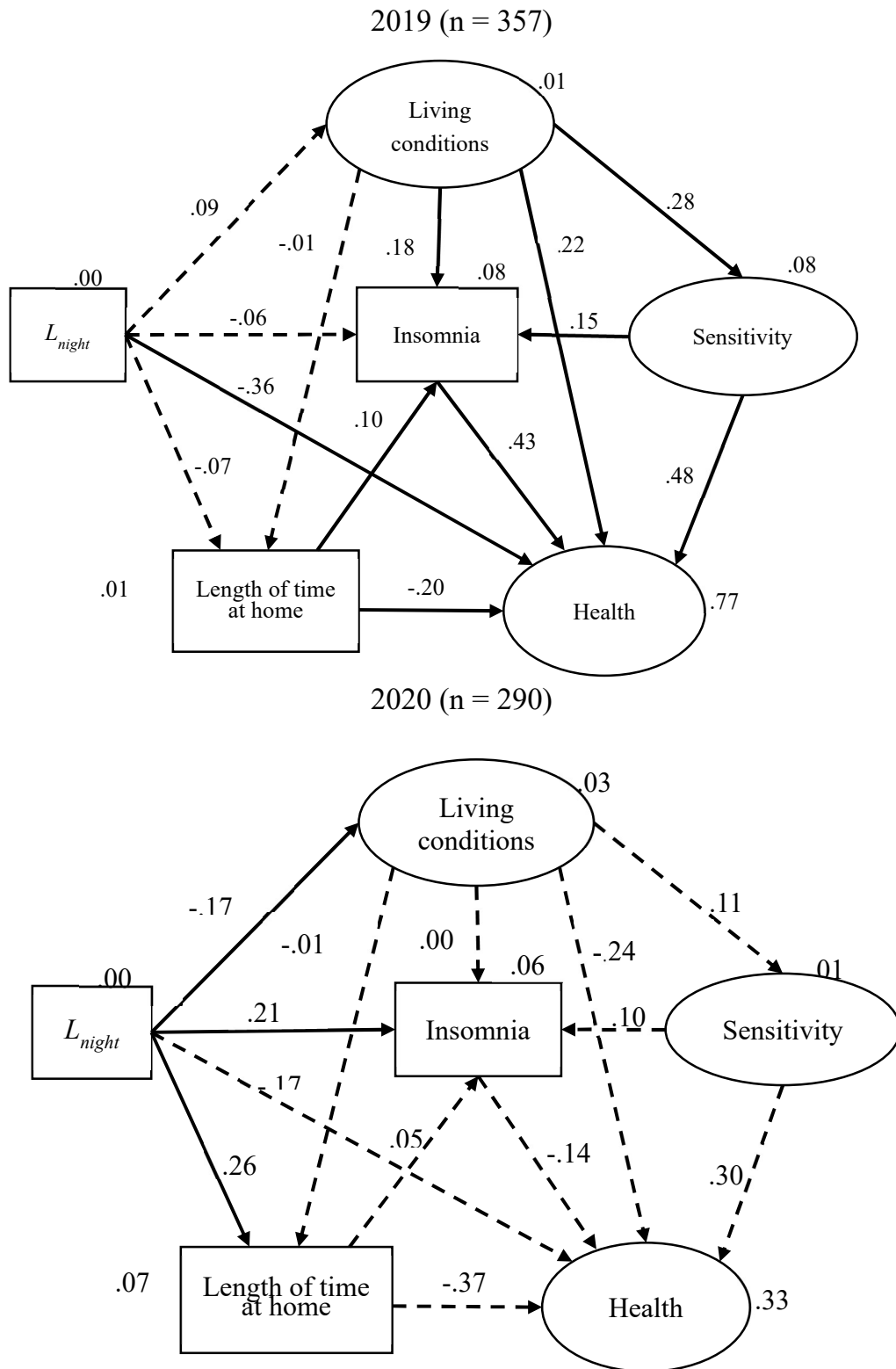


Figure 11. The impact structure in the estimated noise annoyance model in the 2019,2020 and 2023 surveys using chi-square, GFI, CFI, and RMSEA statistics: chi-square = 446.203,  $p < 0.01$ ,

$df = 126$ ,  $GFI = 0.932$ ,  $CFI = 0.906$ , and  $RMSEA = 0.052$ . Statistically significant paths and standardized regression weights were annotated with ( $p < 0.05$ ). The non-significant paths are represented by dashed lines. The explained variances are annotated for each variable. (Model developed from TSN datasets in [32,33]).



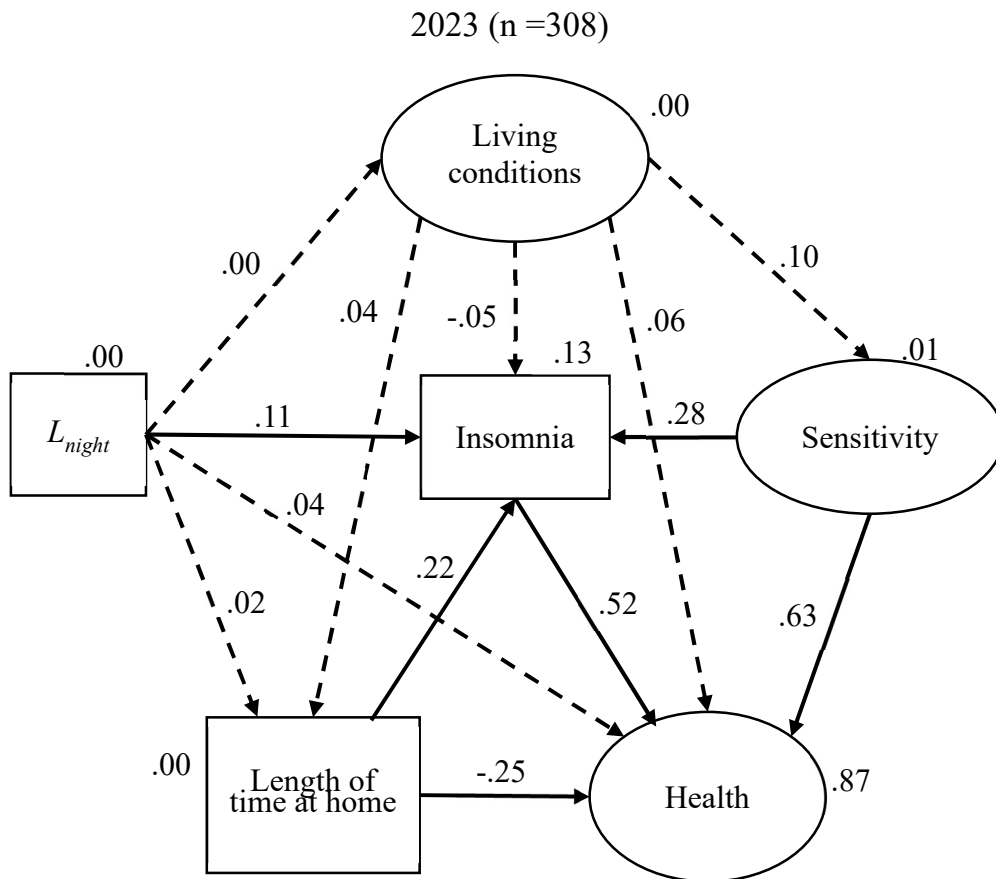


Figure 12. The impact structure in the estimated insomnia model in the 2019,2020 and 2023 surveys using chi-square, GFI, CFI, and RMSEA statistics:  $\chi^2 = 348.733, p < 0.01, df = 126, GFI = 0.945, CFI = 0.930,$  and  $RMSEA = 0.043$ . Statistically significant paths and standardized regression weights were annotated with ( $p < 0.05$ ). The non-significant paths are represented by dashed lines. The explained variances are annotated for each variable. (Model developed from TSN datasets in [32,33]).

Table 8. Parameter estimates of the structural equation model for noise annoyance (Data adapted from SEM outputs in [32,33]).

Parameter	2019 Survey				2020 Survey				2023 Survey			
	Estimate	SE	CR	p	Estimate	SE	CR	p	Estimate	SE	CR	p
Living conditions $\leftarrow L_{den}$	0.007	0.004	1.626	0.104	-0.014	0.005	-2.983	0.003	0.000	0.004	-0.089	0.929
Sensitivity $\leftarrow$ Living conditions	0.429	0.105	4.104	*	0.050	0.035	1.443	0.152	0.200	0.119	1.683	0.092
Health $\leftarrow L_{den}$	-0.013	0.003	-4.119	*	-0.001	0.001	-0.643	0.520	-0.004	0.003	-1.366	0.172
Length of time at home $\leftarrow L_{den}$	-0.006	0.005	-1.287	0.198	0.017	0.004	4.601	*	0.002	0.005	0.373	0.709
Length of time at home $\leftarrow$ Living conditions	-0.018	0.078	-0.233	0.816	-0.009	0.048	-0.177	0.859	0.053	0.076	0.695	0.487
Health $\leftarrow$ Living conditions	0.099	0.037	2.680	0.007	-0.011	0.016	-0.661	0.509	-0.022	0.038	-0.591	0.554
Health $\leftarrow$ Sensitivity	0.085	0.025	3.408	*	0.026	0.039	0.667	0.505	0.166	0.030	5.545	*

Health ← Length of time at home	-0.041	0.022	-1.849	0.064	-0.027	0.040	-0.677	0.499	-0.065	0.030	-2.156	0.031
Health ← Annoyance	0.032	0.010	3.232	0.001	0.004	0.007	0.674	0.500	0.046	0.012	3.964	*
Annoyance ← $L_{den}$	0.105	0.013	8.009	*	-0.038	0.018	-2.162	0.031	0.147	0.014	10.402	*
Annoyance ← Length of time at home	-0.001	0.140	-0.006	0.995	1.003	0.276	3.637	*	0.508	0.167	3.035	0.002
Annoyance ← Sensitivity	0.711	0.129	5.494	*	0.254	0.433	0.586	0.558	-0.038	0.110	-0.347	0.728
Annoyance ← Living conditions	-0.141	0.216	-0.652	0.515	-0.071	0.226	-0.314	0.753	0.056	0.223	0.250	0.802

\*  $p < 0.001$ ; SE, standard error; CR, critical ratio (CR = estimate/SE).

Table 9. Parameter estimates of the structural equation model for insomnia (Data adapted from SEM outputs in [32,33]).

Parameter	2019 Survey				2020 Survey				2023 Survey			
	Estimate	SE	CR	p	Estimate	SE	CR	p	Estimate	SE	CR	p
Living conditions ← $L_{night}$	0.007	0.004	1.635	0.102	-0.014	0.005	-2.829	0.005	0.000	0.004	-0.069	0.945
Sensitivity ← Living conditions	0.428	0.100	4.299	*	0.056	0.037	1.513	0.130	0.200	0.119	1.682	0.093
Health ← $L_{night}$	-0.009	0.003	-3.600	0.065	0.000	0.001	-0.318	0.750	0.001	0.003	0.464	0.643
Length of time at home ← $L_{night}$	-0.007	0.005	-1.370	0.171	0.016	0.004	4.494	*	0.002	0.005	0.420	0.674
Length of time at home ← Living conditions	-0.018	0.077	-0.232	0.816	-0.011	0.048	-0.235	0.814	0.053	0.076	0.695	0.487
Health ← Living conditions	0.078	0.038	2.075	0.038	-0.006	0.019	-0.320	0.749	0.031	0.046	0.673	0.501
Health ← Sensitivity	0.110	0.028	3.876	*	0.015	0.046	0.321	0.748	0.167	0.028	6.023	*
Health ← Length of time at home	-0.053	0.024	-2.204	0.027	-0.012	0.038	-0.322	0.748	-0.103	0.036	-2.847	0.004
Health ← Insomnia	0.206	0.052	3.954	*	-0.006	0.018	0.317	0.752	0.341	0.065	5.204	*
Insomnia ← $L_{night}$	-0.003	0.003	-1.178	0.239	0.010	0.003	3.477	*	0.006	0.003	2.007	0.045
Insomnia ← Length of time at home	0.058	0.029	1.990	0.047	0.038	0.045	0.827	0.408	0.135	0.033	4.054	*
Insomnia ← Sensitivity	0.070	0.029	2.456	0.014	0.118	0.073	1.618	0.106	0.112	0.022	5.060	*
Insomnia ← Living conditions	0.135	0.045	2.983	0.003	-0.002	0.037	-0.045	0.964	-0.039	0.044	-0.870	0.384

\*  $p < 0.001$ ; SE, standard error; CR, critical ratio (CR = estimate/SE).

In 2019 model (Pre-Pandemic) nighttime noise ( $L_{night}$ ) had no direct effect on insomnia ( $p = 0.216$ ), though it marginally affected health ( $p = 0.065$ ). Health was weakly linked to sensitivity ( $p = 0.046$ ), but its overall role in insomnia was minor. In this phase, insomnia was more influenced by subjective factors like length of time at home, living conditions and individual noise sensitivity rather than by objective noise exposure itself.

In 2020 model (During Pandemic), The path from  $L_{\text{night}}$  to Insomnia became significant and positive (Estimate = 0.010,  $p < 0.001$ ). Time at home and Insomnia relation was non-significant, as was sensitivity, possibly due to pandemic-related psychological overload. Path between  $L_{\text{night}}$  and Time at home was strongly significant (0.016,  $p < 0.001$ ), showing how noise exposure increased as people stayed home more. All the other paths to insomnia were non-significant. The shift suggests that nighttime noise exposure directly disrupted sleep during lockdown, when people spent more time at home and had fewer coping mechanisms. The usual buffer factors (sensitivity, living conditions) lost influence, possibly overshadowed by the extraordinary context of the pandemic.

In 2023 model (Post-Pandemic Recovery), Insomnia was now influenced by multiple significant predictors  $L_{\text{night}}$  ( $p = 0.045$ ), Time at home ( $p < 0.001$ ), and Sensitivity ( $p < 0.001$ ) Health linked to Insomnia significantly. The living conditions and Insomnia path was no longer significant, unlike in 2019. In 2023, the model reflects a complex interaction: noise exposure ( $L_{\text{night}}$ ) directly impacts insomnia, but sensitivity and increased time at home amplify the effect. The role of health defined here as sleep disturbances, stress, and nutritional concerns is more pronounced, acting as a mediator between sensitivity and sleep quality.

Overall, despite reduced aircraft noise during 2020, insomnia levels did not significantly improve, suggesting non-acoustic stressors (e.g., health concerns, stress, home confinement) had strong influence. Post-pandemic, insomnia remains influenced by both acoustic ( $L_{\text{night}}$ ) and non-acoustic factors, reflecting enduring changes in lifestyle and sensitivity. This supports the hypothesis that personal health and psychological sensitivity amplify the impact of environmental noise on sleep, especially under prolonged exposure or stress.

It is worth noted that health variables might amplify the negative effects of noise on both annoyance and insomnia. This helps explain why the percentage of people experiencing high annoyance or insomnia did not significantly decrease despite a major reduction in aircraft noise. The persistence of these symptoms despite lower noise levels suggests that non-acoustic factors, particularly personal health, played a critical role in shaping residents' responses to noise in post-pandemic phase, particularly in terms of their sensitivity to noise and overall sleep quality.

### 3.4 Discussions

This study confirms that both acoustic and non-acoustic factors influence annoyance and insomnia associated with aircraft noise, consistent with international research trends. Although overall noise exposure levels ( $L_{\text{den}}$ ) significantly decreased during the COVID-19 pandemic due to reduced flight activity, residents reported higher levels of annoyance. This pattern aligns with the findings of Tong et al. (2021), who observed an increase in noise complaints during lockdowns despite objectively quieter environments [23]. Their case study in Greater London suggested that heightened expectations for quietness and prolonged time spent at home were major contributing factors—conditions similarly observed in the Tan Son Nhat (TSN) context. The results of this study also support those of Guski et al. (2017), who emphasized that psychological and contextual variables, including individual noise sensitivity, perceived control, and building characteristics, play a critical role in shaping annoyance responses [24].

In contrast to annoyance trends, insomnia complaints did not rise notably during the pandemic but showed a significant increase in 2023 after flight activity resumed. This pattern differs from Basner et al. (2011), who reported immediate sleep disturbance effects following higher aircraft noise exposure [25]. However, it is consistent with more recent longitudinal studies, such as Clark

et al. (2020), which indicate that the adverse health effects of noise on sleep may emerge gradually and become more pronounced after periods of reduced exposure, possibly due to changes in baseline tolerance or altered expectations [26]. The structural equation modeling (SEM) results further confirmed that noise sensitivity and indoor environmental quality mediate the relationship between exposure and health outcomes [27, 28]. Therefore, the evaluation of environmental noise impacts should incorporate a comprehensive framework that integrates acoustic, psychological, and environmental dimensions. Such understanding is essential for developing evidence-based noise management policies and guiding future urban planning

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## CHAPTER 4: NOISE MONITORING AND HEALTH ASSESSMENT AT HOSPITAL NEAR TAN SON NHAT AIRPORT

*This chapter integrates and extends the author's journal manuscript under review and related peer-reviewed conference proceedings on hospital noise exposure near Tan Son Nhat Airport [27,28].*

### 4.1 Introduction

Noise pollution from aircraft and road traffic is a growing public health issue, especially in densely populated urban regions with heavy transportation activity. Numerous studies have shown that nighttime noise exposure, particularly from aircraft and traffic, can significantly impair sleep quality, leading to long-term adverse health outcomes [1]. For example, a WHO systematic evidence review found that transportation noise (aircraft, road, and rail) is associated with both self-reported sleep disturbance and objective measures (such as cortical awakenings), and that a 10 dB increase in nighttime noise level ( $L_{night}$ ) increases odds of being highly sleep disturbed [2]. Similarly, Basner et al. (2014) demonstrated both auditory and non-auditory health effects of noise exposure, including sleep disturbance, stress, and cardiovascular and metabolic consequences [3].

Aircraft noise has long been recognized as one of the dominant environmental stressors around airports, particularly in densely populated urban areas. Previous studies conducted around Tan Son Nhat International Airport (TSN) in Ho Chi Minh City, Vietnam, have provided critical insights into community responses and health impacts associated with aviation noise. Our earlier work developed models of noise aviation and examined how variations in aircraft operation levels influenced annoyance and sleep disturbance among nearby residents [4]. Furthermore, an assessment of aircraft noise exposure and residents' subjective responses revealed that both day-evening-night noise level ( $L_{den}$ ) and ( $L_{night}$ ) were significantly correlated with annoyance and self-reported sleep disturbance [5]. These studies emphasized the urgent need for more detailed investigations of noise effects in sensitive environments, such as hospitals located within urban flight corridors.

In addition to non-auditory outcomes, environmental noise exposure is also associated with adverse auditory effects. Prolonged exposure to high sound levels can contribute to hearing fatigue, tinnitus, and impaired speech perception, particularly in environments characterized by high background noise and frequent impulsive events [3,29]. In hospital settings, excessive noise may interfere with verbal communication between patients and medical staff, increase listening effort, and exacerbate sensory stress, especially among vulnerable patients with pre-existing health conditions [6,7]. These auditory-related effects further highlight the importance of controlling noise in healthcare environments.

Aircraft noise has long been recognized as one of the dominant environmental stressors around airports, particularly in densely populated urban areas. Previous studies conducted around Tan Son Nhat International Airport (TSN) in Ho Chi Minh City, Vietnam, have provided critical insights into community responses and health impacts associated with aviation noise. Our earlier work developed models of noise aviation and examined how variations in aircraft operation levels influenced annoyance and sleep disturbance among nearby residents [5]. Furthermore, an assessment of aircraft noise exposure and residents' subjective responses revealed that both day-evening-night noise level ( $L_{den}$ ) and  $L_{night}$  were significantly correlated with annoyance and self-

reported sleep disturbance [5]. These studies emphasized the urgent need for more detailed investigations of noise effects in sensitive environments, such as hospitals located within urban flight corridors.

Hospitals are particularly sensitive environments in which excessive noise poses serious risks to both patients and staff. Previous research has demonstrated that since the 1960s, background noise levels in hospitals have increased markedly - average daytime levels rising from ~57 dB(A) in 1960 to ~72 dB(A), and nighttime levels from ~42 dB(A) to ~60 dB(A). These levels are often well above WHO guideline values (which recommend noise in patient rooms should not exceed ~35 dB(A) during the day and ~30 dB(A) at night) and are linked to impaired sleep, delayed recovery, increased stress, and reduced quality of care [6]. Intensive Care Units (ICUs) represent one of the hospital settings where noise exposure is especially problematic. The ICU environment frequently causes severely fragmented sleep, reduced duration of deep (slow wave) and REM sleep, frequent arousals, and decreased sleep efficiency. These disruptions are contributed by environmental noise, medical interventions, alarms, staff activity, and other hospital operational demands. The clinical consequences include delayed healing, impaired immune response, cognitive impairment (including delirium risk), prolonged hospitalization, and worse overall patient outcomes. Several studies have reviewed both the impacts and the efficacy of noise reduction strategies in ICUs [7].

Preliminary investigations conducted at hospitals located near major transportation infrastructure have suggested that external environmental noise may substantially contribute to indoor acoustic conditions. An early exploratory survey at Military Hospital 175 reported elevated indoor noise levels and sleep-related complaints among hospital occupants, indicating that aircraft and road traffic noise may penetrate hospital buildings and affect indoor environments (34). Subsequent conference-based studies further examined short-term sleep disturbance and the moderating effects of confounding factors, highlighting the complex interactions between acoustic exposure, perception, and contextual variables in hospital settings (35, 36). These preliminary findings underscored the necessity of investigations integrating environmental noise monitoring, subjective assessment, and physiological indicators.

Tan Son Nhat International Airport (TSN) in Ho Chi Minh City, Vietnam, represents a major source of environmental noise due to its high air traffic volume and central location within a densely populated area. As the country's busiest airport, TSN generates substantial noise pollution that affects nearby residential and institutional areas, including hospitals. Military Hospital 175, located approximately 1 km from the southeast runway end of TSN and surrounded by major roads, is one of the facilities most exposed to continuous aircraft and traffic noise. This raises concerns regarding the potential impacts on sleep quality, physiological responses, and overall health among both hospital patients and staff.

Building on previous exposure–response research, the present study expands the investigation to evaluate short-term physiological and environmental indicators that may clarify mechanisms underlying noise-related health outcomes. The study was conducted at Military Hospital 175 from 2022 to 2024, with three main objectives: (1) to assess the impact of environmental noise on sleep and health among hospital occupants; (2) to examine factors influencing short-term physiological responses using wearable devices; and (3) to explore potential relationships among diverse environmental and physiological indices beyond conventional exposure–response analysis.



#### 4.2.2 Noise Exposure Assessment

Noise exposure at surveyed hospitals was assessed across multiple departments and floors from 2022 to 2024. Figure 14 shows the hospital's location relative to Tan Son Nhat International Airport, highlighting potential external noise sources. Measurements were conducted in patient rooms, staff rooms, balconies, and the rooftop, both indoors and outdoors, as summarized in Table 10.

Noise levels were measured using a Class 1 sound level meter (NL-42, RION Co., Ltd., Japan), which complies with IEC 61672 standards [8]. The instrument was calibrated before and after each measurement campaign using an acoustic calibrator (94 dB at 1 kHz) to ensure measurement accuracy. At each location, the microphone was positioned at a height of approximately 1.2–1.5 m above the floor, corresponding to the typical human ear level [9]. To minimize reflection effects, measurement points were selected to maintain a minimum distance of approximately 1 m from walls, ceilings, or other large reflective surfaces whenever feasible. Continuous noise measurements were conducted for one week at each location to capture typical temporal variations in noise exposure. The recorded acoustic parameters included the daytime equivalent continuous A-weighted sound pressure level,  $L_{Aeq}(6:00-21:00)$ , the nighttime equivalent continuous A-weighted sound pressure level,  $L_{Aeq}(21:00-6:00)$  as well as  $L_{den}$ . Measured data were averaged for each location to quantify representative noise exposure levels.

In addition to field measurements, aircraft noise exposure from 2022 to 2024 was estimated using the Integrated Noise Model (INM), version 7.0 [10]. Aircraft operation data were derived from Automatic Dependent Surveillance–Broadcast (ADS-B) records collected using a receiver installed in the inpatient ward of the surveyed hospital, enabling real-time tracking of aircraft movements. Typical aircraft types operating at Tan Son Nhat International Airport were classified according to standard INM aircraft categories. Default noise–power–distance relationships and engine power settings during takeoff and landing phases embedded in the INM database were applied due to the lack of airline-specific operational data.

Aircraft route data from TSN International Airport were integrated with flight tracking information obtained from Flightradar24 [11] to generate aircraft noise contour maps. Based on the model outputs,  $L_{den}$  and  $L_{night}$  were calculated to represent long-term aircraft noise exposure at the hospital site. During the three-year monitoring period, a gradual increase in flight activity was observed, reflecting the recovery of aviation operations following the COVID-19 pandemic.

Table 10. Noise measurement locations within Military Hospital 175 (Adapted from under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah\_223\_25.)

Department / Ward	Floor	Measurement Location	Year(s) Measured	Environment
Gastroenterology (A3)	2F	Patient room	2022, 2023, 2024	Indoor
Gastroenterology (A3)	2F	Balcony	2023	Outdoor
Inpatient Ward	4F	Staff room	2023, 2024	Indoor

Inpatient Ward	4F	Balcony	2022, 2024	2023,	Outdoor
Inpatient Ward	10F	Rooftop	2022, 2024	2023,	Outdoor
Orthopedic/Physiotherapy– Rehabilitation (C6)	2F	Patient room	2024		Indoor



Figure 14. Noise measurement locations within surveyed hospital. (Source: article under review, Nguyen et al., 2025, *Noise & Health*, Manuscript ID: nah\_223\_25.)

### 4.2.3 Self-Reported Health Outcomes via Questionnaire Survey

Three questionnaire surveys were conducted in September 2022, August 2023, and August 2024 to investigate sleep disturbance and insomnia among patients and hospital staff exposed to both aircraft and road traffic noise. Survey sites included patient and staff rooms representing different noise exposure conditions within the hospital. Face-to-face interviews were conducted with participants who provided informed consent. In each survey, some respondents from the previous year were revisited, while new participants were also recruited to maintain the sample size and to capture temporal variations in sleep-related responses. The questionnaire items were developed with reference to several standardized instruments. Noise annoyance was assessed using the Technical Specification ISO/TS 15666 [12], while the Insomnia Symptom Questionnaire (ISQ) [13,14] was employed to identify respondents experiencing insomnia. Table 11 provides a summary of the main questions and the evaluation scales applied across all three surveys to measure sleep disturbances.

Table 11. Questions and evaluation scales for measuring the outcomes of insomnia [34-36].

<p>Annoyance</p> <p>Question: When you stay at the hospital/ Since you were admitted to the hospital, what number from 0 to 10 best shows how much you are bothered, disturbed, or annoyed by aircraft noise?</p> <p>Evaluation scale: 11-point numerical scale: from 0 (not annoyed at all) to 10 (extremely annoyed)</p>
<p>Question:</p> <p>Please answer this question concerning your sleep:</p> <p>(a) Do you have any trouble with your sleep? No/Yes</p> <p>(b) If you answered "Yes" to the above question, please choose the corresponding alternative (Alternatives: Rarely or not at all, Once or twice a week, More than three times a week) for the following item: (1) Difficult to fall asleep; (2) When awakened during the night, it is difficult to sleep again; (3) Awakened early in the morning; (4) Do not feel as having slept well the next morning; (5) Sleepy during daytime and cannot work well; (6) Others</p> <p>Evaluation scale: 1: have no insomnia symptoms (*), 2: have insomnia symptoms</p> <p>(* ) The participants with insomnia symptoms are those who responded affirmatively to Question (a): Do you have any trouble with your sleep? And (5) sleepy during daytime and cannot work well more than three times a week; and had experienced at least one of the other symptoms (1)– (4) more than three times in a week.</p>

#### 4.2.4 Health Index Monitor

##### 4.2.4.1 Sleep Stages

Sleep parameters were continuously recorded using a Fitbit Sense (Fitbit Inc., San Francisco, CA, USA), a wrist-worn photoplethysmography (PPG)-based wearable device that automatically tracks sleep stages and physiological responses. The Fitbit Sense integrates a triaxial accelerometer, optical heart rate sensor, and electrodermal activity sensor to estimate sleep stages—wake, rapid eye movement (REM), light, and deep—based on proprietary algorithms validated against polysomnography (PSG) in previous studies [15,16,18]. Data on total sleep time (TST), sleep efficiency (SE), sleep onset latency (SOL), wake after sleep onset (WASO), and the proportions of wake, REM, light, and deep sleep were extracted from the Fitbit application. To evaluate sleep quality, nightly averages of these parameters were calculated for each participant. Among them, sleep efficiency (the ratio of total sleep time to time in bed) and the percentage of deep sleep were used as the primary indicators of sleep quality [17]. All data were exported and analyzed using Python (v3.10), and results were expressed as mean ± standard deviation. Differences in noise exposure across sleep stages were tested using the Kruskal–Wallis test, a non-parametric method suitable for comparing more than two independent groups when normality assumptions are not met. Differences in noise exposure across sleep stages were tested using the Kruskal–Wallis test, a non-parametric method suitable for comparing more than two independent groups when normality assumptions are not met. Statistical significance was defined as  $p < 0.05$ . The use of the Fitbit Sense enabled non-invasive, continuous, and practical monitoring of sleep among both recovering patients and healthcare staff under real-world hospital conditions. This

approach aligns with previous research confirming the device’s reliability and validity for clinical and population-level sleep assessments [15,16,18].

**4.2.4.2 Heart Rate Variability**

Heart rate variability (HRV) is a physiological indicator reflecting the variation in time intervals between consecutive heartbeats. It serves as a non-invasive marker of autonomic nervous system (ANS) activity, providing insights into the balance between sympathetic and parasympathetic regulation [9]. In this study, HRV was measured using the Bittium Faros 180 device (Bittium Corporation, Finland), a wearable electrocardiogram (ECG) recorder designed for continuous cardiac monitoring. Participants were instructed to wear the device during sleep (Figure 15), enabling continuous ECG signal recording throughout the night. This approach allowed for the assessment of nocturnal cardiac autonomic modulation and sleep-related physiological responses under different environmental noise exposure conditions. The recorded ECG data were analyzed using Kubios HRV Premium software (version 3.5, Kuopio, Finland), a validated and widely used tool for HRV [20]. The software automatically detected R-peaks and extracted RR intervals, followed by artifact correction and detrending using the smoothness prior’s method. HRV parameters were computed in the time domain, frequency domain, and nonlinear domain, as summarized in Table 12. These indices provided a comprehensive evaluation of autonomic activity, parasympathetic–sympathetic balance, and the physiological effects of environmental noise during sleep.

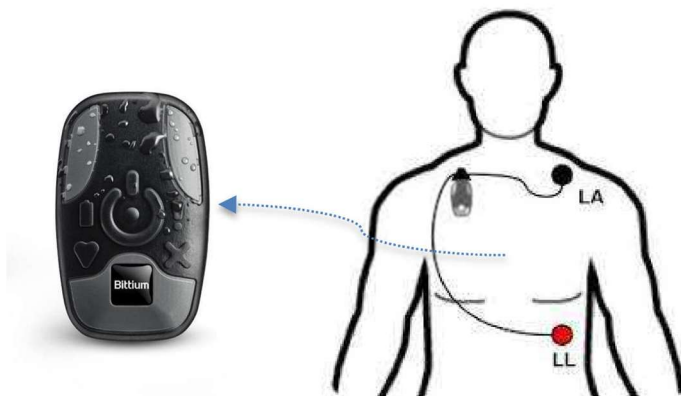


Figure 15. Participants wore the Bittium Faros 180 wearable ECG recorder during sleep. The monitor is attached to the anterior chest using adhesive electrodes, allowing continuous recording of ECG and RR-intervals overnight [34,36].

Table 12. Summary of HRV indices analyzed in this study (Adapted from article under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah\_223\_25, and r[34,36])

Domain	Parameter	Description	Unit	Physiological Interpretation
Time	SDNN	Standard deviation of NN intervals	ms	Reflects overall HRV and total autonomic modulation

Time	RMSSD	Root means square of successive differences between NN intervals	ms	Sensitive index of short-term HRV; represents parasympathetic (vagal) activity
Frequency	LF	Low-frequency (0.04–0.15 Hz)	power ms <sup>2</sup>	Represents both sympathetic and parasympathetic modulation
Frequency	HF	High-frequency (0.15–0.40 Hz)	power ms <sup>2</sup>	Marker of parasympathetic (vagal) activity; linked to respiratory sinus arrhythmia
Frequency	LF/HF	Ratio of low- to high-frequency power	—	Reflects sympathovagal balance; higher values indicate sympathetic predominance
Nonlinear	SD1	Standard deviation of instantaneous beat-to-beat variability (Poincaré plot)	ms	Represents short-term parasympathetic modulation
Nonlinear	SD2	Standard deviation of long-term RR interval variability (Poincaré plot)	ms	Reflects overall autonomic regulation and long-term variability
Nonlinear	DFA $\alpha 1$	Short-term scaling exponent from detrended fluctuation analysis	—	Describes short-term fractal correlation and adaptability of HRV (1–11 beats)
Nonlinear	DFA $\alpha 2$	Long-term scaling exponent from detrended fluctuation analysis	—	Reflects long-term correlation and autonomic stability over extended intervals (>11 beats)

## 4.3 Results

### 4.3.1 Noise Exposure Levels

Noise exposure assessments conducted at surveyed hospital from 2022 to 2024 revealed consistently elevated acoustic levels across multiple hospital departments. Measurements were carried out in the Gastroenterology Department (2022–2024) and the Inpatient Ward (2022–2024), with additional observations added for the Physiotherapy–Rehabilitation Department (C6) in 2024. The average A-weighted noise levels at patient areas and staff areas for the three years are summarized in Table 13 and Table 14, respectively.

In the Gastroenterology Department, indoor measurements on the second floor remained relatively stable across the three years, with daytime equivalent continuous sound levels ( $L_{Aeq, 6-21}$ ) ranging from 56.4 to 61.3 dB and nighttime levels ( $L_{Aeq, 21-6}$ ) between 50.6 and 53.2 dB. The day–evening–night levels ( $L_{den}$ ) varied slightly, from 59.0 to 62.8 dB. While differences across years

were modest, the 2024 measurements indicated a slight increase in internal noise compared with previous years.

In the Inpatient Ward, measured noise levels consistently exceeded the thresholds for special areas defined by QCVN 26:2010/BTNMT[25]. Indoor areas on the fourth floor recorded  $L_{Aeq, 6-21}$  values of 56.5–58.0 dB, whereas outdoor balcony and rooftop locations exhibited substantially higher  $L_{den}$  values, reaching 65.3 dB on the rooftop in both 2023 and 2024. Nighttime levels on the rooftop remained above 57 dB, indicating continuous exposure to high noise even during rest periods.

For the Physiotherapy–Rehabilitation Department (C6) in 2024, indoor measurements showed  $L_{Aeq, 6-21}$  and  $L_{den}$  values comparable to those observed in the Gastroenterology Department, confirming that excessive noise extends beyond patient wards to rehabilitation facilities. Across all departments and measurement points, none of the recorded values complied with the QCVN 26:2010/BTNMT daytime (55 dB) or nighttime (45 dB) limits.

Table 15 and 16 summarize the predicted aircraft noise exposure levels  $L_{den}$  and  $L_{night}$  from 2022 to 2024 at the surveyed hospital departments. The results show a gradual increase in both indices over the three-year period, corresponding to the recovery of flight activity at Tan Son Nhat Airport. At the Gastroenterology Department (A3),  $L_{den}$  remained around 55–56 dB, while  $L_{night}$  increased from 46.6 dB in 2022 to 51.7 dB in 2024. Similar trends were observed in the Inpatient Ward, where  $L_{den}$  rose from 55.9 dB to 57.5 dB, and  $L_{night}$  from 47.4 dB to 52.2 dB. In 2024, the Orthopedic/Physiotherapy Rehabilitation Department (C6) also exhibited relatively high exposure levels ( $L_{den} = 57.0$  dB,  $L_{night} = 51.7$  dB).

All predicted aircraft noise levels exceeded the WHO Environmental Noise Guidelines for the European Region (2018) [2], which recommend  $L_{den} \leq 45$  dB and  $L_{night} \leq 40$  dB (outdoor) to protect against adverse health outcomes such as annoyance, cardiovascular effects, and sleep disturbance. The estimated exposure levels at all surveyed hospital departments were therefore above the threshold associated with potential health risks, suggesting that hospital environments near Tan Son Nhat Airport are subject to continuous high noise burdens.

Figures 16 and 17 illustrate the distribution of aircraft noise contours around Tan Son Nhat Airport, highlighting areas exposed to  $L_{den}$  above 55 dB and  $L_{night}$  above 45 dB, which encompass all surveyed hospital locations.

Table 13. Average A-weighted noise level at patient areas in three years [34-36].

	Gastroenterology (A3)			Orthopedic/Physiotherapy – Rehabilitation Department (C6)	
	2022	2023		2024	2024
	Indoor (2F)	Indoor (2F)	Balcony (2F)	Indoor (2F)	Indoor (2F)
$L_{day}$	59.0	56.4	57.5	61.1	57.9
$L_{evening}$	58.7	55.1	57.5	61.0	57.0

$L_{night}$	52.9	49.8	54.3	52.1	51.7
$L_{den}$	61.6	59.0	61.7	62.8	60.3
$L_{Aeq,6-21}$	59.6	56.4	57.5	61.3	58.0
$L_{Aeq,21-6}$	53.0	50.6	54.6	53.2	52.1
$L_{Aeq,24h}$	58.3	55.1	56.7	59.6	56.6

Table 14. Average A-weighted noise level at staff areas in three years [34-36].

Inpatient Ward								
	2022		2023			2024		
	Balcony (4F)	Rooftop (10F)	Indoor (4F)	Balcony (4F)	Rooftop (10F)	Indoor (4F)	Balcony (4F)	Rooftop (10F)
$L_{day}$	57.9	62.1	57.5	56.3	61.9	46.7	56.7	61.1
$L_{evening}$	57.0	62.3	57.4	57.1	61.6	49.3	59.3	61.1
$L_{night}$	51.7	56.5	54.2	56.7	57.5	47.6	54.1	57.9
$L_{den}$	60.3	65.0	61.6	63.1	65.3	54.7	62.0	65.3
$L_{Aeq,6-21}$	58.0	62.3	57.5	56.5	61.9	47.7	56.9	61.1
$L_{Aeq,21-6}$	52.1	57.2	54.6	56.8	58.1	47.7	55.3	58.2
$L_{Aeq,24h}$	56.6	61.1	56.7	56.6	60.8	47.9	56.4	60.1

Table 15. The average number of daily flight operation in three years (source: by author).

	Operation Models	2022-Aug	2023-Aug	2024-Aug
Day (6:00–18:00)	Arrival	175	206	206
	Departure	176	223	226
	Total	346	429	432
	Arrival	55	78	75

Evening (18:00–22:00)	Departure	56	72	77
	Total	111	150	152
Night (22:00–6:00)	Arrival	51	76	87
	Departure	53	69	71
All day	Total	104	145	158
	Arrival	281	360	368
	Departure	285	365	374
	Total	566	725	742

Table 16. Estimated aircraft noise exposure levels at the surveyed hospital from (2022–2024) (Adapted from the article under review, Nguyen et al., 2025, Noise & Health, Manuscript ID: nah\_223\_25.)

Location	$L_{den}$			$L_{night}$		
	2022	2023	2024	2022	2023	2024
Gastroenterology (A3)	55.1	56.6	56.6	46.6	49.1	51.7
Orthopedic/Physiotherapy Rehabilitation Department (C6)	-	-	57.0	-	-	51.7
Inpatient ward	55.9	57.5	57.5	47.4	49.9	52.2

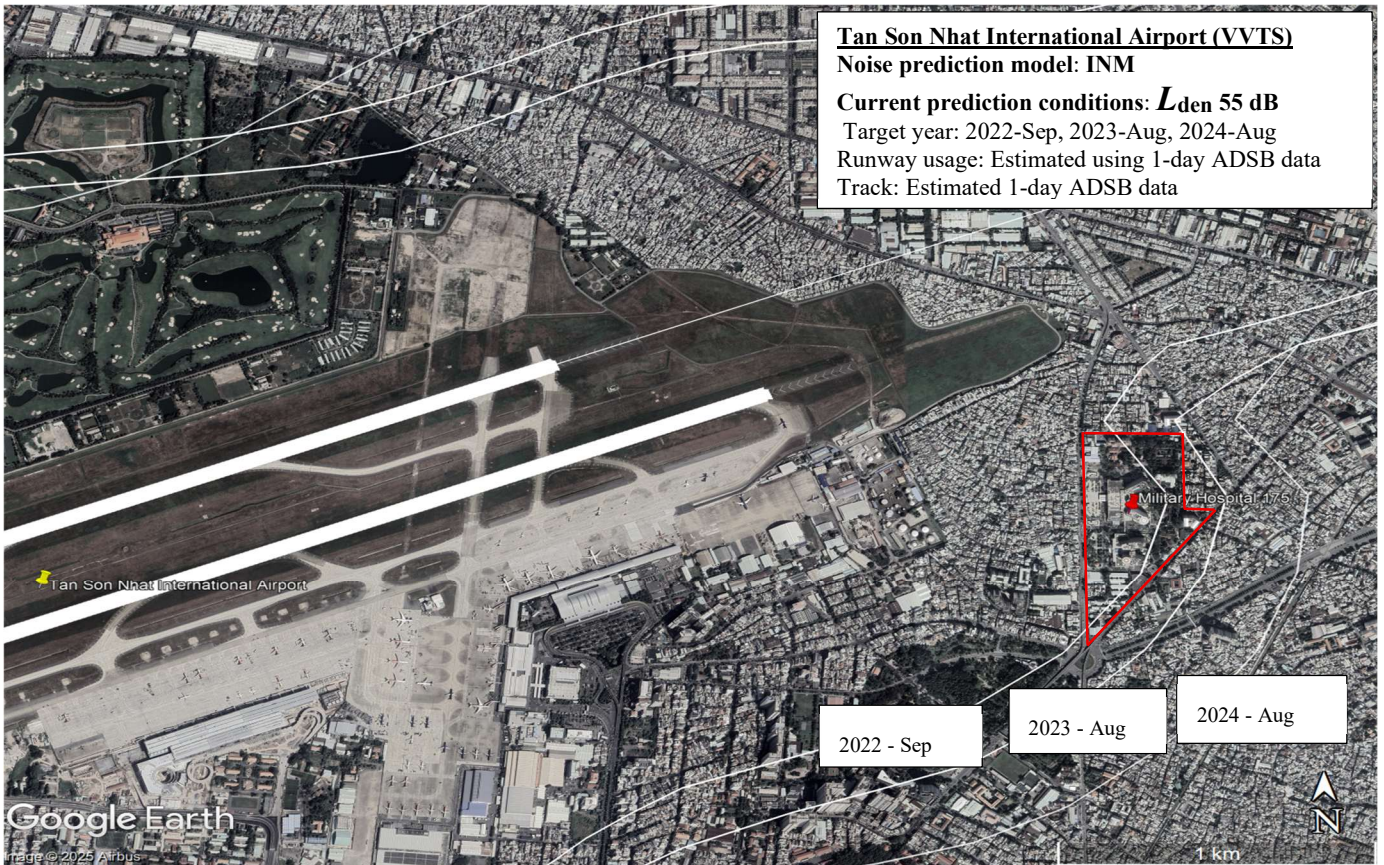


Figure 16. Noise contours of TSN Airport delineate the areas exposed to day-evening-night noise levels exceeding 55 dB across all surveyed hospital. (Adapted from article under review, Nguyen et al., 2025, Noise & Health.)

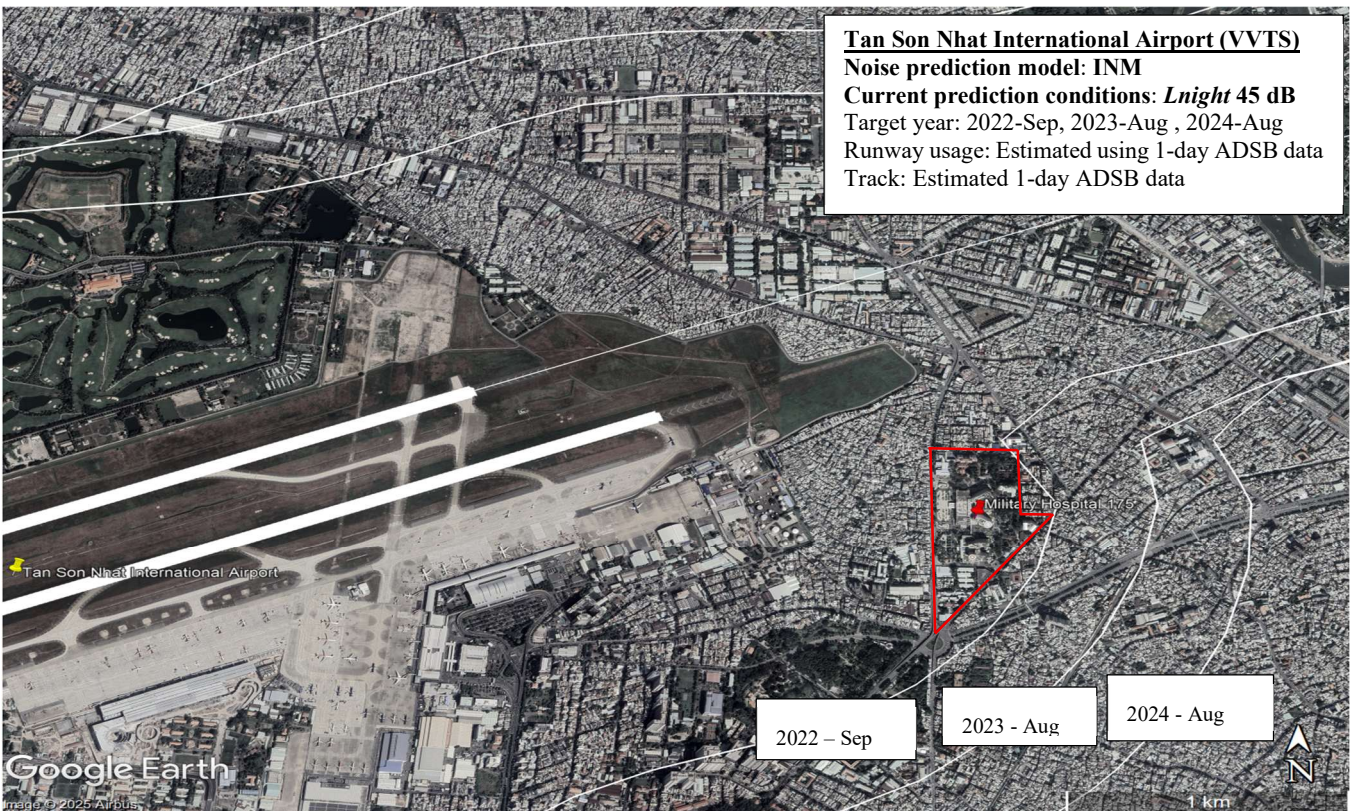


Figure 17. Noise contours of TSN Airport delineate the areas exposed to nighttime noise levels exceeding 45 dB across all surveyed hospital. (Adapted from article under review, Nguyen et al., 2025, Noise & Health.)

### 4.3.2 Associations Between Noise Exposure and Self-Reported Health Outcomes

#### 4.3.2.1 Questionnaire Survey Results

Table 17 presents the results of structured questionnaire surveys conducted in 2022, 2023, and 2024 among patients and staff at the surveyed hospital. The surveys assessed participants’ characteristics, perceptions of the hospital environment, noise sensitivity, sleep quality, and self-rated health status. Overall, noise sensitivity and annoyance increased over time, accompanied by a decline in staff satisfaction with quietness, suggesting a rising awareness of hospital noise issues. The habit of opening windows has decreased, likely reflecting attempts to reduce outdoor noise intrusion. In 2024, 17.1% of staff and nearly half of the patients reported annoyance caused by aircraft noise. Sleep and health indicators also suggested potential noise-related effects: up to 60% of patients reported poor sleep during noisy periods, while a smaller proportion of staff experienced insomnia or stress. Patients consistently reported poorer overall health than the staff. Lifestyle responses among staff showed gradual improvement, including less alcohol use and more physical activity.

Table 17. Data on personal and attitudinal, and self-rated health variables (2022-2023-2024) (Survey data collected and compiled by the authors; adapted from article under review, Nguyen et al., 2025, Noise & Health and [34,35]).

		Staff			Patients		
		2022 survey	2023 survey	2024 survey	2022 survey	2023 survey	2024 survey
Number of responses		28	28	35	4	2	5
<b>Personal and attitudinal variables</b>							
Gender	Male	50.0 (14/28)	60.7 (17/28)	82.9 (29/35)	100.0 (4/4)	100.0 (2/2)	80.0 (4/5)
Age	<60 years old	100.0 (28/28)	100.0 (28/28)	100 (35/35)	50.0 (2/4)	100.0 (2/2)	80.0 (4/5)
Area preference (Positive)	Room	100.0 (26/26)	100.0 (28/28)	97.1 (34/35)	75.0 (3/4)	100.0 (2/2)	80.0 (1/5)
	Surrounding environment	100.0 (27/27)	100.0 (28/28)	97.1 (34/35)	100.0 (4/4)	100.0 (2/2)	100.0 (5/5)
	Living condition	Streets, sceneries, buildings	100.0 (27/27)	100.0 (28/28)	97.1 (34/35)	100.0 (4/4)	100.0 (2/2)
	View from room	100.0 (27/27)	100.0 (28/28)	91.4 (32/35)	100.0 (4/4)	100.0 (2/2)	100.0 (5/5)

	Quietness	100.0 (27/27)	85.7 (24/28)	85.7 (30/35)	75.0 (3/4)	0	100.0 (5/5)
	Convenience	100.0 (27/27)	92.9 (26/28)	88.6 (31/35)	100.0 (4/4)	100.0 (2/2)	100.0 (5/5)
Open windows of the room	Dry season	51.9 (14/27)	50.0 (14/28)	25.7 (9/35)	0	0	40.0 (2/5)
	Rainy season	44.4 (12/27)	39.3 (11/28)	14.3 (5/35)	0	0	0
Sensitivity	Cold	0	0	2.9 (1/35)	0	0	0
	Hot	7.1 (2/28)	10.7 (3/28)	11.4 (4/35)	0	0	60.0 (3/5)
	Noise	7.1 (2/28)	3.6 (1/28)	17.1 (6/35)	0	50.0 (1/2)	60.0 (3/5)
	Vibration	3.6 (1/28)	3.6 (1/28)	0	0	0	0
<b>Self-rated health variables</b>							
Annoyance (5-point verbal scale)	Aircraft noise	3.6 (1/28)	0	17.1 (6/35)	0	0	0
	Road traffic noise	0	3.6 (1/28)	14.3 (5/35)	0	100.0 (2/2)	20.0 (2/5)
	Vibration	3.6 (1/28)	3.6 (1/28)	11.4 (4/35)	0	0	0
Annoyance (11-numerical scale)	Highly annoyed (Aircraft noise)	0	0	5.7 (2/35)	0	50.0 (1/2)	40.0 (2/5)
Sleep Quality	Low	10.7 (3/28)	7.1 (2/28)	5.7 (2/35)	33.3 (1/4) before 50.0 (2/4) during	0 (0/2) before 100.0 (2/2) during	0 (0/5) before 60.0 (3/5) during
Insomnia	Have symptoms	3.6 (1/28)	0	2.9 (2/35)	0	0	0
Depression	Have symptoms	0	0	5.7 (2/35)	0	0	0
Hearing ability	Have difficulty	0	0	0	0	0	0
Health status	Bad	7.1 (2/28)	7.1 (2/28)	0	100.0 (3/3)	100.0 (2/2)	80.0 (4/5)
Life satisfaction	Dissatisfied	0	0	0	0	0	0

Stress	Stressful	14.3 (4/28)	17.9 (5/28)	11.4 (4/35)	0	0	0
Morbidity	Have symptoms	3.6 (1/28)	10.7 (3/28)	5.7 (2/35)	75.0 (3/4)	100.0 (2/2)	60.0 (3/5)
	Salt intake (much)	0 (0/19)	4.8 (1/21)	0	0	0	0
	Nutrition (Do not think)	61.1 (11/18)	45.0 (9/20)	71.4 (25/35)	33.3 (1/3)	0	60.0 (3/5)
Routines	Drink much alcohol	79.2 (19/24)	19.2 (5/26)	26.5 (9/34)	100.0 (4/4)	0	0
	Smoking (a lot)	4.2 (1/24)	0	0	0	0	0
	Do not do exercises much	44.0 (11/25)	37.0 (10/27)	5.7 (2/35)	50.0 (2/4)	100.0 (2/2)	60.0 (3/5)
BMI*	>29	0	0	2.9 (1/35)	0	0	0

\*BMI categories were defined according to WHO global standards (BMI  $\geq$  30 kg/m<sup>2</sup>) rather than Asian-specific cutoffs to allow comparability with previous international studies [24].

#### 4.3.2.2 Association Between Noise Exposure and Insomnia

Table 18 summarizes the bivariate likelihood ratio test results for factors associated with self-reported insomnia. Among all examined variables, only odor sensitivity (L-R  $\chi^2 = 4.81$ ,  $p = 0.0284$ ) and life satisfaction (L-R  $\chi^2 = 5.11$ ,  $p = 0.0237$ ) were found to have statistically significant associations with insomnia. Noise exposure indicators such as  $L_{\text{night}}$ ,  $L_{\text{den}}$ , and  $L_{\text{Aeq}}$  did not show significant relationships ( $p > 0.05$ ), nor did subjective environmental factors including quietness and stress. Based on these results, odor sensitivity and life satisfaction (both  $p < 0.05$ ) were included in the multiple logistic regression model, along with  $L_{\text{night}}$ , duration of residence, quietness, and stress as control variables to account for potential confounding effects. As shown in Table 19, only odor sensitivity (OR = 24.57,  $p = 0.0126$ ) and life satisfaction (OR = 0.165,  $p = 0.0089$ ) remained significantly associated with insomnia. Participants who were more sensitive to odors had a substantially higher likelihood of reporting insomnia, while those dissatisfied with life were also more likely to experience sleep disturbance. Other variables, such as the measured night-time noise level ( $L_{\text{night}}$ ), perceived quietness, stress, and duration of residence, were not statistically significant ( $p > 0.05$ ). The model achieved a good predictive performance (AUC = 0.77), indicating that psychosocial and perceptual factors contributed more strongly to insomnia than objective noise exposure.

Table 18. Bivariate likelihood ratio test for potential predictors of insomnia. Each variable was individually tested for its association with self-reported insomnia using the likelihood ratio chi-square test (source: by author).

Variable	Likelihood Ratio Chi-square	p-value
----------	-----------------------------	---------

$L_{Aeq,24h}$	1.358	0.244
$L_{den}$	0.000	—
$L_{night}$	1.037	0.309
Length of residence	1.088	0.297
Area preference	0.000	0.999
Surrounding environment	0.000	—
Sceneries	—	—
View from room	0.000	0.999
Quietness	0.047	0.828
Convenience	0.005	0.942
Open window (dry season)	0.738	0.390
Open window (rainy season)	0.177	0.674
Cold	0.000	0.998
Hot	0.004	0.949
Noise perception	0.333	0.564
Vibration	0.000	0.999
Chemicals	0.000	—
Odor sensitivity	4.805	0.0284*
Staying at home	—	—
Life satisfaction	5.114	0.0237*
Health status	0.278	0.598
Stress	0.034	0.854
Salt intake	0.105	0.745
Nutrition	0.046	0.831
Alcohol	0.147	0.701

Smoking	—	—
Exercise	0.104	0.747

\*p-value < 0.05

Table 19. The multiple logistic regression of insomnia (Generalized R2: 0.1764; AUC: 0.77039). (Adapted from article under review, Nguyen et al., 2025, Noise & Health.)

Item	Category	Estimate	Std Error	p-Value	Odds Ratio
Intercept		-7.682	8.058	0.3404	
$L_{\text{night}}^{\text{b}}$		0.120	0.147	0.4131	1.128b
Odor sensitivity	Not sensitive				1
	Sensitive	-1.601	0.643	0.0126*	24.570
Duration of residence	>5 years				1
	≤5 years	-0.214	0.957	0.8230	1.534
Quietness	Good				1
	Bad	0.638	0.492	0.1944	0.279
Stress	Not stressful				1
	Stressful	0.461	0.596	0.4396	1.585
Life satisfaction	Satisfied				1
	Dissatisfied	0.901	0.344	0.0089*	0.165

<sup>b</sup> Night-time equivalent continuous sound pressure level

\*p-value < 0.05

#### 4.3.2.3 Association Between Noise Exposure and Annoyance

Table 20 summarizes the results of the bivariate likelihood ratio tests for potential predictors of annoyance. Among all examined variables, quietness (L-R  $\chi^2 = 67.48$ ,  $p < 0.0001$ ), cold perception (L-R  $\chi^2 = 52.08$ ,  $p < 0.0001$ ), and stress (L-R  $\chi^2 = 57.30$ ,  $p < 0.0001$ ) were significantly associated with annoyance. In contrast, objective noise indicators such as  $L_{\text{Aeq}}$ ,  $L_{\text{den}}$ , and  $L_{\text{night}}$  showed no significant relationships ( $p > 0.05$ ).

Based on the bivariate results, quietness and stress (both  $p < 0.001$ ) were selected as key subjective predictors, while  $L_{\text{den}}$  was included in the multivariate model to represent objective noise exposure. Table 21 presents the results of the multiple logistic regression analysis examining factors associated with self-reported annoyance. After adjusting for potential confounders, both the day-evening-night noise level ( $L_{\text{den}}$ ) ( $p = 0.0137$ ) and perceived quietness ( $p = 0.0236$ ) remained

significant predictors of annoyance. Participants who perceived their environment as “bad” in terms of quietness were substantially more likely to report annoyance (OR = 31.46), while higher  $L_{den}$  values were also associated with increased annoyance. In contrast, stress was not statistically significant ( $p = 0.1514$ ). The model demonstrated excellent discriminative ability (AUC = 0.91), indicating that the combined effects of objective noise exposure and subjective environmental perception accounted for a large proportion of the variance in annoyance.

Table 20. Bivariate likelihood ratio test for potential predictors of annoyance. Each variable was individually tested for its association with self-reported insomnia using the likelihood ratio chi-square test (source: by author).

Variable	Likelihood Ratio Chi-square	p-Value
$L_{Aeq,24h}$	0.00006	0.9938
$L_{den}$	0.0000000016	1.0000
$L_{night}$	0	—
Duration of residence	0.0000000006	1.0000
Area preference	0.2235	0.6364
Surrounding environment	0	—
Sceneries	—	—
View from room	0.0000000228	0.9999
Quietness	67.4805	<0.0001
Convenience	0.0000000287	0.9999
Open window (dry season)	0.0000000189	0.9999
Open window (rainy season)	0.0000000249	0.9999
Cold	52.0751	<0.0001
Hot	0.0000000065	1.0000
Noise perception	0.0668	0.7960
Vibration	0.0000000127	1.0000
Chemicals	0	—
Odors	0.000000408	0.9995
Stay at home	—	—

Life satisfaction	0.0000000055	0.9999
Health status	0.0000969	0.9921
Stress	57.3018	<0.0001
Salt intake	0.000000408	0.9995
Nutrition	0.0000000000869	1.0000
Alcohol	0.000000000351	1.0000
Smoking	—	—
Exercise	0.0000000524	0.9998

\*p-value < 0.05

Table 21. The multiple logistic regression of annoyance (Generalized R2: 0.3116; AUC: 0.91039). (Adapted from article under review, Nguyen et al., 2025, Noise & Health.)

Item	Category	Estimate	Std Error	p-Value	Odds Ratio
Intercept		36.769	28.666	0.1996	
$L_{den}^a$		-0.637	0.468	0.0137	0.529
Quietness	Good				1
	Bad	-1.724	0.762	0.0236*	31.462
Stress	Not stressful				1
	Stressful	-1.195	0.809	0.1514	10.931

<sup>a</sup> Day-evening-night-time equivalent continuous sound pressure level

\*p-value < 0.05

### 4.3.3 Health Monitoring Outcomes

#### 4.3.3.1 Associations Between Sleep Stages and Noise Exposure

A total of five recovering patients and twenty-eight healthy hospital staff members participated in the study. Participants wore the device throughout their sleep period, from bedtime until waking, for one night of observation. Table 22 and 23 summarizes the demographic characteristics of the participants by sex and age group for 2023 and 2024. In 2023, data were obtained from 21 participants (19 staff and 2 patients), while in 2024, 14 participants (9 staff and 5 patients) were included in the analysis.

Figure 18 presents the distributions of  $L_{Aeq}$ ,  $L_{Amax}$ , and  $L_{Amin}$  across different sleep stages among patients after outlier removal.  $L_{Aeq}$  showed relatively small variation across stages, ranging approximately from 48 to 50 dB, indicating a stable background noise environment during sleep.

The Kruskal–Wallis test indicated that differences in  $L_{Aeq}$  across sleep stages approached statistical significance ( $H = 7.512, p = 0.057$ ). In contrast,  $L_{Amax}$  differed significantly among sleep stages ( $H = 9.684, p = 0.021$ ), with higher peak noise levels observed during wake periods. These peaks occasionally exceeded 65 dB, suggesting the presence of intermittent noise events with the potential to disrupt sleep continuity.  $L_{Amin}$  remained relatively stable across stages ( $H = 6.651, p = 0.084$ ), varying within a narrow range of approximately 45–48 dB, reflecting limited fluctuation in the lowest ambient noise levels.

Figure 19 illustrates the distributions of  $L_{Aeq}$ ,  $L_{Amax}$ , and  $L_{Amin}$  across sleep stages among hospital staff. For  $L_{Aeq}$ , median values were similar across wake, REM, light, and deep sleep stages, generally ranging between approximately 53 and 56 dB. Despite the relatively small absolute differences, the Kruskal–Wallis test indicated a statistically significant difference among sleep stages ( $H = 18.437, p < 0.001$ ), reflecting subtle but consistent variation in background noise levels across stages. For  $L_{Amax}$ , clearer differences were observed across sleep stages. Median  $L_{Amax}$  values were higher during wake and light sleep compared with REM and deep sleep stages, with some peak values approaching or exceeding 70 dB during wake periods. The Kruskal–Wallis test confirmed a significant difference in  $L_{Amax}$  among sleep stages ( $H = 26.425, p < 0.001$ ), indicating that peak noise events varied systematically with sleep stage. For  $L_{Amin}$ , median values were clustered within a narrow range (approximately 50–54 dB) across all sleep stages. Statistically significant differences were detected among stages ( $H = 13.968, p = 0.003$ ), suggesting small but consistent variations in the lowest ambient noise levels.

Table 22. Distribution of patients by sex and age group for sleep quality analysis [36].

Year	Sex	20-29	30-39	40-49	50-59
2023	Female	0	0	0	0
	Male	0	0	0	2
2024	Female	1	2	0	1
	Male	1	3	0	2

Table 23. Distribution of staff by sex and age group for sleep quality analysis [36].

Year	Sex	20-29	30-39	40-49	50-59
2023	Female	5	3	0	0
	Male	6	5	0	0
2024	Female	1	2	0	0
	Male	3	3	0	0

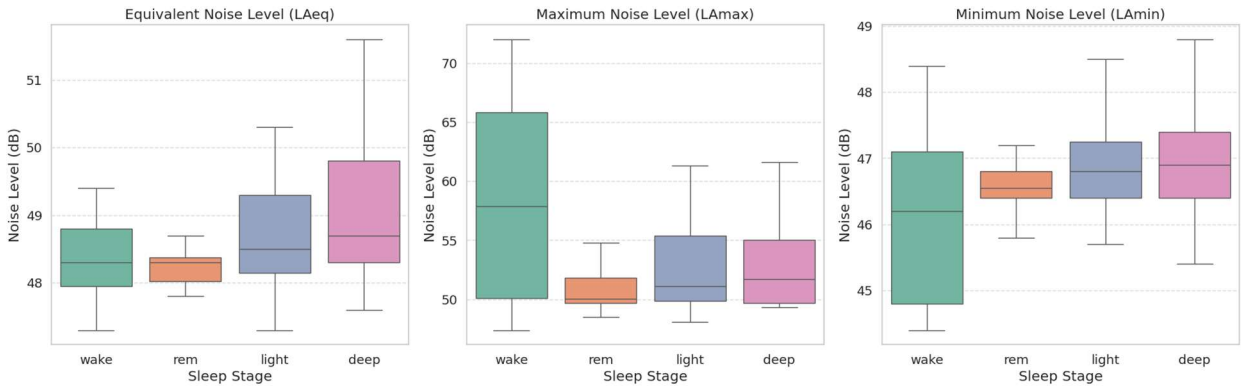


Figure 18. Comparison of noise levels across sleep stages of all patients (Source: article under review, Nguyen et al., 2025, Noise & Health.)

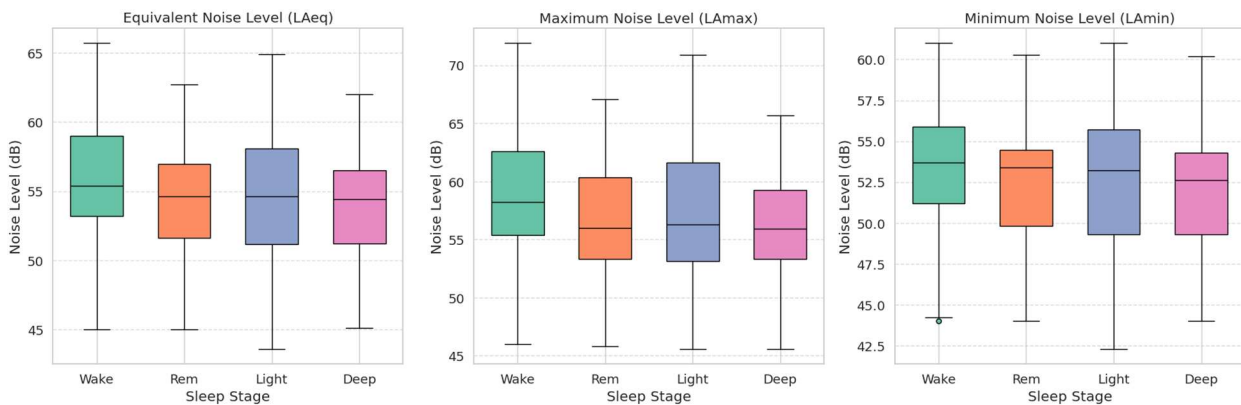


Figure 19. Comparison of noise levels across sleep stages of all staff (Source: article under review, Nguyen et al., 2025, Noise & Health.)

#### 4.3.3.2 Associations Between HRV Indices and Noise Exposure

Figures 21a–21b and 23a–23b present the correlations between environmental noise indicators ( $L_{Aeq}$ ,  $L_{Amax}$ , and  $L_{Amin}$ ) and heart rate variability (HRV) indices among hospital staff ( $n = 8$ ) and patients ( $n = 4$ ) monitored during 2022–2024. The Spearman’s correlation heatmap (Figure 20) for staff revealed overall weak and non-significant associations between noise and HRV parameters ( $|\rho| < 0.3$ ,  $p > 0.05$ ). Among time-domain indices, SDNN showed a slight positive correlation with  $L_{Aeq}$  ( $\rho = 0.22$ ), while RMSSD, reflecting short-term parasympathetic activity, remained stable across different noise levels ( $\rho = 0.00$ ). In the frequency- and nonlinear-domain measures, the LF/HF ratio, DFA  $\alpha_1$ , and DFA  $\alpha_2$  demonstrated mild negative correlations ( $\rho \approx -0.3$  to  $-0.1$ ), suggesting a small, non-significant reduction in HRV complexity or vagal modulation under higher noise exposure. Overall, these findings indicate that fluctuations in environmental noise did not induce measurable physiological stress among staff, likely due to habituation or adaptation to the hospital’s acoustic environment.

In contrast, the correlation heatmap for patients (Figure 22) showed a markedly different pattern. Moderate correlations were observed between noise indicators and specific HRV metrics—particularly positive correlations between RMSSD and all noise indicators ( $\rho \approx 0.6$ ) and negative correlations between DFA  $\alpha_1$  and noise levels ( $\rho \approx -0.6$ ). Although these relationships did not reach statistical significance ( $p > 0.05$ ), they imply a greater physiological sensitivity to noise among patients compared with staff.

The observed increase in RMSSD with higher  $L_{Aeq}$  or  $L_{Amax}$  may reflect transient autonomic adjustments or compensatory vagal activation in response to noise, whereas the decrease in DFA  $\alpha1$  and DFA  $\alpha2$  suggests a reduction in heart-rate complexity and autonomic flexibility, consistent with mild stress-related autonomic activation.

These findings suggest that patients exhibited a more reactive autonomic profile to environmental noise, while staff members displayed physiological stability and signs of long-term adaptation. The scatter plots (Figures 21a–21b) further support the absence of strong linear trends between acoustic indicators and HRV metrics, confirming that noise variations within the hospital did not produce measurable effects on autonomic cardiac regulation among staff participants.

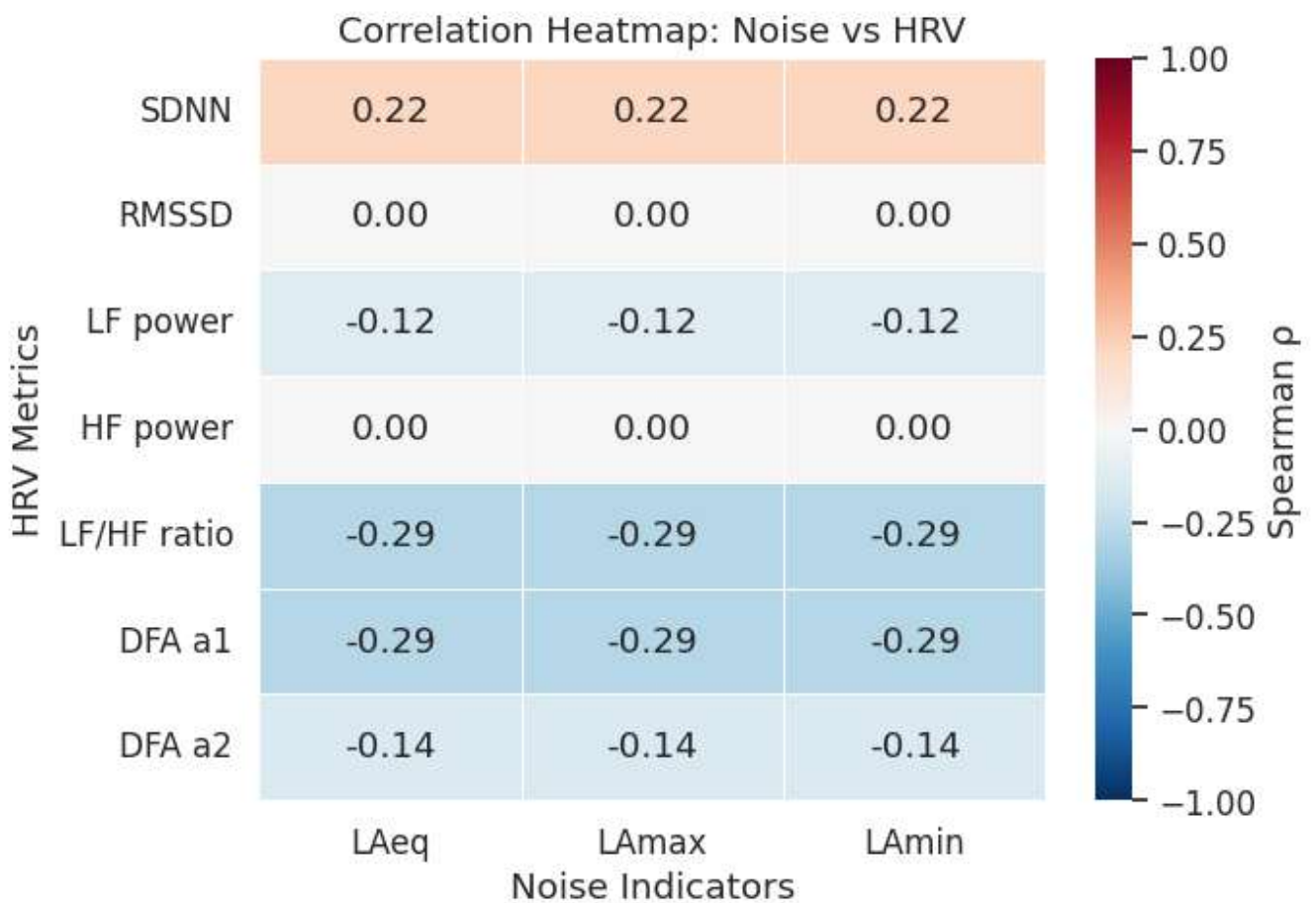


Figure 20. Spearman’s correlation heatmap showing relationships between environmental noise indices ( $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$ ) and HRV parameters (SDNN, RMSSD, LF, HF, LF/HF ratio, DFA  $\alpha1$ , DFA  $\alpha2$ ) among hospital staff ( $n = 8$ ) (source: by author).

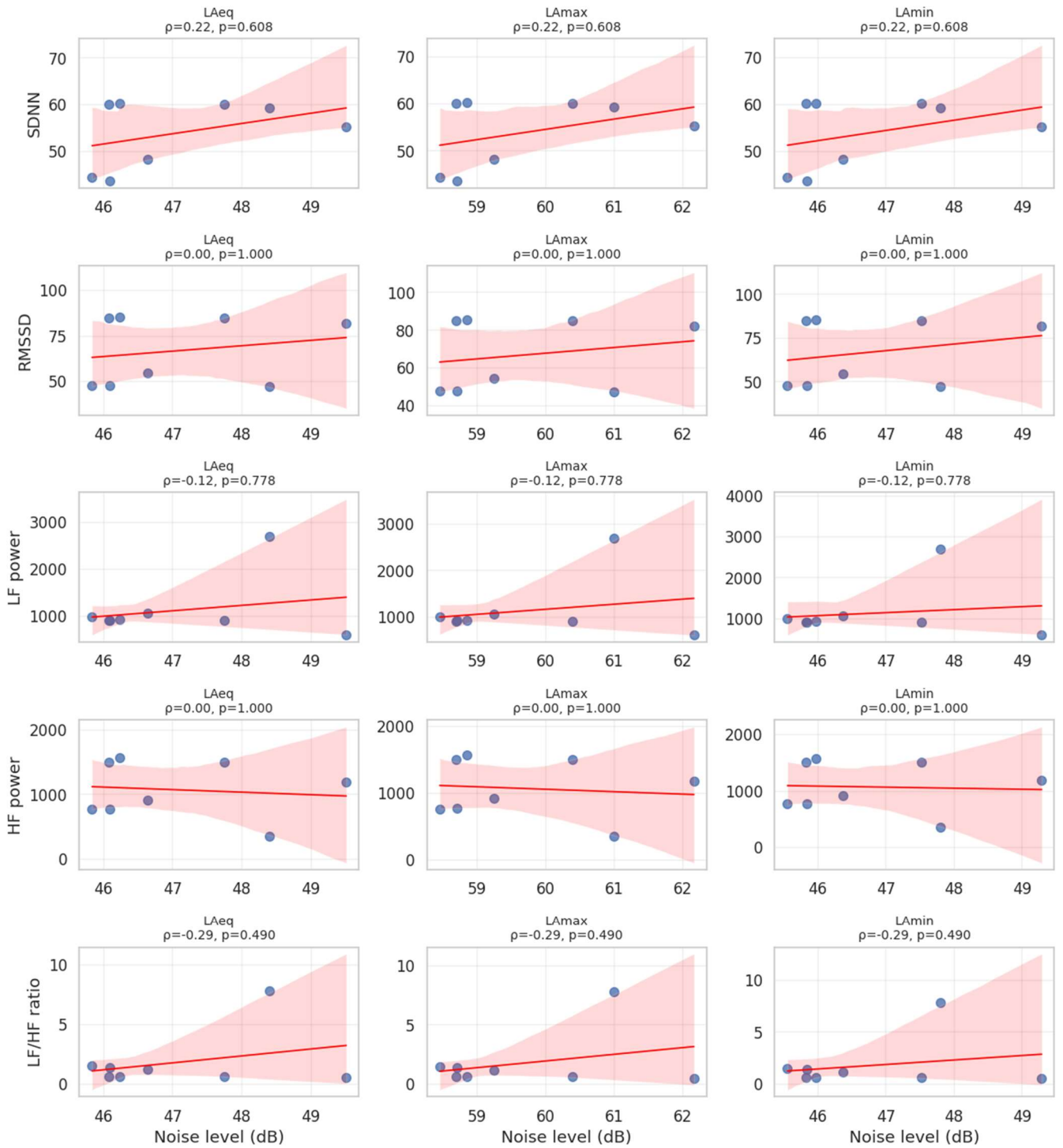


Figure 21a. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Time & frequency domain indices (SDNN, RMSSD, LF, HF, LF/HF ratio) among hospital staff ( $n = 8$ ). (Source: article under review, Nguyen et al., 2025, Noise & Health.)

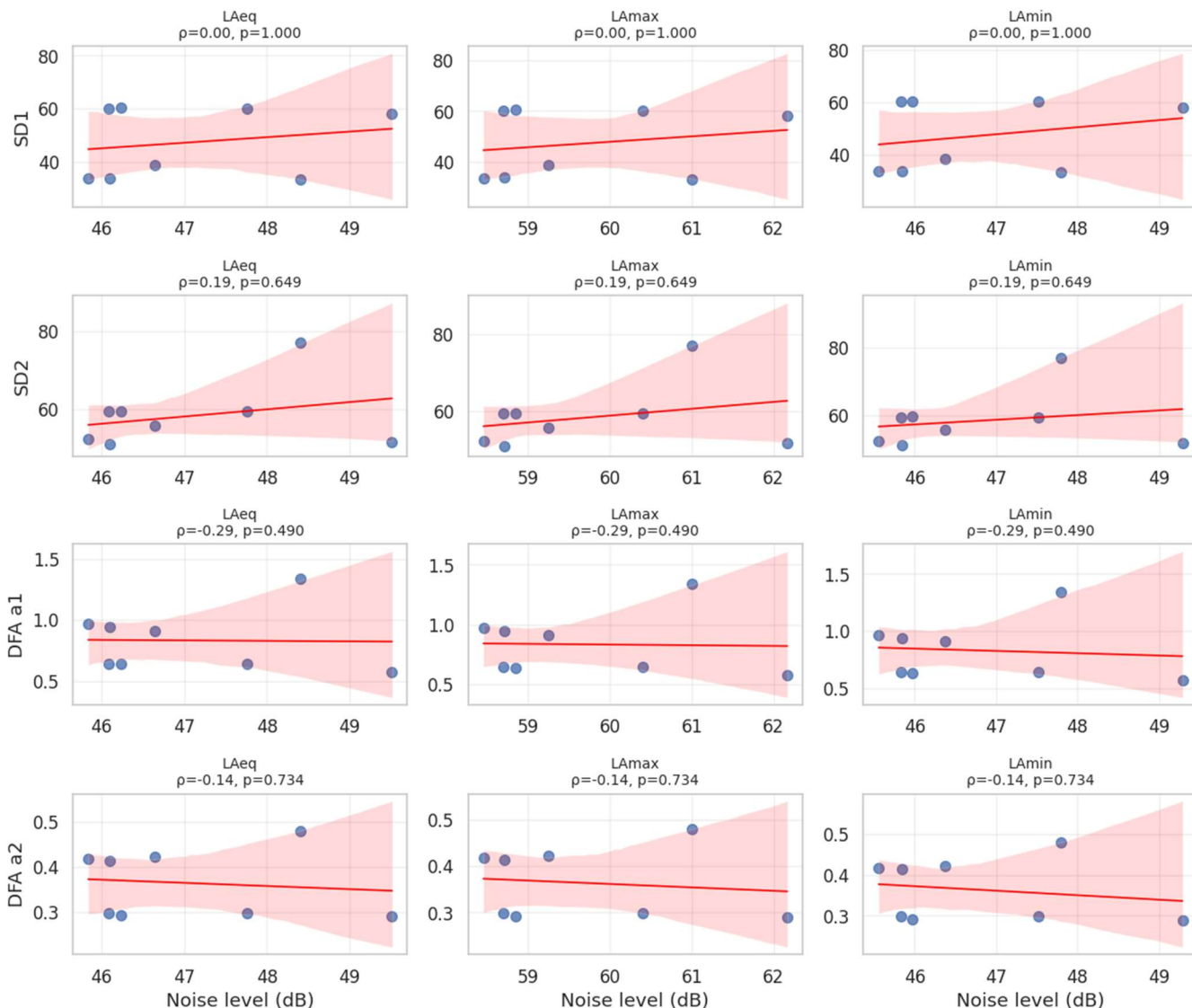


Figure 21b. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Nonlinear indices ( $SD1$ ,  $SD2$ ,  $DFA \alpha1$ ,  $DFA \alpha2$ ) among hospital staff ( $n = 8$ ). (Source: article under review, Nguyen et al., 2025, Noise & Health.)

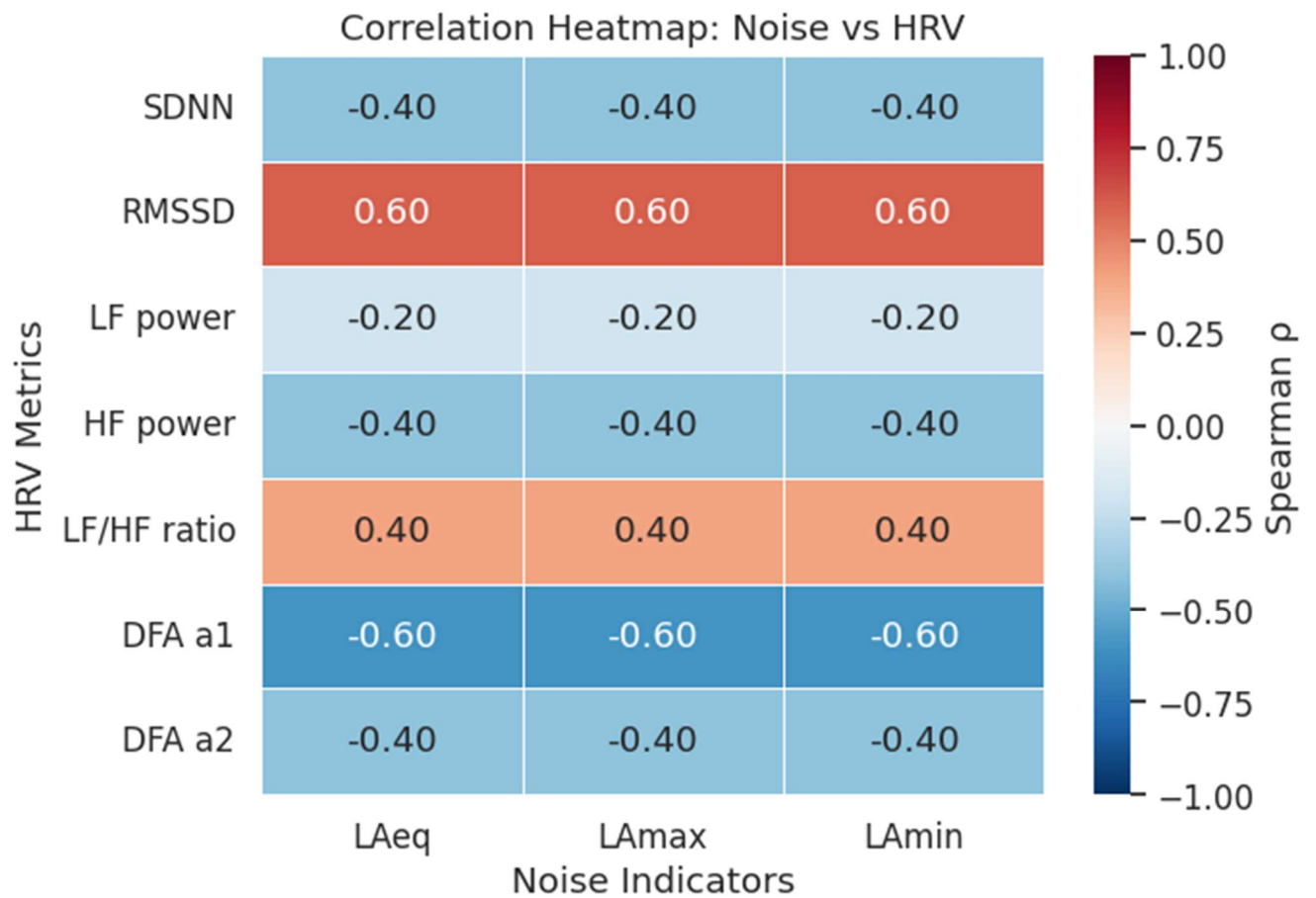


Figure 22. Spearman's correlation heatmap showing relationships between environmental noise indices (LAeq, LAmax, LAmin) and HRV parameters (SDNN, RMSSD, LF, HF, LF/HF ratio, DFA  $\alpha 1$ , DFA  $\alpha 2$ ) among patient ( $n = 4$ ) (source: by author).

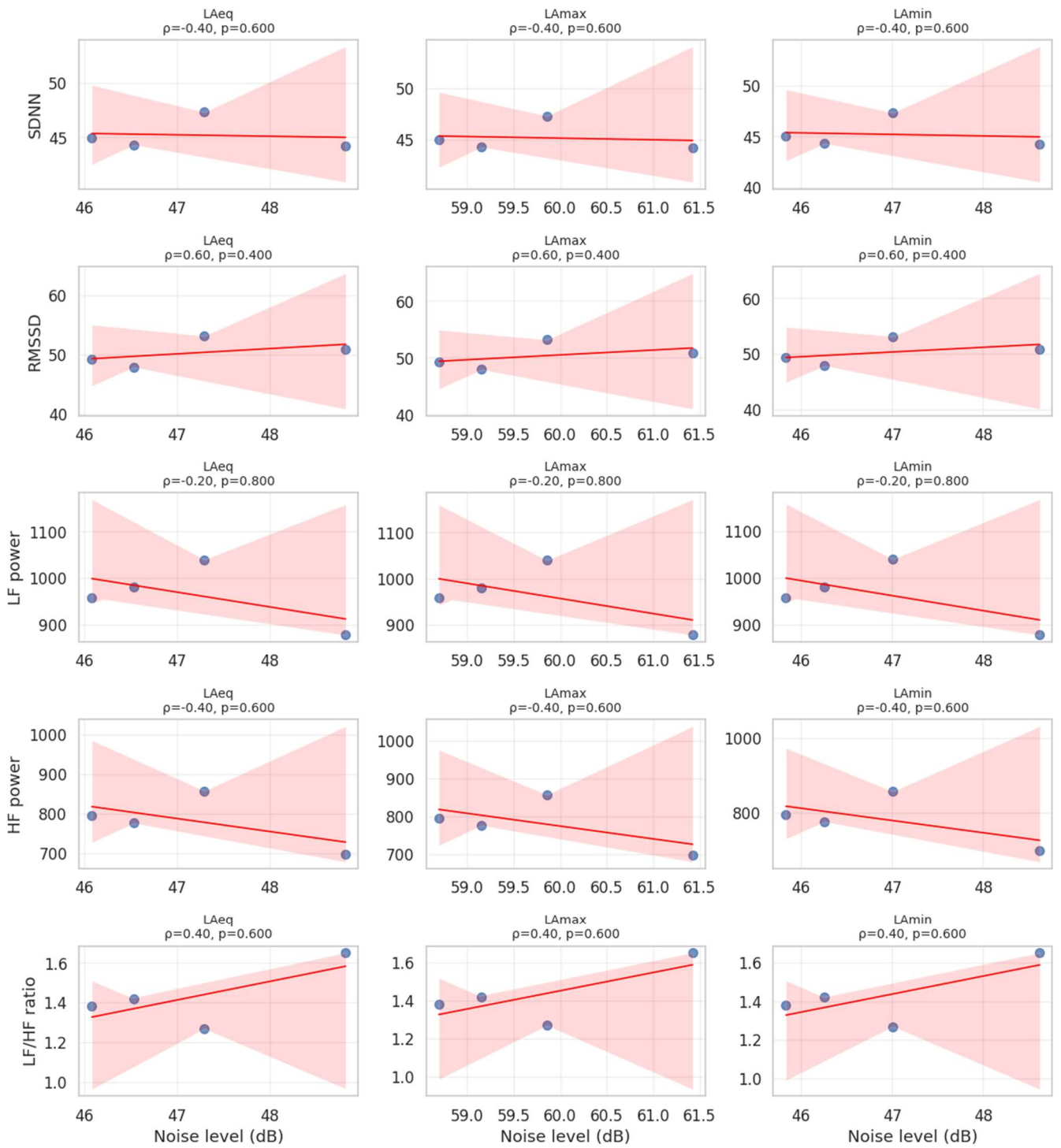


Figure 23a. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Nonlinear indices ( $SD1$ ,  $SD2$ ,  $DFA \alpha1$ ,  $DFA \alpha2$ ) among patient ( $n = 4$ ). (Source: article under review, Nguyen et al., 2025, Noise & Health.)

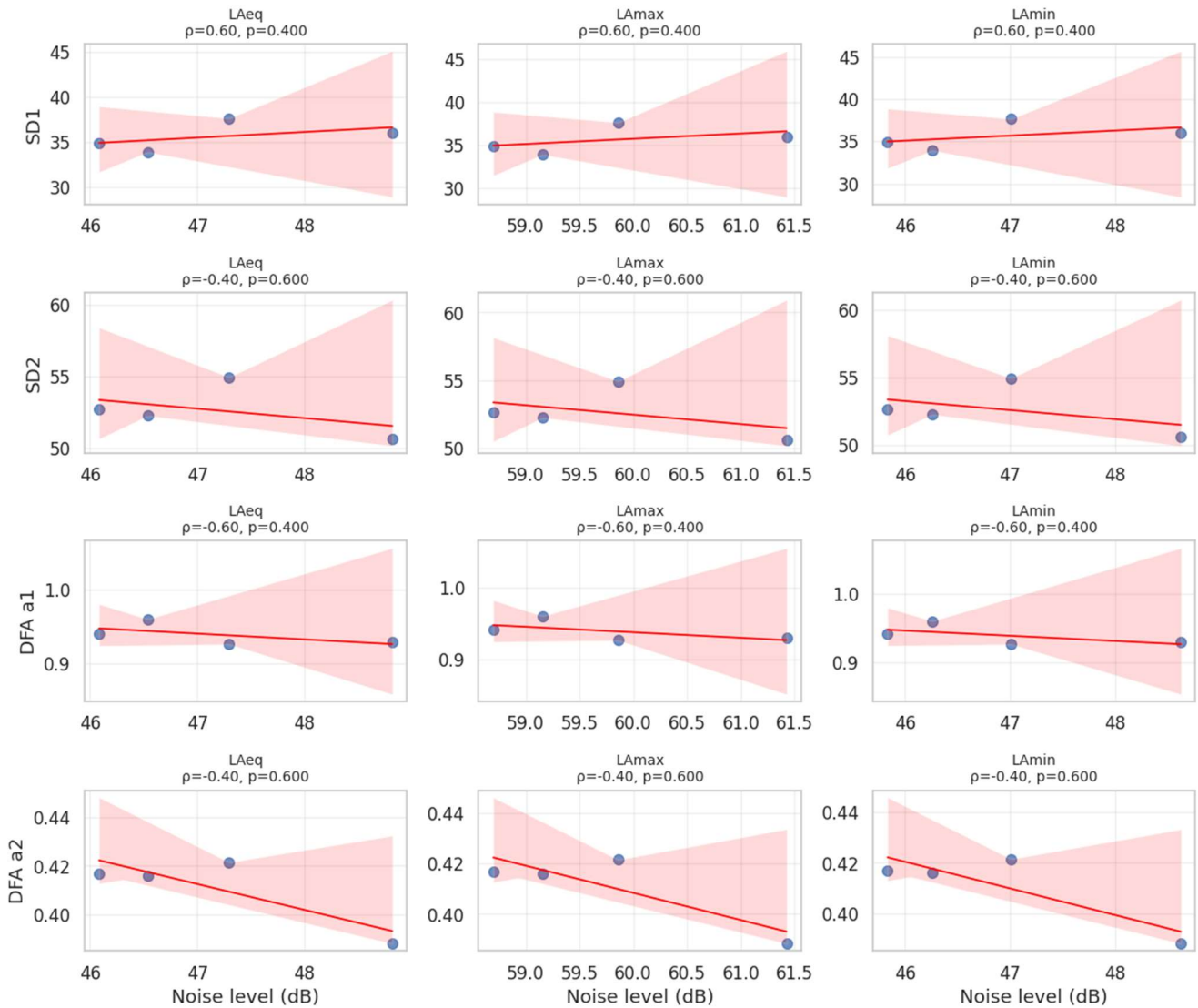


Figure 23b. Scatter plots showing correlations between  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{Amin}$  and Nonlinear indices (SD1, SD2, DFA  $\alpha 1$ , DFA  $\alpha 2$ ) among patient ( $n = 4$ ). (Source: article under review, Nguyen et al., 2025, Noise & Health.)

#### 4.4 Discussions

##### *Environmental context and acoustic implications*

This study provides new evidence that hospitals located near airports are continuously exposed to high background and intermittent noise levels that exceed both QCVN 26:2010/BTNMT standards and WHO standards [2,25]. Rather than reiterating the specific values, it is important to note that these acoustic conditions reflect a combination of external sources (aircraft, road traffic) and internal contributors (medical equipment, human activity). The coexistence of these noise sources creates a complex soundscape that is difficult to control. Similar situations have been described in hospitals near major transport corridors. In such settings, indoor noise levels often remain above recommended thresholds even when windows are closed [6,26]. The results suggest that acoustic mitigation in such environments cannot rely solely on structural insulation. This aligns with previous findings showing that hospital soundscapes are dominated by impulsive peaks and speech-related sounds, which are especially disruptive at night [3,26].

*Role of perception and psychological factors*

The absence of a statistically significant association between objective noise indicators and insomnia symptoms does not imply that noise exposure has no health relevance. Rather, it underscores the mediating role of psychological and perceptual factors in shaping health outcomes. In this study, odor sensitivity and life satisfaction emerged as significant predictors of insomnia, while annoyance was strongly associated with perceived quietness and stress. These findings reinforce the notion that individual responses to noise are not determined solely by sound pressure levels, but also by cognitive appraisal and emotional context [28–30].

Previous research has demonstrated that noise sensitivity functions as a vulnerability factor, amplifying annoyance and sleep disturbance even under moderate exposure conditions [31]. The observed association between perceived quietness and insomnia risk supports this framework, suggesting that subjective evaluations of the acoustic environment may play an important role alongside objective noise indicators in hospital settings. Consequently, interventions that address perceptual dimensions, such as acoustic zoning, spatial reorganization, patient education, and environmental design may yield meaningful improvements in comfort and sleep quality, even when large reductions in sound levels are difficult to achieve.

*Physiological adaptation and vulnerability*

Physiological findings from HRV analysis provide further insight into the differential responses of patients and medical staff exposed to the same acoustic environment. Among staff members, correlations between HRV indices and noise indicators were weak and non-significant, suggesting relative physiological stability. This pattern may reflect habituation or long-term adaptation to chronic occupational noise exposure, as reported in studies of workers in persistently noisy environments [32].

In contrast, patients exhibited moderate trend-level correlations between noise indicators and specific HRV metrics, including increased RMSSD and decreased DFA $\alpha$  indices with higher noise exposure. Although these associations did not reach statistical significance, likely due to the limited sample size and inter-individual variability, they suggest a tendency toward greater physiological reactivity among patients. Such trends are consistent with clinical and environmental health literature indicating that individuals with compromised health status or reduced coping capacity may show heightened autonomic sensitivity to environmental stressors, including noise [33].

Taken together, these findings support a conceptual framework in which objective noise exposure, subjective perception, and physiological susceptibility interact to influence health outcomes in hospital settings near airports. While medical staff may develop adaptive mechanisms over time, patients may remain potentially vulnerable to short-term acoustic fluctuations. Therefore, effective hospital noise management should combine conventional noise control with strategies that enhance perceived environmental control and promote a calm and restorative soundscape.

*Implications for hospital noise management near airports*

The present findings indicate that hospital noise management near airports should extend beyond uniform sound level reduction strategies and explicitly account for differences in vulnerability between patients and medical staff. While staff may develop physiological adaptation to long-term occupational noise exposure, patients—particularly those in recovery—appear more susceptible to short-term acoustic fluctuations and intermittent high-level noise events. From a practical

perspective, patient-centered acoustic strategies should prioritize the reduction of temporal variability and peak noise events during rest periods, especially at night. In addition to conventional building insulation, soundscape-oriented interventions, such as acoustic zoning, control of intrusive operational sounds, and the introduction of predictable and low-arousal background acoustic conditions may enhance perceived environmental control and support physiological recovery. These approaches are particularly relevant for hospitals located near airports, where complete elimination of external noise is often impractical.

### *Limitations*

This study has limitations related to sample size. The small and uneven sample size, particularly among patients, may have limited the statistical power to detect significant associations, especially in subgroup and physiological analyses. Staff were unavailable for monitoring due to busy night shifts, and only a limited number of healthy patients could participate. In this study, “healthy patients” refers to patients in stable condition without severe cardiovascular diseases, diagnosed sleep disorders, or conditions requiring intensive care. Therefore, the generalizability of results is restricted. Future studies should expand the sample size and include different hospital departments and longer observation periods to further clarify the relationship between hospital noise exposure, sleep quality, and health outcomes.

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## CHAPTER 5: CONCLUSIONS

This doctoral study examined the effects of environmental noise exposure on sleep, health, and well-being in both community and hospital settings surrounding Tan Son Nhat International Airport, Ho Chi Minh City. As discussed in Chapter 1, international research frameworks—including the WHO Environmental Noise Guidelines and large-scale epidemiological studies such as HYENA and DEBATS—have established exposure–response relationships linking aircraft noise to annoyance, sleep disturbance, and cardiovascular health risks. However, these relationships have been derived primarily from studies conducted in Europe and Japan, with limited empirical evidence from rapidly urbanizing cities in developing countries.

The community-based findings presented in Chapter 3 both support and extend these international observations. Consistent with WHO and HYENA-based evidence, aircraft noise exposure was associated with annoyance and sleep-related complaints. However, at comparable exposure levels, the overall proportion of highly annoyed residents was lower than that predicted by international reference curves. This difference highlights the influence of contextual and socio-environmental factors, as suggested in Chapter 1, including housing conditions, lifestyle, and cultural attitudes. Importantly, temporal variations in annoyance and insomnia observed across different phases of aircraft operation were not fully explained by acoustic indicators alone, indicating limitations in conventional exposure–response models.

This doctoral study investigated the effects of environmental noise exposure on health, sleep, and well-being among both community residents and hospital occupants in the urban vicinity of Tan Son Nhat International Airport, Ho Chi Minh City. As highlighted in Chapter 1, environmental noise has become a critical urban health issue, particularly in rapidly developing countries where residential areas and healthcare facilities are increasingly located close to major transportation infrastructure. Although international studies have established robust associations between aircraft noise, annoyance, sleep disturbance, and cardiovascular outcomes, empirical evidence integrating acoustic, psychological, and physiological perspectives remains limited in Vietnam. In response to these gaps, this study adopted a multidisciplinary framework to examine environmental-noise exposure and health responses across both community and hospital contexts.

By applying structural equation modeling (SEM), this study advances beyond the traditional exposure–response approaches emphasized in earlier research. In line with international evidence recognizing the importance of non-acoustic modifiers, the SEM analysis quantitatively demonstrated that housing characteristics, noise sensitivity, and psychosocial stress significantly mediated the relationships between aircraft noise exposure ( $L_{den}$  and  $L_{night}$ ) and health-related outcomes. This methodological contribution directly addresses the knowledge gap identified in Chapter 1 regarding the limited integration of acoustic and non-acoustic factors in noise–health research in Vietnam.

The hospital-based investigation reported in Chapter 4 further extends the scope of environmental-noise research beyond outdoor residential exposure, which has been the primary focus of most aircraft-noise studies reviewed in Chapter 1. Consistent with previous hospital-noise research, indoor noise levels frequently exceeded WHO guideline values and were associated with disturbed sleep and increased stress among hospital occupants. However, this study provides novel empirical evidence demonstrating that external transportation noise, particularly aircraft and road

traffic noise, contributes substantially to indoor noise exposure in a hospital located near an international airport.

Moreover, the findings confirm that acoustic indicators alone are insufficient to explain health-related responses in hospital environments. In agreement with emerging hospital-noise literature, perceptual and psychosocial factors played a central role in shaping sleep disturbance and physiological stress responses. Physiological analyses further revealed differential vulnerability between population groups: healthcare staff exhibited partial adaptation to chronic noise exposure, whereas patients showed stronger autonomic nervous system responses to intermittent high-noise events. These results directly address the gap identified in Chapter 1 regarding the lack of integrated studies combining indoor noise assessment with physiological health indicators in hospital settings.

From a policy and planning perspective, the results support the health-oriented approach advocated by the WHO Environmental Noise Guidelines while highlighting important limitations of purely engineering-based standards, such as Vietnam's current noise regulation (QCVN 26:2010/BTNMT). In line with the concerns raised in Chapter 1, the findings demonstrate that compliance with decibel-based limits alone may not adequately protect health, particularly in noise-sensitive environments such as hospitals located near major transportation infrastructure.

Overall, this thesis confirms the general applicability of international noise–health frameworks while demonstrating the need for context-specific adaptation in rapidly urbanizing environments. By integrating community-based SEM analysis with hospital-based indoor noise monitoring and physiological assessment, the study provides novel evidence that advances beyond conventional exposure–response models. The findings underscore the importance of interdisciplinary, health-based noise management strategies that account for non-acoustic factors and indoor exposure pathways, thereby contributing to more effective and locally relevant approaches to urban and hospital noise management in Vietnam.

## CHAPTER 6: FUTURE RESEARCH DIRECTIONS

### Integration of Green Environment into Environmental Noise–Health Assessment

Building upon the current findings, future studies should focus on integrating green environmental factors—quantified through the Normalized Difference Vegetation Index (NDVI) to understand how vegetation moderates' community responses to environmental noise.

#### 6.1 Study Background

The preceding chapters of this thesis demonstrated that environmental noise exposure significantly influenced community responses, including annoyance, sleep disturbance, and short-term physiological indicators such as heart rate variability (HRV). Chapter 3 revealed that, across the 12 residential sites around Tan Son Nhat Airport, community annoyance and insomnia varied not only with acoustic indicators ( $L_{den}$ ,  $L_{night}$ ) but also with contextual and psychological factors such as housing conditions, noise sensitivity, and stress. Chapter 4 further showed that within Military Hospital 175, indoor noise levels exceeded the WHO (2018) night-noise guideline of 40 dB, and participants who reported higher stress or lower life satisfaction exhibited greater insomnia risk and lower HRV. Although these results provide valuable insight into how acoustic and non-acoustic factors shape community responses, the potential influence of the green environment, a key determinant of psychological recovery and health has not yet been assessed. Urban greenery can reduce perceived annoyance through acoustic attenuation, visual comfort, and restorative perception mechanisms [2,4]. To quantify these effects, vegetation can be measured by the Normalized Difference Vegetation Index (NDVI), a satellite-derived indicator representing vegetation density and greenness. Integrating NDVI with environmental noise and health data will make it possible to clarify how green environments can buffer the negative impacts of environmental noise on community well-being, particularly in dense urban areas and hospital zones.

#### 6.2 Objectives of Future Research

Based on the findings from this thesis, the objectives of the proposed further study are to:

- Quantify the vegetation condition using the Normalized Difference Vegetation Index (NDVI) derived from Landsat 8/9 or Sentinel-2 satellite imagery and integrate it with environmental noise exposure maps ( $L_{den}$ ,  $L_{night}$ ) for both residential and hospital areas.
- Investigate the moderating or mediating role of NDVI in the relationship between environmental noise exposure and community responses such as annoyance, sleep disturbance, and HRV indices.
- Compare community responses between the 12 residential sites and the hospital environment to determine how vegetation coverage and visual green exposure affect perceived annoyance and physiological stress.
- Develop a predictive environmental health model integrating acoustic, environmental, and physiological data to guide evidence-based urban and hospital planning.

#### 6.3 Proposed Methodological Approaches

The proposed study will employ a spatially integrated and statistical approach consisting of three main components:

- **Data Integration**  
Environmental noise data ( $L_{den}$ ,  $L_{night}$ ,  $L_{Aeq}$ ) will be obtained from the previous noise modeling results in this thesis. NDVI and Enhanced Vegetation Index (EVI) values will be derived from Landsat 8/9 and Sentinel-2 imagery using Google Earth Engine (GEE). Mean NDVI values will be extracted for each study zone (residential site or hospital department) within defined buffer radii (e.g., 100–500 m) to represent the surrounding greenery.
- **GIS and Statistical Analysis**  
NDVI maps will be overlaid with environmental noise contours in QGIS to visualize the co-distribution of green and noisy zones. Spatial regression and Structural Equation Modeling (SEM) will be used to test whether NDVI moderates the causal pathway (noise → annoyance/sleep disturbance → health).  
The analysis will compare low- and high-green areas to detect threshold effects of vegetation on reducing noise annoyance and physiological stress.
- **Comparative and Longitudinal Study Design**  
The analysis will combine data from the 12 community sites and Military Hospital 175 to identify differences in environmental sensitivity and coping mechanisms. A longitudinal comparison (2019–2023) may be added to evaluate how vegetation recovery or loss influences community responses over time and between cultural contexts (Vietnam and Japan).

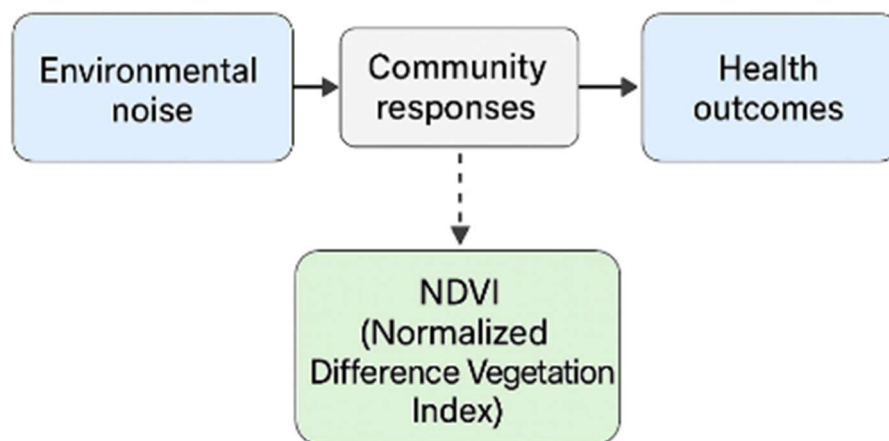


Figure 24. Proposed framework linking environmental noise, vegetation (NDVI), and community responses in residential and hospital settings.

#### 6.4 Expected Outcomes and Scientific Contributions

Based on the current findings and previous research, the proposed study is expected to produce the following outcomes:

- **Quantitative evidence for the “green–noise–response” relationship:**  
NDVI is expected to show an inverse relationship with annoyance and physiological stress, confirming its buffering effect in areas with high environmental noise exposure [2,3].
- **Improved modeling accuracy:**  
Incorporating NDVI into SEM models is anticipated to enhance the explanatory power of

previous frameworks [1,5]., leading to a more comprehensive understanding of community responses to environmental noise.

- Spatial identification of restorative versus vulnerable zones: Integrating NDVI and noise data in GIS will enable visualization of “high-noise–low-green” versus “low-noise–high-green” areas, supporting targeted interventions near hospitals and residential areas.
- Policy and planning applications: Findings will contribute to green-acoustic urban planning, encouraging the design of green buffer belts, tree corridors, and restorative outdoor environments around hospitals and residential communities, consistent with WHO (2018) [6] noise and health guidelines.

## 6.5 Summary

In summary, future studies should move toward a multi-dimensional assessment that integrates environmental noise exposure, vegetation conditions, and community health responses. The Normalized Difference Vegetation Index (NDVI) provides a valuable metric for quantifying greenery and its potential to mitigate the adverse effects of environmental noise. By combining NDVI, noise mapping, and health indicators such as annoyance, sleep quality, and HRV, researchers can clarify how green environments enhance community resilience and promote restorative urban and hospital design. Such interdisciplinary research will advance the understanding of environmental health interactions and contribute to sustainable, livable cities in both Japan and Vietnam.

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## **APPENDICES**

- Questionnaire 09/2020 – Japanese version
- Questionnaire 09/2020 – English version
- Questionnaire 09/2020 – Vietnamese version
- Questionnaire 06/2020 – Vietnamese version
- Questionnaire 2019 – English version
- Questionnaire 2019 – Vietnamese version
- Questionnaire 2023 – English version
- Questionnaire 2023 – Vietnamese version
- Questionnaire for surveyed hospital 2022,2023,2024 for Staff – English version
- Questionnaire for surveyed hospital 2022,2023,2024 for Staff – Vietnamese version
- Questionnaire for surveyed hospital 2022,2023,2024 for Patient – English version
- Questionnaire for surveyed hospital 2022,2023,2024 for Patient– Vietnamese version

## 生活環境と健康に関するアンケート

ID : 2020-0xx

日付 : 令和 2 年 9 月 xx 日

インタビュー対象者の名前 :

住所 :

GPS :

電話番号 / メール :

インタビュアーの名前 :

**Ho Chi Minh, 2020**

対応する回答を選択して確認することにより、次の質問に回答してください。

1. あなたの住宅の所有形態は以下のどれですか。

- 1 持ち家
- 2 賃貸住宅
- 3 その他\_\_\_\_\_

2. あなたは現在の住宅に住んで何年になりますか。\_\_\_\_\_ 年間

3. あなたの住宅の延べ床面積はおおよそどの程度ですか。約 \_\_\_\_\_ m<sup>2</sup>

4. あなたは現在住んでいる地域をどの程度好きですか。

- 1 非常に好きである
- 2 好きである
- 3 どちらともいえない
- 4 嫌いである
- 5 非常に嫌いである

5. 以下の項目についてあなたが住んでいる地域を評価してください。

	1 非常に 良い	2 良い	3 普通	4 悪い	5 非常に悪 い
1) 緑地などの自然環境	( )	( )	( )	( )	( )
2) 街路景観などの町並み 整備	( )	( )	( )	( )	( )
3) 家からの眺め	( )	( )	( )	( )	( )
4) 自宅周辺の静けさ	( )	( )	( )	( )	( )
5) 通勤の便	( )	( )	( )	( )	( )
6) 通学の便	( )	( )	( )	( )	( )
7) 医療施設への便	( )	( )	( )	( )	( )
8) 郵便局、銀行、	( )	( )	( )	( )	( )
9) 公共交通機関の利便性	( )	( )	( )	( )	( )

6. 過去4か月ほどを考えると、次の要因のそれぞれがあなたが家にいるときにどれだけ気になっているか、邪魔しているか、またはいらいらしていますか。

	1 まったく 感じない	2 それほど 感じない	3 多少感じる	4 だいぶ感 じる	5 非常に感 じる
(1) 航空機騒音	( )	( )	( )	( )	( )
(2) 道路交通騒音	( )	( )	( )	( )	( )
(3) 工場騒音	( )	( )	( )	( )	( )
(4) 隣人からの騒音	( )	( )	( )	( )	( )
(5) 航空機のフライオーバーによる振動	( )	( )	( )	( )	( )
(6) 排出ガス工場	( )	( )	( )	( )	( )
(7) 工場から排出される煙	( )	( )	( )	( )	( )
(8) におい	( )	( )	( )	( )	( )

7. 日常生活で航空機の運行が原因で様々な迷惑をこうむったり、活動がじゃまされることがありますが、以下の項目についてどのように感じていますか。

	1 まっ たく	2 それほ ど感じ	3 多少感じる	4 だい	5 非常に感 じる
1) 住宅内での会話	( )	( )	( )	( )	( )
2) 電話での相手の話声を聴き	( )	( )	( )	( )	( )
3) テレビやラジオの聴き取り	( )	( )	( )	( )	( )
4) 住宅内での読書や考え事	( )	( )	( )	( )	( )
5) 住宅内での休息	( )	( )	( )	( )	( )

6) 寝付くとき	( )	( )	( )	( )	( )
7) 夜中に目を覚まさせられる	( )	( )	( )	( )	( )
8) 窓を開けたいときに開けら	( )	( )	( )	( )	( )
9) 航空機の運行による住宅の	( )	( )	( )	( )	( )
10) 航空機の事故（墜落等） に巻き込まれる恐れ	( )	( )	( )	( )	( )

※ 庭、バルコニー、屋上テラスをお持ちの方は以下の3つの質問にもお答え下さい。

11) 庭、バルコニー、屋上テラスでの作業	( )	( )	( )	( )	( )
12) 庭、バルコニー、屋上テラスでの会話	( )	( )	( )	( )	( )
13) 庭、バルコニー、屋上テラスでの休息	( )	( )	( )	( )	( )

8. 過去（4ヶ月くらい）を振り返って、あなたが航空機からの騒音で悩まされたり、あるいは、じゃまされたり、うるさいと感じる程度を最も良く表すのは0から10までのどの数字でしょうか？（0を「まったくうるさくない」、10を「非常にうるさい」として、0から10までの1つの数字に○印をつけてください）

0      1      2      3      4      5      6      7      8      9      10

まったくうるさくない

非常にうるさい

9. どのくらいの頻度で眠りにつくか、眠り続けるのに問題がありますか？

1. 多くの場合      2.時々      3.ほとんどない

10. 普段のあなたは何時頃に寝て、何時頃に起きますか。

	就寝時間	起床時間
週日	_____時	_____時
週末（休日）	_____時	_____時

11. 過去 4 週間で、自分で全体的な睡眠の質をどのように評価しますか？

- 1.非常に良い                      2.かなり良い                      3.かなり悪い                      4.非常に悪い

12. あなたの睡眠に関するこの質問に教えてください

(3) 睡眠に問題がありますか？ 1. はい 2. いいえ

(2) 上記の質問に「はい」と答えた場合、各項目に適切な番号を選択してください。

	1 時々	2 週に一度か二度	3 週に3回以上
(1) 入眠困難	( )	( )	( )
(2) 夜中に目が覚めると、眠りにつくのが難しい	( )	( )	( )
(3) 朝早く起きた	( )	( )	( )
(4) 翌朝、ぐっすり眠っていないと感じた。	( )	( )	( )
(5) 日中は眠くて作業効率が良くない。	( )	( )	( )
(6) その他_____	( )	( )	( )

(3) 睡眠に問題がある場合、それは航空機の騒音によるものだと思いますか？

1. はい 2. いいえ

13. あなたの家の上を飛んでいる飛行機を見ますか？

1. はい 2. いいえ

「はい」の場合、1日に何回ですか。 \_\_\_\_\_ 回ぐらい

14. あなたは以下の季節に窓を開けて寝ることがありますか。

	1 めったに	2 ときどき	3 よくある	4 ほとんど
1) 乾季	( )	( )	( )	( )
2) 雨季	( )	( )	( )	( )

15. 日常生活の中で私たちはいろいろな環境要因にさらされていますが、あなたは以下の要因に対してどの程度敏感ですか。

	1 まったく	2 それほど	3 多少	4 だいぶ	5 非常に
1) 寒さ	( )	( )	( )	( )	( )
2) 暑さ	( )	( )	( )	( )	( )
3) 騒音、音	( )	( )	( )	( )	( )
4) 振動	( )	( )	( )	( )	( )
5) 化学物質	( )	( )	( )	( )	( )
6) におい	( )	( )	( )	( )	( )
7) ほこり、花粉	( )	( )	( )	( )	( )

次に個人情報に関連する質問に答えていただけませんか？

16. 現在、あなたは何をしておられますか。差し支えない程度でお答えください。

- |                          |     |
|--------------------------|-----|
| 1) 仕事についている → (職種等)_____ | ( ) |
| 2) 農家                    | ( ) |
| 3) 学生                    | ( ) |
| 4) 主婦                    | ( ) |
| 5) 退職している                | ( ) |
| 6) 無職                    | ( ) |

17. 過去 4 か月を考えると、24 時間のうち在宅時間どれくらいですか。

1. 8 時間未満                      2. 8 ～ 15 時間                      3. 15 時間より長い

18. 一般的に、あなたの現在の健康状態はいかがですか？

- |            |     |
|------------|-----|
| 1) よい      | ( ) |
| 2) まあよい    | ( ) |
| 3) ふつう     | ( ) |
| 4) あまりよくない | ( ) |
| 5) よくない    | ( ) |

19. 0 から 10 のスケールを使用して、0 は「非常に不満」を意味し、10 は「非常に満足」を意味しますが、今、あなたの人生全体についてどう思いますか？



20. あなたの人生のストレスのレベルを考えると、ほとんどの日をどのように感じていますか？

- |                |     |
|----------------|-----|
| 1) 全くストレスにならない | ( ) |
| 2) ストレスが少ない    | ( ) |
| 3) 少しストレスが多い   | ( ) |
| 4) かなりストレスが多い  | ( ) |
| 5) 非常にストレスが多い  | ( ) |

21. 通常、定期健康診断を行っていますか？                      1. はい                      2. いいえ

22. 普段どの保健施設に行きますか？ \_\_\_\_\_

23. 以下にあげている病気のうち、あなたはこれまでにこれらの病気になってことがありますか？初めの枠にはその病気になっあかならなかったかを 1. はい、 2. いいえ

で答え、もし 1. はい であれば右の枠の全ての質問に回答してください。なった病気が複数あれば、その病気どこに回答を記入してください。

今までに以下の病気になりましたか? 1. はい 2. いいえ	何歳ごろそれは始まりましたか?	医者に見せましたか? 1. はい 2. いいえ	そのために入院しましたか? 1. はい 2. いいえ	そのために処方薬を飲みましたか? 1. はい 2. いいえ	過去1年間では、まだこの病気がありますか? 1. はい 2. いいえ
心臓病 ( ) (不整脈を含む)	歳	( )	( )	( )	( )
高血圧 ( )	歳	( )	( )	( )	( )
高脂血症 ( ) (高コレステロール・高中性脂肪を含む)	歳	( )	( )	( )	( )
脳卒中 ( ) (軽い脳梗塞や過性を含む)	歳	( )	( )	( )	( )
喘息 ( )	歳	( )	( )	( )	( )
糖尿病 ( )	歳	( )	( )	( )	( )
がん ( ) がんのタイプ: _____ _____ _____	歳	( ) ( ) ( )	( ) ( ) ( )	( ) ( ) ( )	( ) ( ) ( )

うつ病または神経症 ( )	歳	( )	( )	( )	( )
その他:	歳	( )	( )	( )	( )
		( )	( )	( )	( )
		( )	( )	( )	( )
		( )	( )	( )	( )

24. あなたの実の父または実の母が次の病気になったかどうかお答えください。

1-ならない

2-なった

3-わからない

	実の父	実の母
A. 心臓病 (不整脈を含む)	( )	( )
B. 高血圧	( )	( )
C. 脳卒中 (脳出血・脳梗塞・脳血栓を含む)	( )	( )
D. 糖尿病	( )	( )

25. あなたはどのくらいの塩を食べますか？

1.非常に多い

2.ある程度

3.あまり多くない

4.なし

26. 次の食べ物はどれくらい食べますか？

	1.あまり食べない	2.2.1日1回食べる	3.毎食を食べる
漬物	( )	( )	( )
魚醤	( )	( )	( )

醤油	( )	( )	( )
蒸し魚	( )	( )	( )
その他の塩辛い 食べ物:	( )	( )	( )
_____	( )	( )	( )
—	( )	- ( )	- ( )
_____	( )	( )	( )
_____	( )	- ( )	- ( )
_____	( )	- ( )	- ( )
_____	( )	- ( )	- ( )

27. あなたは塩味の食べ物やスープを食べたり飲んだりしますか？

- 1.あまり食べない 2.1日1回食べる 3.毎食を食べる

28. あなたの食事の栄養バランスについて考えますか？

- 1.考えない 2.少し考える 3.考える 4.よく考える

29. お酒はどのくらい飲みますか？

- 1.全く飲まない 2.月に2, 3日以下  
3.週に1~4日 4.ほぼ毎日

30. タバコを吸いますか？

- 1.吸ったことない 2.以前吸っていたがやめた  
3.1日20本以下 4.1日20本以上

31. 普段の30分以上の運動習慣の歩度ですか？

1) 全くない

( )

2) 月に1. 2回

( )

3) 週1回以下

( )

4) 週2~3回

( )

5) 週 4~5 回

( )
-----

6) ほぼ毎日

( )
-----

32. 通常の会話（補聴器を使用した場合でも）で単語を聞いて理解するのはどのくらい難しいですか？

- 1.非常に多い                      2.ある程度                      3.少し                      4.なし

以下の質問にお答えになり、難易度を教えてください。「なし」場合は無視してください。

		はい	時々	いいえ
1	片耳または両耳に聴覚障害がありますか	( )	( )	( )
2	片方または両方の耳で他の聴覚障害がありますか？	( )	( )	( )
3	片耳または両耳に耳鳴りやリンギングがありますか？	( )	( )	( )
4	現在、補聴器を使用していますか？	( )	( )	( )

5.（補聴器なしで）左耳での聴覚を最もよく表しているステートメントはどれですか？ 1.良い                      2.小さな問題                      3.たくさん問題                      4.聴覚障害者

6.（補聴器なしで）あなたの右耳でのあなたの聴覚を最もよく説明しているステートメントはどれですか？

- 1.良い                      2.小さな問題                      3.たくさん問題                      4.聴覚障害者

33. 以下は、あなたが感じた、あるいは振る舞ったかもしれない方法のリストです。チェックボックスをオンにして、過去 1 週間ほどでこのように感じた頻度を教えてください。

	先週				2 週間 ほぼ毎日
	ま っ た く な い、ま	1~2 日	3~4 日	5~7 日	

		たは1日 未満				
1	食欲減少	( )	( )	( )	( )	( )
2	退屈を振り払うことはできなかった	( )	( )	( )	( )	( )
3	自分のやっていることに集中できなかった	( )	( )	( )	( )	( )
4	落ち込んで感じた	( )	( )	( )	( )	( )
5	睡眠は落ち着きがなかった	( )	( )	( )	( )	( )
6	悲しい感じた	( )	( )	( )	( )	( )
7	物事を始めることができない	( )	( )	( )	( )	( )
8	何も私を幸せにしなかった	( )	( )	( )	( )	( )
9	私は悪い人のように感じました	( )	( )	( )	( )	( )
10	いつもの活動に興味がなくなった	( )	( )	( )	( )	( )
11	いつもよりずっと寝た	( )	( )	( )	( )	( )
12	ゆっくり動いているような気がした	( )	( )	( )	( )	( )
13	そわそわを感じた	( )	( )	( )	( )	( )
14	死んだらいいのに	( )	( )	( )	( )	( )
15	自分を傷つけたかった	( )	( )	( )	( )	( )
16	ずっと疲れていた	( )	( )	( )	( )	( )
17	自分が好きではなかった	( )	( )	( )	( )	( )
18	何の努力もせずにたくさんの体重を減らした	( )	( )	( )	( )	( )
19	眠りにつくのに苦労した	( )	( )	( )	( )	( )
20	重要なことに集中できなかった	( )	( )	( )	( )	( )

34. 以下は、あなたが感じた、あるいは振る舞ったかもしれない方法のリストです。ボックスをチェックして、このように感じた頻度を教えてください。

		はい	時々	いいえ
1	頭が痛くなることがありますか？	( )	( )	( )
2	目まいがすることがありますか？	( )	( )	( )
3	頭がぼんやりすることがありますか？	( )	( )	( )
4	手足がだるいことがありますか？	( )	( )	( )
5	体のあちこちが痛むことがありますか？	( )	( )	( )
6	頭が重いことがありますか？	( )	( )	( )
7	生つばが出ることがありますか？	( )	( )	( )
8	肩が凝ったり痛んだりすることがありますか？	( )	( )	( )
9	目がぼんやりかすむことがありますか？	( )	( )	( )
10	腰の痛むことがありますか？	( )	( )	( )
11	体が熱っぽかったり微熱があったりしますか？	( )	( )	( )
12	背中や背骨が痛むことがありますか？	( )	( )	( )
13	急いで歩くと動悸が激しくなりますか？	( )	( )	( )
14	近ごろ体がだるいですか？	( )	( )	( )
15	目が痛かったり熱く感じたりすることがありますか？	( )	( )	( )
16	鼻がつまることがありますか？	( )	( )	( )
17	胸やけすることがありますか？	( )	( )	( )
18	横になって休みたいことがありますか？	( )	( )	( )

19	のどが痛かったりいがらっぽかったりしますか？	( )	( )	( )
20	顔がほてったり頭がのぼせたりしますか？	( )	( )	( )

35. あなたのお宅では自動車、自動二輪車（原付含む）、自動車を保有していますか。

- 1 自転車\_\_\_\_\_台
- 2 二輪車\_\_\_\_\_台
- 3 自動車\_\_\_\_\_台
- 4 その他\_\_\_\_\_台

36. あなたは以下のそれぞれの移動手段をどの程度使いますか。

	1 積極的に 使う	2 なるべく 使うよう に している	3 どちらと も いけない	4 なるべく 使わない ようにし ている	5 まったく 使わない
1) 自動車	( )	( )	( )	( )	( )
2) 鉄道	( )	( )	( )	( )	( )
3) バイク	( )	( )	( )	( )	( )
4) バス	( )	( )	( )	( )	( )
5) 航空機	( )	( )	( )	( )	( )
6) 自転車	( )	( )	( )	( )	( )
7) 徒歩	( )	( )	( )	( )	( )

37. あなたを含めた社会全体にとって以下の移動手段をどのように思いますか。

	1 積極的に 使った方 がよい	2 なるべく 使った方 が よい	3 どちらと もいえない	4 なるべく 使わない 方 がよい	5 まったく 使わない 方がよい

1) 自動車	( )	( )	( )	( )	( )
2) 鉄道	( )	( )	( )	( )	( )
3) バイク	( )	( )	( )	( )	( )
4) バス	( )	( )	( )	( )	( )
5) 航空機	( )	( )	( )	( )	( )
6) 自転車	( )	( )	( )	( )	( )
7) 徒歩	( )	( )	( )	( )	( )

38. あなたは以下の移動手段の安全性をどのように思いますか。

	1 非常に安全	2 どちらか	3 どちらとも	4 どちらかと	5 非常に危険
1) 自動車	( )	( )	( )	( )	( )
2) 鉄道	( )	( )	( )	( )	( )
3) バイク	( )	( )	( )	( )	( )
4) バス	( )	( )	( )	( )	( )
5) 航空機	( )	( )	( )	( )	( )
6) 自転車	( )	( )	( )	( )	( )
7) 徒歩	( )	( )	( )	( )	( )

39. あなたはあなたの家族をどのカテゴリーに分類しますか？

1. 5万円未満      2. 5～10万円      3. 10万円以上

40. 過去4か月間、家族の収入はコロナウイルスの流行の影響を受けますか？

1. いいえ      2. はい

41. あなたの最後の学校または大学は何ですか？

1. \_\_\_\_\_ 中学校.  
 2. \_\_\_\_\_ 高校.  
 3. \_\_\_\_\_ 大学

4. その他 \_\_\_\_\_

42. 健康状態について下記の情報をお知らせください。

(1) 身長 \_\_\_\_\_ cm

(2) 重量 \_\_\_\_\_ kg

(3) 最大血圧 \_\_\_\_\_ mmHg

(4) 最低血圧 \_\_\_\_\_ mmHg

(5) 年齢 \_\_\_\_\_ years old

43. 以上の質問以外に生活環境に関して意見がございましたらお聞かせください。

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ご協力ありがとうございました。

\*以下の項目は調査者（インタビュアー）自身の観察によって記入してください。  
観察によって分からなければ、回答者に尋ねて記入してください。

F1. 回答者の性別

1 男

2 女

F2. 回答者の住宅の構造は以下のどれですか。該当するものをすべて選んでください。

1 木造

2 煉瓦造

3 ブロック造

4 鉄筋コンクリート造

5 鉄筋コンクリート造+煉瓦造

6 その他 \_\_\_\_\_

F3. 回答者の居間の開口部（窓、ガラス戸等）のガラスは何層ですか。

ペアガラス（複層ガラス）入りのサッシの場合は二重ガラスと答えてください。

- ( ) 1 三重ガラス以上
- ( ) 2 二重ガラス
- ( ) 3 一重ガラス
- ( ) 4 その他

F4. 回答者の居間の開口部の枠のタイプは以下のどれですか。

該当するものを選んでください。

- ( ) 1 アルミ枠
- ( ) 2 木枠
- ( ) 3 樹脂 (プラスチック)
- ( ) 4 その他

F5. 回答者の居間のドア (窓、ドア) は道路に面していますか？

- 1. いいえ
- 2. はい

F6. 回答者の寝室の開口部 (窓、ガラス戸等) のガラスは何層ですか。

ペアガラス (複層ガラス) 入りのサッシの場合は二重ガラスと答えてください。

- ( ) 1 三重ガラス以上
- ( ) 2 二重ガラス
- ( ) 3 一重ガラス
- ( ) 4 その他\_\_\_\_\_

F7. 回答者の寝室の開口部の枠のタイプは以下のどれですか。

該当するものを選んでください。

- ( ) 1 アルミ枠
- ( ) 2 木枠
- ( ) 3 樹脂 (プラスチック)
- ( ) 4 その他

F8. 回答者の寝室のドア (窓、ドア) は道路に面していますか？

- 1. いいえ
- 2. はい

F9. 家の中にエアコンはありますか？ 1. ある 2. ない

ご協力ありがとうございました。

# QUESTIONNAIRE ON LIVING ENVIRONMENT AND HEALTH

ID: 2020-00x

Date: September xx, 2020

Interviewee:

Address:

GPS:

Contact:

Interviewer:

**Please answer the following questions by choosing and checking the corresponding answer:**

**1. What type is your house ownership?**

- 1 Self-owning ( )
- 2 Renting ( )
- 3 Other \_\_\_\_\_ ( )

**2. How long have you been living in your present house? \_\_\_\_\_ years**

**3. How big is your floor area? About \_\_\_\_\_ m<sup>2</sup>**

**4. How much do you like your residential area?**

- 1) Like very much
- 2) Like
- 3) Neither like nor dislike
- 4) Dislike
- 5) Dislike very much

**5. Please evaluate your living area according to the following items:**

	<b>1 Extremely good</b>	<b>2 Good</b>	<b>3 Neither good nor bad</b>	<b>4 Bad</b>	<b>5 Extremely bad</b>
<b>(1) Surrounding environment and natural green</b>	( )	( )	( )	( )	( )
<b>(2) Surrounding street sceneries and buildings</b>	( )	( )	( )	( )	( )
<b>(3) View from your house:</b>	( )	( )	( )	( )	( )
<b>(4) Quietness around the house</b>	( )	( )	( )	( )	( )
<b>(5) Convenience for commuting to working place</b>	( )	( )	( )	( )	( )
<b>(6) Convenience to kindergartens, schools or universities</b>	( )	( )	( )	( )	( )
<b>(7) Convenience to hospitals/health clinics</b>	( )	( )	( )	( )	( )

<b>(8) Convenience to post offices, banks or markets</b>	( )	( )	( )	( )	( )
<b>(9) Convenience to access to public transportation</b>	( )	( )	( )	( )	( )

**6. Thinking about the last 4 months or so, how much does each of the following factors bother, disturb or annoy you when you are here at home?**

	<b>1</b> <b>Not at all</b>	<b>2</b> <b>Slightly</b>	<b>3</b> <b>Moderately</b>	<b>4</b> <b>Very</b>	<b>5</b> <b>Extremely</b>
<b>(1) Aircraft noise</b>	( )	( )	( )	( )	( )
<b>(2) Road traffic noise</b>	( )	( )	( )	( )	( )
<b>(3) Factory noise</b>	( )	( )	( )	( )	( )
<b>(4) Noise from the neighbors</b>	( )	( )	( )	( )	( )
<b>(5) Vibration by aircraft flyover</b>	( )	( )	( )	( )	( )
<b>(6) Exhausted gas factories</b>	( )	( )	( )	( )	( )
<b>(7) Smoke discharged from factories</b>	( )	( )	( )	( )	( )
<b>(8) Odors</b>					

**7. In daily life, how disturbed are you by aircraft flyovers in the following cases?**

	<b>1</b> <b>Not at all</b>	<b>2</b> <b>Slightly</b>	<b>3</b> <b>Moderately</b>	<b>4</b> <b>Very</b>	<b>5</b> <b>Extremely</b>
<b>(1) When you have conversation indoor</b>	( )	( )	( )	( )	( )
<b>(2) When you communicate with the phone</b>	( )	( )	( )	( )	( )
<b>(3) When you listen to TV/radio indoor</b>	( )	( )	( )	( )	( )
<b>(4) When you concentrate or read books indoor</b>	( )	( )	( )	( )	( )



**11. During the past 4 weeks, how would you rate the quality of your sleep overall?**

1. Very good                      2. Fairly good                      3. Fairly bad                      4. Very bad

**12. Please answer this question concerning your sleep:**

**(4) Do you have any trouble with your sleep?**

1) No

2) Yes

**(2) If you answered “Yes” to the above question, please choose appropriate numbers for each item.**

	1 Occasionally	2 Once or twice a week	3 More than 3 times a week
(7) Difficult to fall asleep	( )	( )	( )
(8) When awakened during the night, it is difficult to sleep again.	( )	( )	( )
(9) Awakened early in the morning	( )	( )	( )
(10) Do not feel as having slept well the next morning.	( )	( )	( )
(11) Sleepy during daytime and cannot work well	( )	( )	( )
(12) Others (                      )	( )	( )	( )

**(3) If you have trouble with your sleep, do you think that it is due to the aircraft noise?**

1) No

2) Yes

**13. Do you see the airplane flying through your house?**

1) No

2) Yes

If “yes”, how many times a day? \_\_\_\_\_ times

**14. Is your bedroom windows opened in the following season?**

	<b>1</b> <b>Rarely</b>	<b>2</b> <b>Sometimes</b>	<b>3</b> <b>Often</b>	<b>4</b> <b>Always</b>
<b>(1) Dry season</b>	( )	( )	( )	( )
<b>(2) Rainy season</b>	( )	( )	( )	( )

**15. In daily life, climatic factors as well as environmental conditions affect us much, then how much are you sensitive to the following factors?**

	<b>1</b> <b>Not at all</b>	<b>2</b> <b>Slightly</b>	<b>3</b> <b>Moderately</b>	<b>4</b> <b>Very</b>	<b>5</b> <b>Extremely</b>
<b>(1) Coldness</b>	( )	( )	( )	( )	( )
<b>(2) Hotness</b>	( )	( )	( )	( )	( )
<b>(3) Noise</b>	( )	( )	( )	( )	( )
<b>(4) Vibration</b>	( )	( )	( )	( )	( )
<b>(5) Chemicals</b>	( )	( )	( )	( )	( )
<b>(6) Odors</b>	( )	( )	( )	( )	( )
<b>(7) Dust, pollen, polluted air</b>	( )	( )	( )	( )	( )

**In the next part, do you mind answering some questions relating personal information?**

**16. What is your present job?**

- 1) Employed -> (Occupation)\_\_\_\_\_ ( )
- 2) Farmer ( )
- 3) Student ( )
- 4) Housewife ( )
- 5) Retired ( )
- 6) Unemployed ( )

**17. Thinking about the last 4 months, how long in a day do you stay at home?**

1. Under 8 hours      2. 8-15 hours      3. Over 15h hours

**18. In general, would you say your health is...?**

- |              |     |
|--------------|-----|
| 1) Excellent | ( ) |
| 2) Very good | ( ) |
| 3) Good      | ( ) |
| 4) Fair      | ( ) |
| 5) Poor      | ( ) |

**19. Using a scale of 0 to 10, where 0 means “Very dissatisfied” and 10 means “Very satisfied”, how do you feel about your life as a whole right now?**

- |                   |   |   |   |   |                |   |   |   |   |    |
|-------------------|---|---|---|---|----------------|---|---|---|---|----|
| 0                 | 1 | 2 | 3 | 4 | 5              | 6 | 7 | 8 | 9 | 10 |
| ↓                 |   |   |   |   | ↓              |   |   |   |   |    |
| Very dissatisfied |   |   |   |   | Very satisfied |   |   |   |   |    |

**20. Thinking about the amount of stress in your life, would you say that most days are?**

- |                          |     |
|--------------------------|-----|
| 1) Not at all stressful  | ( ) |
| 2) Not very stressful    | ( ) |
| 3) A bit stressful       | ( ) |
| 4) Quite a bit stressful | ( ) |
| 5) Extremely stressful   | ( ) |

**21. Do you usually have periodic health examination?**

- |        |     |
|--------|-----|
| 1) No  | ( ) |
| 2) Yes | ( ) |

**22. Which health facility do you usually visit? \_\_\_\_\_**

**23. Here is a list of medical conditions that usually last for some time. Have you ever had any of these conditions? In the first column, check “yes” or “no” for each condition, then, for each “yes”, please answer every question across the page.**

Have you ever had...? 1. No 2. Yes	What year did it start?	Did you ever see a doctor about it? 1. No 2. Yes	Have you ever been hospitalized for it? 1. No 2. Yes	Have you ever taken medicines prescribed for it? 1. No 2. Yes	Have you had it in the last 12 months? 1. No 2. Yes
Heart trouble		( )	( )	( )	( )
High blood pressure or Hypertension		( )	( )	( )	( )
Hyperlipidemia		( )	( )	( )	( )
Stroke, Small stroke or TIA		( )	( )	( )	( )
Asthma		( )	( )	( )	( )
Diabetes		( )	( )	( )	( )
Cancer Type of cancer:  _____  _____  _____		( )  ( )  ( )  ( )	( )  ( )  ( )  ( )	( )  ( )  ( )  ( )	( )  ( )  ( )  ( )
Depression or neurosis		( )	( )	( )	( )
Others: _____  _____  _____		( )  ( )  ( )	( )  ( )  ( )	( )  ( )  ( )	( )  ( )  ( )

_____		( )	( )	( )	( )
_____					

**24. Please indicate if your biological (natural) father and mother ever had any of the conditions below.**

**1-No                      2-Yes                      3-Do not know**

	Biological Father	Biological Mother
A. Heart trouble	( )	( )
B. High blood pressure	( )	( )
C. Stroke or "TIA"	( )	( )
D. Diabetes	( )	( )

**25. How much salty do you eat?**

1. Very much ( )    2. Some ( )    3. Not much ( )    4. None ( )

**26. How much do you eat the following foods:**

	1. Not eat much	2. Once a day	3. Every meal
Pickles	( )	( )	( )
Fish sauce	( )	( )	( )
Soy sauce	( )	( )	( )
Braised fish	( )	( )	( )
Other salty foods:	( )	( )	( )
_____	_____	_____	_____
	( )	( )	( )
_____	_____	_____	_____
	( )	( )	( )
_____	_____	_____	_____
	( )	( )	( )

**27. Do you eat or drink salty food or soup?**

1. Not eat much    2. Once a day    3. Every meal

**28. Do you think about the nutritional balance of the diet?**

1. Don't think                      2. Think a little                      3. Think                      4. Think a lot

**29. How often do you drink alcohol?**

1. Not at all                      2. 2-3 times a month or less  
3. 1-4 days a week                      4. Almost everyday

**30. Do you smoke cigarettes?**

1. Not at all                      2. I smoked before but stopped  
3. 20 or less per day                      4. More than 20 per day

**31. How often do you do physical activity over 30 minutes?**

- |                          |     |
|--------------------------|-----|
| 1) Not at all            | ( ) |
| 2) Once or twice a month | ( ) |
| 3) About once a week     | ( ) |
| 4) 2-3 times a week      | ( ) |
| 5) 4-5 times a week      | ( ) |
| 6) Almost everyday       | ( ) |

**32. How much difficulty do you have hearing and understanding words in a normal conversation (even with a hearing aid)?**

1. A great deal                      2. Some                      3. A little                      4. None

1	Do you have deafness in one or both ears?	Yes	Sometimes	No
2	Do you now have any other trouble hearing with one or both ears?	( )	( )	( )
3	Do you now have tinnitus or ringing in one or both ears?	( )	( )	( )
4	Do you now use a hearing aid?	( )	( )	( )

**5. Which statements best describe your hearing in your LEFT ear (without hearing aid)?**

1. Good                      2. Little trouble                      3. A lot of trouble                      4. Deaf

**6. Which statements best describe your hearing in your RIGHT ear (without hearing aid)?**

1. Good                      2. Little trouble                      3. A lot of trouble                      4. Deaf

**33. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so.**

		Last week				Nearly every day for 2 weeks
		Not at all or less than 1 day	1-2 days	3-4 days	5-7 days	
1	My appetite was poor	( )	( )	( )	( )	( )
2	I could not shake off the blues	( )	( )	( )	( )	( )
3	I had trouble keeping my mind on what I was doing	( )	( )	( )	( )	( )
4	I felt depressed	( )	( )	( )	( )	( )
5	My sleep was restless	( )	( )	( )	( )	( )
6	I felt sad	( )	( )	( )	( )	( )
7	I could not get going	( )	( )	( )	( )	( )
8	Nothing made me happy	( )	( )	( )	( )	( )
9	I felt like a bad person	( )	( )	( )	( )	( )
10	I lost interest in my usual activities	( )	( )	( )	( )	( )
11	I slept much more than usual	( )	( )	( )	( )	( )
12	I felt like I was moving too slowly	( )	( )	( )	( )	( )
13	I felt fidgety	( )	( )	( )	( )	( )
14	I wished I were dead	( )	( )	( )	( )	( )
15	I wanted to hurt myself	( )	( )	( )	( )	( )
16	I was tired all the time	( )	( )	( )	( )	( )
17	I did not like myself	( )	( )	( )	( )	( )
18	I lost a lot of weight without any effort	( )	( )	( )	( )	( )
19	I had a lot of trouble getting to sleep	( )	( )	( )	( )	( )

20	I could not focus on the important things	( )	( )	( )	( )	( )
----	---	-----	-----	-----	-----	-----

**34. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way.**

		Yes	Sometimes	No
1	Do you have headaches?	( )	( )	( )
2	Do you experience feelings of dizziness?	( )	( )	( )
3	Have you experienced a sense of dullness or a heavy feeling in your head?	( )	( )	( )
4	Have you experienced a sense of dullness or a heavy sensation in your hands or legs?	( )	( )	( )
5	Do you have pains in various parts of your body?	( )	( )	( )
6	Does your head feel "heavy" or "dull"?	( )	( )	( )
7	Does your mouth "water" a lot ; that is, produce a lot of saliva?	( )	( )	( )
8	Do you have any stiffness or pain in your neck or shoulders?	( )	( )	( )
9	Do you have blurred vision?	( )	( )	( )
10	Do you have low back pain?	( )	( )	( )
11	Do you feel flushed or feverish?	( )	( )	( )
12	Do you have high back pain?	( )	( )	( )
13	Does your heart pound or beat faster when you walk in a hurry?	( )	( )	( )
14	Are you tired recently?	( )	( )	( )
15	Do you feel pain or hot in your eyes?	( )	( )	( )
16	Is your nose stuffy?	( )	( )	( )
17	Do you have heart burn?	( )	( )	( )
18	Are there times when you would like to take a rest or lie down in bed during the day?	( )	( )	( )
19	Do you feel irritation or pain in your throat?	( )	( )	( )
20	Do you have hot flashes in your face or head?	( )	( )	( )

**35. How many vehicles are your family using for daily transport?**

- 1. Bicycles: \_\_\_\_\_ ( )
- 2. Motorbikes: \_\_\_\_\_ ( )
- 3. Cars: \_\_\_\_\_ ( )
- 4. Others: \_\_\_\_\_ ( )

**36. How much do you use the following means of transportation?**

	<b>1</b> Actively use	<b>2</b> Use	<b>3</b> No preference	<b>4</b> Seldom use	<b>5</b> Not use at all
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**37. How good is the use of the following means of transportation for the society?**

	<b>1</b> Should be used frequently	<b>2</b> Should be used	<b>3</b> No preference	<b>4</b> Should be seldom use	<b>5</b> Should not be used at all
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**38. How safe is the following means of transportation?**

	<b>1</b> Extremely safe	<b>2</b> Safe	<b>3</b> Neither safe nor	<b>4</b> Dangerous	<b>5</b> Extremely
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )

<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**39. In which category do you classify your family incomes?**

1. Under 10M VND    2. From 10M to 20M VND    3. More than 20M VND

**40. In the last 4 months, was your family incomes affected by Corona virus epidemic disease?**

1. No                    2. Yes

**41. What is your last school or university?**

1. \_\_\_\_\_ Secondary School.  
 2. \_\_\_\_\_ High School.  
 3. \_\_\_\_\_ University  
 4. Others \_\_\_\_\_

**42. Please tell us the information below concerning your health condition:**

- (1) Height \_\_\_\_\_ cm  
 (2) Weight \_\_\_\_\_ kg  
 (3) Maximum blood pressure \_\_\_\_\_ mmHg  
 (4) Minimum blood pressure \_\_\_\_\_ mmHg  
 (5) Age \_\_\_\_\_ years old

**43. As you wish, please provide your own comments on the living environment:**

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**THANK YOU FOR YOUR COOPERATION!**

**\* The following part can be answered by interviewers according to the respondent's fact. If an interviewer cannot, please ask a respondent again for sure.**

**F1. Gender of respondent**

- 1. Male ( )
- 2. Female ( )

**F2. How many floors does your house have? \_\_\_\_\_ floors**

Which floor are you usually sleeping at? \_\_\_\_\_

**F3. Structure of the house**

- 1 Wooden ( )
- 2 Bricks ( )
- 3 Prefabricated ( )
- 4 Reinforced concrete ( )
- 5 Reinforced concrete with brick wall ( )
- 6 Others \_\_\_\_\_ ( )

**F4. How many glass layers do your living room windows and doors have? If they are doubled-pane windows/doors, please specify as 2 layers.**

- 1 More than 3 layers ( )
- 2 2 layers ( )
- 3 1 layer ( )
- 4 Others \_\_\_\_\_ ( )

**F5. Which type of frame among the following types do your living room windows and doors have?**

- 1 Aluminum frame ( )
- 2 Wooden frame ( )
- 3 Plastic frame ( )
- 4 Others \_\_\_\_\_ ( )

**F6. How many glass layers do your bedroom windows and doors have? If they are multi-layer doubled-pane windows/doors, please specify as 2 layers.**

- 1 More than 3 layers ( )
- 2 2 layers ( )
- 3 1 layer ( )

4 Others \_\_\_\_\_ ( )

**F7. Which type of frame among the following types do your bedroom windows and doors have?**

1 Aluminum frame ( )

2 Wooden frame ( )

3 Plastic frame ( )

4 Others \_\_\_\_\_ ( )

**F8. Does the house have the soundproofing materials and products?**

1) No

2) Yes

**F9. Are air-conditioners installed in the house?**

1) No

2) Yes

**THANK YOU VERY MUCH!**



Dự án hợp tác nghiên cứu khoa học giữa  
Đại học Nông Lâm Thành phố Hồ Chí Minh và Đại học Shimane

## **PHIẾU KHẢO SÁT VỀ TIỆN NGHI MÔI TRƯỜNG SỐNG VÀ SỨC KHỎE**

ID: 2020 -A...- 00...

Ngày: ...../09/2020

Họ tên người trả lời phỏng vấn: .....

Địa chỉ: .....

GPS: .....

Liên hệ: .....

Người phỏng vấn: .....

MỌI Ý KIẾN XIN GỬI VỀ:

**NGUYỄN THU LAN**

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Hoặc

**NGUYỄN TRẦN THỊ HỒNG NHUNG**

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KHOA KIẾN TRÚC

ĐẠI HỌC SHIMANE – NHẬT BẢN

**Hồ Chí Minh, 09/2020**

**Xin vui lòng trả lời các câu hỏi sau bằng cách chọn và đánh dấu câu trả lời thích hợp:**

**1. Nhà của anh(chị) thuộc loại nào trong số các loại dưới đây?**

1. Nhà riêng                      2. Nhà thuê                      3. Ngoài ra \_\_\_\_\_

**2. Anh(chị) đã ở ngôi nhà hiện tại bao nhiêu năm? \_\_\_\_\_ năm**

**3. Tổng diện tích sàn tầng 1 của nhà anh(chị) ước tính là bao nhiêu? \_\_\_\_\_ m<sup>2</sup>**

**4. Anh(chị) thích khu vực mình đang sống ở mức độ như thế nào?**

1. Rất thích    2. Thích    3. Bình thường    4. Không thích    5. Rất không thích

**5. Xin vui lòng đánh giá nơi sống của anh(chị) theo các mục sau đây:**

	1 Cực tốt	2 Tốt	3 Bình thường	4 Kém	5 Cực kém
(1) Có môi trường xung quanh thiên nhiên, cây xanh	( )	( )	( )	( )	( )
(2) Xung quanh phố xá, cảnh quan, các tòa nhà sạch đẹp	( )	( )	( )	( )	( )
(3) Tầm nhìn từ nhà của bạn	( )	( )	( )	( )	( )
(4) Độ yên tĩnh xung quanh nhà	( )	( )	( )	( )	( )
(5) Thuận tiện cho việc đi đến nơi làm việc	( )	( )	( )	( )	( )
(6) Thuận tiện cho việc đi đến trường mẫu giáo, trường học hoặc trường đại học.	( )	( )	( )	( )	( )
(7) Thuận tiện cho việc đi đến bệnh viện/ trạm y tế	( )	( )	( )	( )	( )
(8) Thuận tiện cho việc đi đến bưu điện, ngân hàng, chợ,...	( )	( )	( )	( )	( )
(9) Thuận tiện trong sử dụng phương tiện giao thông công cộng	( )	( )	( )	( )	( )

**6. Trong 4 tháng qua, những yếu tố sau đây làm phiền anh(chị) hoặc làm phiền anh(chị) ở mức độ nào khi anh(chị) ở nhà?**

	1 Hoàn toàn không	2 Một phần nào	3 Không quá mức	4 Nhiều	5 Cực nhiều
(1) Tiếng ồn từ máy bay	( )	( )	( )	( )	( )
(2) Tiếng ồn từ các phương tiện giao thông trên đường	( )	( )	( )	( )	( )
(3) Tiếng ồn từ nhà máy	( )	( )	( )	( )	( )
(4) Tiếng ồn từ hàng xóm	( )	( )	( )	( )	( )
(5) Độ rung khi máy bay bay qua	( )	( )	( )	( )	( )
(6) Khí thải	( )	( )	( )	( )	( )
(7) Khói từ nhà máy	( )	( )	( )	( )	( )
(8) Mùi hôi					

**7. Trong cuộc sống hàng ngày, khi máy bay bay qua, anh(chị) cảm thấy bị làm phiền ở mức độ nào trong các trường hợp dưới đây?**

	1 Hoàn toàn không	2 Một phần nào	3 Không quá mức	4 Nhiều	5 Cực kỳ
(1) Làm phiền anh(chị) khi đang nói chuyên trong nhà?	( )	( )	( )	( )	( )
(2) Làm phiền anh(chị) khi nghe điện thoại trong nhà?	( )	( )	( )	( )	( )
(3) Làm phiền anh(chị) khi nghe đài, vô tuyến trong nhà?	( )	( )	( )	( )	( )
(4) Làm phiền anh(chị) khi anh(chị) đang tập trung suy nghĩ, hay đọc sách trong nhà?	( )	( )	( )	( )	( )
(5) Làm phiền khi anh(chị) nghỉ ngơi trong nhà?	( )	( )	( )	( )	( )

(6) Làm anh(chị) khó khăn khi bắt đầu vào giấc ngủ?	( )	( )	( )	( )	( )
(7) Làm anh(chị) bị thức giấc khi đang ngủ say?	( )	( )	( )	( )	( )
(8) Làm anh(chị) không thể mở cửa sổ bởi quá ồn trong khi anh(chị) muốn mở cửa?	( )	( )	( )	( )	( )
(9) Làm anh(chị) khó chịu vì rung do máy bay bay qua?	( )	( )	( )	( )	( )
(10) Làm anh(chị) lo sợ bị ảnh hưởng khi tai nạn máy bay xảy ra?	( )	( )	( )	( )	( )

**Nếu nhà anh(chị) có sân vườn, ban công, sân thượng xin hãy trả lời 3 câu hỏi dưới đây**

(11) Làm phiền anh(chị) khi anh(chị) làm gì đó ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )
(12) Làm phiền anh(chị) khi nói chuyện ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )
(13) Làm phiền anh(chị) khi anh(chị) nghỉ ngơi ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )

**8. Trong 4 tháng qua, tiếng ồn từ máy bay đã làm phiền anh(chị) hoặc gây khó chịu cho anh (chị) ở mức độ nào (thang đo từ 0 đến 10)?**

0    1    2    3    4    5    6    7    8    9    10

Hoàn toàn không

Cực kỳ

**9. Anh(chị) có thường xuyên gặp vấn đề về giấc ngủ không?**

1. Thường xuyên

2. thỉnh thoảng

3. Hầu như không

**10. Mỗi ngày, anh(chị) thường đi ngủ và thức dậy lúc mấy giờ?**

	Đi ngủ	Thức dậy
Các ngày trong tuần	_____ h	_____ h
Cuối tuần (ngày lễ)	_____ h	_____ h

**11. Trong khoảng 4 tuần qua, anh(chị) đánh giá thế nào về chất lượng giấc ngủ của mình?**

1. Rất tốt                      2. Khá tốt                      3. Khá tệ                      4. Rất tệ

**12. Hãy trả lời câu hỏi này liên quan đến giấc ngủ của anh(chị):**

**(1) Anh(chị) có gặp rắc rối với giấc ngủ không?** 1. Không      2. Có

**(2) Nếu trả lời “Có” ở câu hỏi trên, vui lòng chọn số thích hợp cho từng mục sau:**

	1 Hiếm khi/ Hoàn toàn không	2 1-2 lần/ tuần	3 Nhiều hơn 3 lần/ tuần
(1) Khó đi vào giấc ngủ	( )	( )	( )
(2) Khi bị thức giấc vào buổi đêm, khó ngủ trở lại.	( )	( )	( )
(3) Bị thức giấc sớm vào buổi sáng	( )	( )	( )
(4) Không cảm thấy đã được ngủ ngon vào sáng hôm sau.	( )	( )	( )
(5) Cảm giác buồn ngủ vào ban ngày và không thể làm việc tốt	( )	( )	( )
(6) Khác ( )	( )	( )	( )

**(3) Nếu anh (chị) có rắc rối với giấc ngủ, anh(chị) có nghĩ nguyên nhân là do tiếng ồn máy bay không?** 1. Không                      2. Có

**13. Anh(chị) có thấy máy bay qua nhà mình không?** 1. Không      2. Có

Nếu “Có” thì khoảng bao nhiêu lần 1 ngày ? \_\_\_\_\_ lần

**14. Phòng ngủ của anh(chị) có thường mở cửa sổ không?**

	1 Hiếm khi/	2 Thỉnh	3 Thường hay	4 Luôn
(1) Mùa khô	( )	( )	( )	( )
(2) Mùa mưa	( )	( )	( )	( )

**15. Trong cuộc sống hàng ngày các yếu tố thời tiết cũng như điều kiện môi trường tác động đến chúng ta rất nhiều, anh(chị) nhạy cảm ở mức độ nào đối với các yếu tố dưới đây?**

	1 Hoàn toàn	2 Một phần	3 Không quá	4 Nhiều	5 Cực kỳ
(1) Lạnh	( )	( )	( )	( )	( )
(2) Nóng	( )	( )	( )	( )	( )
(3) Tiếng ồn	( )	( )	( )	( )	( )
(4) Độ rung	( )	( )	( )	( )	( )
(5) Chất hóa học	( )	( )	( )	( )	( )
(6) Mùi hôi	( )	( )	( )	( )	( )
(7) Bụi, phấn hoa, không khí bẩn	( )	( )	( )	( )	( )

**Trong phần tiếp theo, anh(chị) có thể trả lời một số câu hỏi liên quan đến thông tin cá nhân được không?**

**16. Công việc hiện tại của anh(chị) là gì?**

1. Đi làm (Nghề nghiệp: \_\_\_\_\_)

2. Nông dân 3. Học sinh 4. Nội trợ 5. Nghỉ hưu 6. Tự do

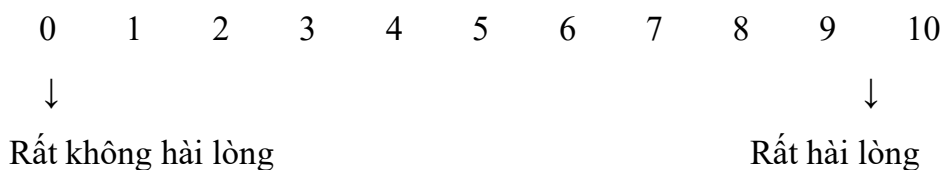
**17. Trong 4 tháng qua anh (chị) thường ở nhà bao nhiêu tiếng 1 ngày?**

1. Dưới 8 tiếng 2. Từ 8-15 tiếng 3. Trên 15 tiếng

**18. Anh(chị) cảm thấy thế nào về tình trạng sức khỏe bản thân?**

1. Tuyệt vời 2. Rất tốt 3. Tốt 4. Khá 5. Kém

**19. Sử dụng thang đo từ 0 đến 10, trong đó 0 là “Rất không hài lòng” và 10 là “Rất hài lòng”, anh(chị) cảm thấy thế nào về cuộc sống của mình hiện tại?**



**20. Nghĩ về những căng thẳng trong cuộc sống, anh(chị) nói thế nào về mức độ căng thẳng trong hầu hết các ngày?**

1. Hoàn toàn không    2. Không hẳn lắm    3. Một chút  
4. Khá căng thẳng    5. Cực kỳ căng thẳng

**21. Anh (chị) có thường xuyên kiểm tra sức khỏe định kỳ không?** 1. Không    2. Có

**22. Anh(chị) thường đến cơ sở khám chữa bệnh nào?** \_\_\_\_\_

**23. Dưới đây là danh sách các bệnh lý thường kéo dài trong một thời gian. Trong cột đầu tiên, hãy kiểm tra “Có” hoặc “ Không” đối với mỗi điều kiện, sau đó đối với mỗi điều kiện “Có”, vui lòng trả lời câu hỏi trang dưới đây.**

Bạn đã bao giờ mắc.....? 1. Không 2. Có	Năm bắt đầu?	Đã gặp bác sĩ chưa? 1. Chưa 2. Có	Đã bao giờ nhập viện vì nó? 1. Chưa 2. Có	Uống thuốc theo chỉ định bác sĩ? 1. Chưa 2. Có	Mắc trong vòng 12 tháng qua? 1. Chưa 2. Có
Bệnh tim mạch ( )		( )	( )	( )	( )
Huyết áp cao hoặc tăng huyết áp ( )		( )	( )	( )	( )
Tăng lipid máu ( )		( )	( )	( )	( )
Đột quy, đột quy nhẹ hay Con thiếu máu não thoáng qua (TIA) ( )		( )	( )	( )	( )
Hen suyễn ( )		( )	( )	( )	( )
Tiểu đường ( )		( )	( )	( )	( )
Ung thư ..... ( )		( )	( )	( )	( )

Trầm cảm hoặc rối loạn thần kinh ( )		( )	( )	( )	( )
Khác		( )	( )	( )	( )
_____		( )	( )	( )	( )
_____		( )	( )	( )	( )

**24. Anh(chị) vui lòng cho biết cha mẹ đẻ của anh(chị) có từng mắc các bệnh dưới đây?**

1 - Không ; 2 - Có ; 3 - Không biết

	Cha đẻ	Mẹ đẻ
(1) Bệnh tim mạch	( )	( )
(2) Huyết áp cao	( )	( )
(3) Đột quy hoặc TIA	( )	( )
(4) Tiểu đường	( )	( )

**25. Lượng muối anh(chị) sử dụng trong mỗi bữa ăn có nhiều không?**

1. Rất nhiều 2. Một chút 3. Không nhiều lắm 4. Không

**26. Anh(chị) có hay ăn những món dưới đây không?**

	Không nhiều lắm	1 lần/ngày	Mọi bữa ăn
(1) Dưa muối	( )	( )	( )
(2) Nước mắm	( )	( )	( )
(3) Nước tương	( )	( )	( )
(4) Cá kho	( )	( )	( )
(5) Các món mặn khác: .....	( )	( )	( )

**27. Anh(chị) có ăn những loại thức ăn mặn và nhiều muối không?**

1. Không nhiều lắm 2. Ngày 1 lần 3. Mọi bữa ăn

**28. Anh(chị) có nghĩ về cân bằng dinh dưỡng trong các bữa ăn không?**

1. Hoàn toàn không    2. Một chút    3. Bình thường    4. Nghĩ nhiều

**29. Anh(chị) có thường uống đồ uống có cồn (rượu, bia...) không?**

1. Hoàn toàn không    2. Một tháng 2-3 lần hoặc ít hơn  
3. Một tuần 1-4 ngày    4. Hầu như hàng ngày

**30. Anh(cahị) có thường xuyên hút thuốc không?**

1. Hoàn toàn không    2. Trước có hút giờ ngừng  
3. Một ngày 20 điếu hoặc ít hơn    4. Hơn 20 điếu một ngày

**31. Anh(chị) có thường xuyên tập thể dục trên 30 phút không?**

1. Hoàn toàn không    2. Một tháng 1-2 lần    3. Một tuần 1 lần  
4. Một tuần 2-3 lần    5. Một tuần 4-5 lần    6. Hầu như hàng ngày

**32. Anh(chị) có cảm thấy khó khăn để nghe và hiểu các từ trong cuộc trò chuyện bình thường (kể cả khi sử dụng máy trợ thính)?**

1. Rất khó khăn    2. Thỉnh thoảng    3. Chỉ một chút    4. Hoàn toàn không

**Anh(chị) vui lòng cho biết đó là khó khăn gì bằng cách trả lời câu hỏi dưới đây. Nếu “hoàn toàn không” xin bỏ qua.**

1	Anh(chị) có bị điếc ở một hoặc cả 2 tai không ?	Có	Thỉnh thoảng	Không
2	Anh (chị) có bao giờ gặp khó khăn nào khi nghe với một hoặc 2 tai không ?	( )	( )	( )
3	Bây giờ anh (chị) có bị ù tai hay ù ở 1 hoặc 2 tai không ?	( )	( )	( )
4	Bây giờ anh (chị) có sử dụng máy trợ thính không ?	( )	( )	( )

**Miêu tả đúng nhất về tình trạng thính lực hiện tại của anh(chị) (không có máy trợ thính)**

		Tốt	Một chút khó khăn	Khá khó khăn	Điếc
5	Tai trái	( )	( )	( )	( )
6	Tai phải	( )	( )	( )	( )

**33. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Tuần trước				Gần như mỗi ngày trong 2 tuần
		Hầu như không hoặc ít hơn 1 lần/ ngày	1-2 ngày	3-4 ngày	5-7 ngày	
1	Tôi cảm thấy ăn không ngon miệng	( )	( )	( )	( )	( )
2	Tôi không thể rũ bỏ buồn chán	( )	( )	( )	( )	( )
3	Tôi gặp vấn đề trong việc tập trung vào những việc tôi đang làm	( )	( )	( )	( )	( )
4	Tôi cảm thấy rất chán nản	( )	( )	( )	( )	( )
5	Ngủ không yên	( )	( )	( )	( )	( )
6	Tôi cảm thấy buồn	( )	( )	( )	( )	( )
7	Tôi không thể bắt đầu một việc gì	( )	( )	( )	( )	( )
8	Không gì khiến tôi cảm thấy vui	( )	( )	( )	( )	( )
9	Tôi cảm thấy mình như một người xấu	( )	( )	( )	( )	( )
10	Tôi mất hứng thú với các hoạt động thường làm trước đây	( )	( )	( )	( )	( )
11	Tôi ngủ nhiều hơn bình thường	( )	( )	( )	( )	( )
12	Tôi cảm thấy tôi đang di chuyển quá chậm	( )	( )	( )	( )	( )
13	Tôi cảm thấy bồn chồn	( )	( )	( )	( )	( )
14	Tôi đã ước tôi có thể chết đi	( )	( )	( )	( )	( )
15	Tôi muốn làm đau bản thân mình	( )	( )	( )	( )	( )
16	Tôi thấy mệt mỏi trong mọi lúc	( )	( )	( )	( )	( )
17	Tôi không thích bản thân mình	( )	( )	( )	( )	( )

18	Tôi giảm cân rất nhiều mà không cần nỗ lực gì cả	( )	( )	( )	( )	( )
19	Tôi gặp nhiều vấn đề về giấc ngủ	( )	( )	( )	( )	( )
20	Tôi không thể tập trung vào những điều quan trọng	( )	( )	( )	( )	( )

**34. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Có	Thỉnh thoảng	Không
1	Anh (chị) có đau đầu không?	( )	( )	( )
2	Anh (chị) có cảm giác chóng mặt không?	( )	( )	( )
3	Anh (chị) có trải qua cảm giác không minh mẫn không?	( )	( )	( )
4	Anh (chị) có trải qua cảm giác tay chân nặng nề không?	( )	( )	( )
5	Anh (chị) có bị đau ở nhiều nơi trên cơ thể không?	( )	( )	( )
6	Anh (chị) của bạn có nặng nề hoặc không minh mẫn không?	( )	( )	( )
7	Miệng của Anh (chị) có tiết nhiều nước bọt không?	( )	( )	( )
8	Anh (chị) có cứng hay đau cổ vai gáy không?	( )	( )	( )
9	Anh (chị) có bị mờ mắt không?	( )	( )	( )
10	Anh (chị) có bị đau thắt lưng không?	( )	( )	( )
11	Anh (chị) có cảm thấy nóng hoặc sốt nhẹ không?	( )	( )	( )
12	Anh (chị) có bị đau lưng cao không?	( )	( )	( )
13	Tim của Anh (chị) có đập mạnh hoặc nhanh hơn khi vội vàng?	( )	( )	( )
14	Gần đây Anh (chị) có cảm thấy mệt mỏi không?	( )	( )	( )
15	Anh (chị) có cảm thấy đau hay nóng mắt không?	( )	( )	( )
16	Mũi của Anh (chị) có nghẹt không?	( )	( )	( )

17	Anh (chị) có ợ nóng không?	( )	( )	( )
18	Có những lúc Anh (chị) muốn nghỉ ngơi hoặc nằm trên giường vào ban ngày không?	( )	( )	( )
19	Anh (chị) có cảm thấy ngứa hay đau họng không?	( )	( )	( )
20	Anh (chị) có cảm thấy nóng mặt hoặc đau đầu không?	( )	( )	( )

**35. Gia đình anh(chị) có bao nhiêu phương tiện tham gia giao thông?**

1. Xe đạp (\_\_\_xe) 2. Xe máy (\_\_\_xe) 3. Ô tô (\_\_\_xe) 4. Khác \_\_\_\_\_ (\_\_\_xe)

**36. Anh(chị) sử dụng các phương tiện giao thông dưới đây ở mức độ nào?**

	1 Sử dụng tích cực	2 Cố gắng sử dụng	3 Sử dụng cũng được, không cũng được	4 Cố gắng không sử dụng	5 Hoàn toàn không sử dụng
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**37. Xin anh(chị) đánh giá cho về việc sử dụng các phương tiện giao thông dưới đây như thế nào thì tốt cho xã hội?**

	1 Phải sử dụng tích cực	2 Nên sử dụng nhiều hơn	3 Sao cũng được	4 Không cần sử dụng nhiều	5 Hoàn toàn không cần
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**38. Xin anh(chị) đánh giá cho mức độ an toàn của các phương tiện giao thông dưới đây:**

	1 Cực kỳ an	2 An toàn	3 Không an toàn	4 Nguy hiểm	5 Cực kỳ nguy
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**39. Xin anh(chị) vui lòng cho biết khoảng thu nhập của gia đình?**

1. Dưới 10 triệu đồng                      2. Khoảng 10-20 triệu đồng                      3. Hơn 20 triệu đồng

**40. Trong 4 tháng qua, thu nhập của gia đình anh (chị) có bị ảnh hưởng không?**

1. Không                      2. Có

**41. Anh(chị) từng học ở những trường nào?**

1. Trường THCS \_\_\_\_\_  
 2. Trường THPT \_\_\_\_\_  
 3. Đại học/ Học viện \_\_\_\_\_  
 4. Khác \_\_\_\_\_

**42. Xin vui lòng cho chúng tôi biết thông tin dưới đây liên quan đến tình trạng sức khỏe của anh(chị) :**

- (1) Chiều cao \_\_\_\_\_ cm                      (2) Cân nặng \_\_\_\_\_ kg  
 (3) Huyết áp trên \_\_\_\_\_ mmHg    (4) Huyết áp dưới \_\_\_\_\_ mmHg  
 (5) Độ tuổi \_\_\_\_\_ tuổi

**43. Ngoài các câu hỏi trên, nếu anh(chị) có ý kiến gì về môi trường sống hiện nay, xin cho biết**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**\* Phần này sinh viên thực hiện phỏng vấn xin hãy quan sát và tự điền câu trả lời (nếu không rõ, xin hỏi lại người trả lời phỏng vấn để có câu trả lời đúng)**

**F1. Giới tính của người trả lời phỏng vấn?** 1. Nam 2. Nữ

**F2. Cấu tạo ngôi nhà thuộc loại nào trong các cấu tạo dưới đây?**

1. Làm từ gỗ
2. Xây từ gạch
3. Nhà lắp ghép
4. Nhà bê tông cốt thép
5. Tường gạch và khung bê tông cốt thép
6. Ngoài ra \_\_\_\_\_

**F3. Kính các loại cửa hướng ra bên ngoài của phòng khách của ngôi nhà (cửa sổ, cửa ra vào) là loại kính bao nhiêu lớp? nếu là kính đôi nhiều lớp, xin xếp vào loại kính hai lớp.**

1. Trên 3 lớp
2. Hai lớp
3. Một lớp
4. Ngoài ra \_\_\_\_\_

**F4. Khung các loại cửa phòng khách của ngôi nhà thuộc loại nào trong số các loại khung dưới đây? Xin chọn đánh giá câu trả lời thích hợp:**

1. Nhôm
2. Gỗ
3. Nhựa
4. Ngoài ra \_\_\_\_\_

**F5. Các cửa của phòng khách (cửa sổ, cửa ra vào) của ngôi nhà có hướng ra mặt đường hay không?** 1. Không 2. Có

**F6. Kính các loại cửa hướng ra bên ngoài của phòng ngủ của ngôi nhà (cửa sổ, cửa ra vào) là loại kính bao nhiêu lớp? nếu là kính đôi nhiều lớp, xin xếp vào loại kính hai lớp.**

1. Trên 3 lớp
2. Hai lớp
3. Một lớp
4. Ngoài ra \_\_\_\_\_

**F7. Khung các loại cửa phòng ngủ của ngôi nhà thuộc loại nào trong số các loại khung dưới đây? Xin chọn đánh giá câu trả lời thích hợp:**

1. Nhôm
2. Gỗ
3. Nhựa
4. Ngoài ra \_\_\_\_\_

**F8. Các cửa của phòng ngủ (cửa sổ, cửa ra vào) của ngôi nhà có hướng ra mặt đường hay không?** 1. Không 2. Có

**F9. Nhà anh(chị) có lắp đặt điều hòa không?** 1. Không 2. Có

**XIN CHÂN THÀNH CẢM ƠN SỰ HỢP TÁC!**

## **Cam kết đồng ý cho phép xử lý dữ liệu cá nhân**

Dữ liệu cá nhân có được thông qua khảo sát này sẽ chỉ được sử dụng cho các mục đích sau:

- (1) Nghiên cứu đánh giá về môi trường
- (2) Lưu trữ trong kho dữ liệu chung về môi trường

Thông tin cá nhân sẽ được lưu trữ trong máy chủ của Đại học Nông Lâm và Đại học Shimane. Nhóm nghiên cứu sẽ quản lý thông tin cá nhân của người trả lời một cách thích hợp.

Tôi đồng ý và xác nhận thông tin.

NGÀY

TÊN



Dự án hợp tác nghiên cứu khoa học giữa  
Đại học Nông Lâm Thành phố Hồ Chí Minh và Đại học Shimane

## **PHIẾU KHẢO SÁT VỀ TIỆN NGHI MÔI TRƯỜNG SỐNG VÀ SỨC KHỎE**

ID: 2020 -A...- 00...

Ngày: ...../06/2020

Họ tên người trả lời phỏng vấn: .....

Địa chỉ: .....

GPS: .....

Liên hệ: .....

Người phỏng vấn: .....

MỌI Ý KIẾN XIN GỬI VỀ:

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Hoặc

**NGUYỄN TRẦN THỊ HỒNG NHUNG**

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KHOA KIẾN TRÚC

ĐẠI HỌC SHIMANE – NHẬT BẢN

**Hồ Chí Minh, 06/2020**

**Xin vui lòng trả lời các câu hỏi sau bằng cách chọn và đánh dấu câu trả lời thích hợp:**

**1. Anh(chị) thích khu vực mình đang sống ở mức độ như thế nào?**

1. Rất thích    2. Thích    3. Bình thường    4. Không thích    5. Rất không thích

**2. Xin vui lòng đánh giá nơi sống của anh(chị) theo các mục sau đây:**

	1 Cực tốt	2 Tốt	3 Bình thường	4 Kém	5 Cực kém
(1) Có môi trường xung quanh thiên nhiên, cây xanh	( )	( )	( )	( )	( )
(2) Xung quanh phố xá, cảnh quan, các tòa nhà sạch đẹp	( )	( )	( )	( )	( )
(4) Tầm nhìn từ nhà của bạn	( )	( )	( )	( )	( )
(4) Độ yên tĩnh xung quanh nhà	( )	( )	( )	( )	( )
(5) Thuận tiện cho việc đi đến nơi làm việc	( )	( )	( )	( )	( )
(6) Thuận tiện cho việc đi đến trường mẫu giáo, trường học hoặc trường đại học.	( )	( )	( )	( )	( )
(7) Thuận tiện cho việc đi đến bệnh viện/ trạm y tế	( )	( )	( )	( )	( )
(8) Thuận tiện cho việc đi đến bưu điện, ngân hàng, chợ,...	( )	( )	( )	( )	( )
(9) Thuận tiện trong sử dụng phương tiện giao thông công cộng	( )	( )	( )	( )	( )

**3. Trong 3 tháng qua, những yếu tố sau đây làm phiền anh(chị) hoặc làm phiền anh(chị) ở mức độ nào khi anh(chị) ở nhà?**

	1 Hoàn toàn không	2 Một phần nào	3 Không quá mức	4 Nhiều	5 Cực nhiều
(1) Tiếng ồn từ máy bay	( )	( )	( )	( )	( )

(2) Tiếng ồn từ các phương tiện giao thông trên đường	( )	( )	( )	( )	( )
(3) Tiếng ồn từ nhà máy	( )	( )	( )	( )	( )
(4) Tiếng ồn từ hàng xóm	( )	( )	( )	( )	( )
(5) Độ rung khi máy bay bay qua	( )	( )	( )	( )	( )
(6) Khí thải	( )	( )	( )	( )	( )
(7) Khói từ nhà máy	( )	( )	( )	( )	( )
(8) Mùi hôi					

4. **Trong 3 tháng qua, tiếng ồn từ máy bay đã làm phiền anh(chị) hoặc gây khó chịu cho anh (chị) ở mức độ nào (thang đo từ 0 đến 10)?**

0    1    2    3    4    5    6    7    8    9    10

Hoàn toàn không

Cực kỳ

5. **Anh(chị) có thường xuyên gặp vấn đề về giấc ngủ không?**

1. Thường xuyên

2. thỉnh thoảng

3. Hầu như không

6. **Mỗi ngày, anh(chị) thường đi ngủ và thức dậy lúc mấy giờ?**

	Đi ngủ	Thức dậy
Các ngày trong tuần	_____ h	_____ h
Cuối tuần (ngày lễ)	_____ h	_____ h

7. **Trong khoảng 4 tuần qua, anh(chị) đánh giá thế nào về chất lượng giấc ngủ của mình?**

1. Rất tốt

2. Khá tốt

3. Khá tệ

4. Rất tệ

8. **Hãy trả lời câu hỏi này liên quan đến giấc ngủ của anh(chị):**

(1) **Anh(chị) có gặp rắc rối với giấc ngủ không?** 1. Không    2. Có

(2) **Nếu trả lời “Có” ở câu hỏi trên, vui lòng chọn số thích hợp cho từng mục sau:**

	1	2	3
	Hiếm khi/ Hoàn toàn không	1-2 lần/ tuần	Nhiều hơn 3 lần/ tuần

(7) Khó đi vào giấc ngủ	( )	( )	( )
(8) Khi bị thức giấc vào buổi đêm, khó ngủ trở lại.	( )	( )	( )
(9) Bị thức giấc sớm vào buổi sáng	( )	( )	( )
(10) Không cảm thấy đã được ngủ ngon vào sáng hôm sau.	( )	( )	( )
(11) Cảm giác buồn ngủ vào ban ngày và không thể làm việc tốt	( )	( )	( )
(12) Khác ( )	( )	( )	( )

**(3) Nếu anh (chị) có rắc rối với giấc ngủ, anh(chị) có nghĩ nguyên nhân là do tiếng ồn máy bay không?** 1. Không 2. Có

**9. Anh(chị) có thấy máy bay qua nhà mình không?** 1. Không 2. Có

Nếu “Có”, thì bao nhiêu lần 1 ngày? \_\_\_\_\_ lần

**10. Phòng ngủ của anh(chị) có thường mở cửa sổ không?**

1. Hiếm khi 2. thỉnh thoảng 3. Thường xuyên 4. Luôn Luôn

**11. Nhà anh(chị) có lắp đặt điều hòa không?** 1. Không 2. Có

**12. Trong cuộc sống hàng ngày các yếu tố thời tiết cũng như điều kiện môi trường tác động đến chúng ta rất nhiều, anh(chị) nhạy cảm ở mức độ nào đối với các yếu tố dưới đây?**

	1 Hoàn toàn	2 Một phần	3 Không quá	4 Nhiều	5 Cực kỳ
(1) Lạnh	( )	( )	( )	( )	( )
(2) Nóng	( )	( )	( )	( )	( )
(3) Tiếng ồn	( )	( )	( )	( )	( )
(4) Độ rung	( )	( )	( )	( )	( )
(5) Chất hóa học	( )	( )	( )	( )	( )
(6) Mùi hôi	( )	( )	( )	( )	( )
(7) Bụi, phấn hoa, không khí bẩn	( )	( )	( )	( )	( )

**Trong phần tiếp theo, anh(chị) có thể trả lời một số câu hỏi liên quan đến thông tin cá nhân được không?**

**13. Công việc hiện tại của anh(chị) là gì?**

1. Đi làm (Nghề nghiệp: \_\_\_\_\_)  
 2. Nông dân 3. Học sinh 4. Nội trợ 5. Nghỉ hưu 6. Tự do

**14. Trong 3 tháng qua anh (chị) thường ở nhà bao nhiêu tiếng 1 ngày?**

1. Dưới 8 tiếng 2. Từ 8-15 tiếng 3. Trên 15 tiếng

**15. Anh(chị) cảm thấy thế nào về tình trạng sức khỏe bản thân?**

1. Tuyệt vời 2. Rất tốt 3. Tốt 4. Khá 5. Kém

**16. Sử dụng thang đo từ 0 đến 10, trong đó 0 là “Rất không hài lòng” và 10 là “Rất hài lòng”, anh(chị) cảm thấy thế nào về cuộc sống của mình hiện tại?**

0 1 2 3 4 5 6 7 8 9 10



Rất không hài lòng



Rất hài lòng

**17. Nghĩ về những căng thẳng trong cuộc sống, anh(chị) nói thế nào về mức độ căng thẳng trong hầu hết các ngày?**

- |                      |     |
|----------------------|-----|
| 1) Hoàn toàn không   | ( ) |
| 2) Không hẳn lắm     | ( ) |
| 3) Một chút          | ( ) |
| 4) Khá căng thẳng    | ( ) |
| 5) Cực kỳ căng thẳng | ( ) |

**18. Anh (chị) có thường xuyên kiểm tra sức khỏe định kỳ không?** 1. Không 2. Có

**19. Dưới đây là danh sách các bệnh lý thường kéo dài trong một thời gian. Trong cột đầu tiên, hãy kiểm tra “Có” hoặc “Không” đối với mỗi điều kiện, sau đó đối với mỗi điều kiện “Có”, vui lòng trả lời câu hỏi trang dưới đây.**

Bạn đã bao giờ mắc.....?	Năm bắt đầu?	Đã gặp bác sĩ chưa?	Đã bao giờ nhập viện vì nó?	Uống thuốc theo chỉ định bác sĩ?	Mắc trong vòng 12 tháng qua?
1. Không 2. Có		3. Chưa 4. Có	3. Chưa 4. Có	3. Chưa 4. Có	3. Chưa 4. Có
Bệnh tim mạch		( )	( )	( )	( )

Huyết áp cao hoặc tăng huyết áp		( )	( )	( )	( )
Tăng lipid máu		( )	( )	( )	( )
Đột quy, đột quy nhẹ hay Con thiếu máu não thoáng qua (TIA)		( )	( )	( )	( )
Hen suyễn		( )	( )	( )	( )
Tiểu đường		( )	( )	( )	( )
Ung thư .....		( )	( )	( )	( )
Trầm cảm hoặc rối loạn thần kinh		( )	( )	( )	( )
Khác		( )	( )	( )	( )
_____		( )	( )	( )	( )
_____		( )	( )	( )	( )

**20. Anh(chị) có thường xuyên tập thể dục trên 30 phút không?**

1) Hoàn toàn không

( )

2) 1 hoặc 2 lần trong tháng

( )

3) Khoảng 1 lần 1 tuần

( )

4) 2-3 lần/tuần

( )

5) 4-5 lần/tuần

( )

6) Hầu như mỗi ngày

( )

**21. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Tuần trước				Gần như mỗi ngày trong 2 tuần
		Hầu như không hoặc ít hơn 1 lần/ ngày	1-2 ngày	3-4 ngày	5-7 ngày	
1	Tôi cảm thấy ăn không ngon miệng	( )	( )	( )	( )	( )
2	Tôi không thể rũ bỏ buồn chán	( )	( )	( )	( )	( )
3	Tôi gặp vấn đề trong việc tập trung vào những việc tôi đang làm	( )	( )	( )	( )	( )
4	Tôi cảm thấy rất chán nản	( )	( )	( )	( )	( )
5	Ngủ không yên	( )	( )	( )	( )	( )
6	Tôi cảm thấy buồn	( )	( )	( )	( )	( )
7	Tôi không thể bắt đầu một việc gì	( )	( )	( )	( )	( )
8	Không gì khiến tôi cảm thấy vui	( )	( )	( )	( )	( )
9	Tôi cảm thấy mình như một người xấu	( )	( )	( )	( )	( )
10	Tôi mất hứng thú với các hoạt động thường làm trước đây	( )	( )	( )	( )	( )
11	Tôi ngủ nhiều hơn bình thường	( )	( )	( )	( )	( )
12	Tôi cảm thấy tôi đang di chuyển quá chậm	( )	( )	( )	( )	( )
13	Tôi cảm thấy bồn chồn	( )	( )	( )	( )	( )
14	Tôi đã ước tôi có thể chết đi	( )	( )	( )	( )	( )
15	Tôi muốn làm đau bản thân mình	( )	( )	( )	( )	( )
16	Tôi thấy mệt mỏi trong mọi lúc	( )	( )	( )	( )	( )
17	Tôi không thích bản thân mình	( )	( )	( )	( )	( )
18	Tôi giảm cân rất nhiều mà không cần nỗ lực gì cả	( )	( )	( )	( )	( )
19	Tôi gặp nhiều vấn đề về giấc ngủ	( )	( )	( )	( )	( )

20	Tôi không thể tập trung vào những điều quan trọng	( )	( )	( )	( )	( )
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**22. Anh(chị) có bao nhiêu khó khăn để nghe và hiểu các từ trong cuộc trò chuyện bình thường (ngay cả có máy trợ thính)?**

1. Tuyệt vời      2. Một vài      3. Ít      4. Không có

		Có	Thỉnh thoảng	Không
1	Anh(chị) có bị điếc ở một hoặc cả 2 tai không ?			
2	Anh (chị) có bao giờ gặp khó khăn nào khi nghe với một hoặc 2 tai không ?	( )	( )	( )
3	Bây giờ anh (chị) có bị ù tai hay ù ở 1 hoặc 2 tai không ?	( )	( )	( )
4	Bây giờ anh (chị) có sử dụng máy trợ thính không ?	( )	( )	( )

5. Câu nào mô tả đúng nhất khả năng nghe ở tai TRÁI của anh (chị) ( không có máy trợ thính) ?

1. Tốt      2. Có 1 chút rắc rối      3. Có nhiều rắc rối      4. Điếc

6. Câu nào mô tả đúng nhất khả năng nghe ở tai PHẢI của anh (chị) ( không có máy trợ thính)?

1. Tốt      2. Có 1 chút rắc rối      3. Có nhiều rắc rối      4. Điếc

**23. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Có	Thỉnh thoảng	Không
1	Anh (chị) có đau đầu không?	( )	( )	( )
2	Anh (chị) có cảm giác chóng mặt không?	( )	( )	( )
3	Anh (chị) có trải qua cảm giác không minh mẫn không?	( )	( )	( )
4	Anh (chị) có trải qua cảm giác tay chân nặng nề không?	( )	( )	( )
5	Anh (chị) có bị đau ở nhiều nơi trên cơ thể không?	( )	( )	( )
6	Anh (chị) của bạn có nặng nề hoặc không minh mẫn không?	( )	( )	( )
7	Miệng của Anh (chị) có tiết nhiều nước bọt không?	( )	( )	( )
8	Anh (chị) có cứng hay đau cổ vai gáy không?	( )	( )	( )
9	Anh (chị) có bị mờ mắt không?	( )	( )	( )

10	Anh (chị) có bị đau thắt lưng không?	( )	( )	( )
11	Anh (chị) có cảm thấy nóng hoặc sốt nhẹ không?	( )	( )	( )
12	Anh (chị) có bị đau lưng cao không?	( )	( )	( )
13	Tim của Anh (chị) có đập mạnh hoặc nhanh hơn khi vội vàng?	( )	( )	( )
14	Gần đây Anh (chị) có cảm thấy mệt mỏi không?	( )	( )	( )
15	Anh (chị) có cảm thấy đau hay nóng mắt không?	( )	( )	( )
16	Mũi của Anh (chị) có nghẹt không?	( )	( )	( )
17	Anh (chị) có ợ nóng không?	( )	( )	( )
18	Có những lúc Anh (chị) muốn nghỉ ngơi hoặc nằm trên giường vào ban ngày không?	( )	( )	( )
19	Anh (chị) có cảm thấy ngứa hay đau họng không?	( )	( )	( )
20	Anh (chị) có cảm thấy nóng mặt hoặc đau đầu không?	( )	( )	( )

**24. Trong 3 tháng qua, thu nhập của gia đình anh (chị) có bị ảnh hưởng không?**

1. Không                      2. Có

**25. Thu nhập của gia đình anh (chị) trong khoảng bao nhiêu dưới đây?**

1. Dưới 10Tr VND              2. Từ 10Tr Đến 20Tr VND                      3. Hơn 20Tr VND

**26. Xin vui lòng cho chúng tôi biết thông tin dưới đây liên quan đến tình trạng sức khỏe của anh(chị) :**

- (1) Chiều cao \_\_\_\_\_ cm                      (2) Cân nặng \_\_\_\_\_ kg  
 (3) Huyết áp trên \_\_\_\_\_ mmHg      (4) Huyết áp dưới \_\_\_\_\_ mmHg  
 (5) Độ tuổi \_\_\_\_\_ tuổi

**27. Nếu anh(chị) muốn, xin vui lòng cung cấp nhận xét của anh (chị) về môi trường sống hiện nay:**

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## **XIN CHÂN THÀNH CẢM ƠN SỰ HỢP TÁC!**

### **Cam kết đồng ý cho phép xử lý dữ liệu cá nhân**

Dữ liệu cá nhân có được thông qua khảo sát này sẽ chỉ được sử dụng cho các mục đích sau:

- (1) Nghiên cứu đánh giá về môi trường
- (2) Lưu trữ trong kho dữ liệu chung về môi trường

Thông tin cá nhân sẽ được lưu trữ trong máy chủ của Đại học Nông Lâm và Đại học Shimane. Nhóm nghiên cứu sẽ quản lý thông tin cá nhân của người trả lời một cách thích hợp.

Tôi đồng ý và xác nhận thông tin.

NGÀY

TÊN

(Chữ ký)

# QUESTIONNAIRE ON LIVING ENVIRONMENT AND HEALTH

ID: 2019-00x

Date: August xx, 2019

Interviewee:

Address:

GPS:

Contact:

Interviewer:

**Please answer the following questions by choosing and checking the corresponding answer:**

**1. What type is your house ownership?**

- 1 Self-owning ( )
- 2 Renting ( )
- 3 Other \_\_\_\_\_ ( )

**2. How long have you been living in your present house? \_\_\_\_\_ years**

**3. How big is your floor area? About \_\_\_\_\_ m<sup>2</sup>**

**4. How much do you like your residential area?**

- 1) Like very much
- 2) Like
- 3) Neither like nor dislike
- 4) Dislike
- 5) Dislike very much

**5. Please evaluate your living area according to the following items:**

	<b>1 Extremely good</b>	<b>2 Good</b>	<b>3 Neither good nor bad</b>	<b>4 Bad</b>	<b>5 Extremely bad</b>
<b>(1) Surrounding environment and natural green</b>	( )	( )	( )	( )	( )
<b>(2) Surrounding street sceneries and buildings</b>	( )	( )	( )	( )	( )
<b>(3) View from your house:</b>	( )	( )	( )	( )	( )
<b>(4) Quietness around the house</b>	( )	( )	( )	( )	( )
<b>(5) Convenience for commuting to working place</b>	( )	( )	( )	( )	( )
<b>(6) Convenience to kindergartens, schools or universities</b>	( )	( )	( )	( )	( )
<b>(7) Convenience to hospitals/health clinics</b>	( )	( )	( )	( )	( )



**11. Please answer this question concerning your sleep:**

**(5) Do you have any trouble with your sleep?**

1) No

2) Yes

**If you answered “Yes” to the above question, please choose appropriate numbers for each item.**

	1 Occasionally	2 Once or twice a week	3 More than 3 times a week
(13) Difficult to fall asleep	( )	( )	( )
(14) When awakened during the night, it is difficult to sleep again.	( )	( )	( )
(15) Awakened early in the morning	( )	( )	( )
(16) Do not feel as having slept well the next morning.	( )	( )	( )
(17) Sleepy during daytime and cannot work well	( )	( )	( )
(18) Others ( )	( )	( )	( )

**(2) If you have trouble with your sleep, do you think that it is due to the aircraft noise?**

1) No

2) Yes

**12. Do you see the airplane flying through your house?**

1) No

2) Yes

If yes, how many times a day? \_\_\_\_\_ times

**13. Is your bedroom windows opened in the following season?**

	<b>1 Rarely</b>	<b>2 Sometimes</b>	<b>3 Often</b>	<b>4 Always</b>
<b>(1) Dry season</b>	( )	( )	( )	( )
<b>(2) Rainy season</b>	( )	( )	( )	( )

**14. In daily life, climatic factors as well as environmental conditions affect us much, then how much are you sensitive to the following factors?**

	<b>1 Not at all</b>	<b>2 Slightly</b>	<b>3 Moderately</b>	<b>4 Very</b>	<b>5 Extremely</b>
<b>(1) Coldness</b>	( )	( )	( )	( )	( )
<b>(2) Hotness</b>	( )	( )	( )	( )	( )
<b>(3) Noise</b>	( )	( )	( )	( )	( )
<b>(4) Vibration</b>	( )	( )	( )	( )	( )
<b>(5) Chemicals</b>	( )	( )	( )	( )	( )
<b>(6) Odors</b>	( )	( )	( )	( )	( )
<b>(7) Dust, pollen, polluted air</b>	( )	( )	( )	( )	( )

**In the next part, do you mind answering some questions relating personal information?**

**15. What is your present job?**

- |                                  |     |
|----------------------------------|-----|
| 1) Employed -> (Occupation)_____ | ( ) |
| 2) Farmer                        | ( ) |
| 3) Student                       | ( ) |
| 4) Housewife                     | ( ) |
| 5) Retired                       | ( ) |
| 6) Unemployed                    | ( ) |

**16. How long in a day do you stay at home? About \_\_\_\_\_ hours**

1. Under 8 hours      2. 8-15 hours      3. Over 15h hours

**17. In general, would you say your health is...?**

- |              |     |
|--------------|-----|
| 1) Excellent | ( ) |
| 2) Very good | ( ) |
| 3) Good      | ( ) |
| 4) Fair      | ( ) |
| 5) Poor      | ( ) |

**18. Using a scale of 0 to 10, where 0 means “Very dissatisfied” and 10 means “Very satisfied”, how do you feel about your life as a whole right now?**

0      1      2      3      4      5      6      7      8      9      10



Very dissatisfied



Very satisfied

**19. Thinking about the amount of stress in your life, would you say that most days are?**

- |                          |     |
|--------------------------|-----|
| 1) Not at all stressful  | ( ) |
| 2) Not very stressful    | ( ) |
| 3) A bit stressful       | ( ) |
| 4) Quite a bit stressful | ( ) |
| 5) Extremely stressful   | ( ) |

**20. Do you usually have periodic health examination?**

- |        |     |
|--------|-----|
| 1) No  | ( ) |
| 2) Yes | ( ) |

**21. Which health facility do you usually visit? \_\_\_\_\_**

**22. Here is a list of medical conditions that usually last for some time. Have you ever had any of these conditions? In the first column, check “yes” or “no” for each condition, then, for each “yes”, please answer every question across the page.**

Have you ever had...? 1. No 2. Yes	What year did it start?	Did you ever see a doctor about it? 3. No 4. Yes	Have you ever been hospitalized for it? 3. No 4. Yes	Have you ever taken medicines prescribed for it? 3. No 4. Yes	Have you had it in the last 12 months? 3. No 4. Yes
Heart trouble		( )	( )	( )	( )
High blood pressure or Hypertension		( )	( )	( )	( )
Hyperlipidemia		( )	( )	( )	( )
Stroke, Small stroke or TIA		( )	( )	( )	( )
Asthma		( )	( )	( )	( )
Diabetes		( )	( )	( )	( )
Cancer Type of cancer: _____ _____ _____		( ) ( ) ( ) ( )	( ) ( ) ( ) ( )	( ) ( ) ( ) ( )	( ) ( ) ( ) ( )
Depression or neurosis		( )	( )	( )	( )
Others: _____ _____ _____ _____		( ) ( ) ( ) ( )	( ) ( ) ( ) ( )	( ) ( ) ( ) ( )	( ) ( ) ( ) ( )

**23. Please indicate if your biological (natural) father and mother ever had any of the conditions below.**

1-No ( )

2-Yes ( )

3-Do not know ( )

	Biological Father	Biological Mother
A. Heart trouble		
B. High blood pressure		
C. Stroke or "TIA"		
D. Diabetes		

**24. How much salty do you eat?**

1. Very much ( )

2. Some ( )

3. Not much ( )

4. None ( )

**25. How much do you eat the following foods:**

	1. Not eat much	2. Once a day	3. Every meal
Pickles	( )	( )	( )
Fish sauce	( )	( )	( )
Soy sauce	( )	( )	( )
Braised fish	( )	( )	( )
Other salty foods:	( )	( )	( )
_____	_____ ( )	_____ ( )	_____ ( )
_____	_____ ( )	_____ ( )	_____ ( )
_____	_____ ( )	_____ ( )	_____ ( )

**26. Do you eat or drink salty food or soup?**

1. Not eat much

2. Once a day

3. Every meal

**27. Do you think about the nutritional balance of the diet?**

1. Don't think

2. Think a little

3. Think

4. Think a lot

**28. How often do you drink alcohol?**

- 1. Not at all
- 2. 2-3 times a month or less
- 3. 1-4 days a week
- 4. Almost everyday

**29. Do you smoke cigarettes?**

- 1. Not at all
- 2. I smoked before but stopped
- 3. 20 or less per day
- 4. More than 20 per day

**30. How often do you do physical activity over 30 minutes?**

- 1) Not at all
- 2) Once or twice a month
- 3) About once a week
- 4) 2-3 times a week
- 5) 4-5 times a week
- 6) Almost everyday

**31. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so.**

		Last week				Nearly every day for 2 weeks
		Not at all or less than 1 day	1-2 days	3-4 days	5-7 days	
1	My appetite was poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I could not shake off the blues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	I had trouble keeping my mind on what I was doing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	I felt depressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	My sleep was restless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	I felt sad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	I could not get going	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Nothing made me happy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9	I felt like a bad person	( )	( )	( )	( )	( )
10	I lost interest in my usual activities	( )	( )	( )	( )	( )
11	I slept much more than usual	( )	( )	( )	( )	( )
12	I felt like I was moving too slowly	( )	( )	( )	( )	( )
13	I felt fidgety	( )	( )	( )	( )	( )
14	I wished I were dead	( )	( )	( )	( )	( )
15	I wanted to hurt myself	( )	( )	( )	( )	( )
16	I was tired all the time	( )	( )	( )	( )	( )
17	I did not like myself	( )	( )	( )	( )	( )
18	I lost a lot of weight without any effort	( )	( )	( )	( )	( )
19	I had a lot of trouble getting to sleep	( )	( )	( )	( )	( )
20	I could not focus on the important things	( )	( )	( )	( )	( )

**32. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way.**

		Yes	Sometimes	No
1	Do you have headaches?	( )	( )	( )
2	Do you experience feelings of dizziness?	( )	( )	( )
3	Have you experienced a sense of dullness or a heavy feeling in your head?	( )	( )	( )
4	Have you experienced a sense of dullness or a heavy sensation in your hands or legs?	( )	( )	( )
5	Do you have pains in various parts of your body?	( )	( )	( )
6	Does your head feel "heavy" or "dull"?	( )	( )	( )
7	Does your mouth "water" a lot ; that is, produce a lot of saliva?	( )	( )	( )
8	Do you have any stiffness or pain in your neck or shoulders?	( )	( )	( )
9	Do you have blurred vision?	( )	( )	( )
10	Do you have low back pain?	( )	( )	( )

11	Do you feel flushed or feverish?	( )	( )	( )
12	Do you have high back pain?	( )	( )	( )
13	Does your heart pound or beat faster when you walk in a hurry?	( )	( )	( )
14	Are you tired recently?	( )	( )	( )
15	Do you feel pain or hot in your eyes?	( )	( )	( )
16	Is your nose stuffy?	( )	( )	( )
17	Do you have heart burn?	( )	( )	( )
18	Are there times when you would like to take a rest or lie down in bed during the day?	( )	( )	( )
19	Do you feel irritation or pain in your throat?	( )	( )	( )
20	Do you have hot flashes in your face or head?	( )	( )	( )

**33. How much difficulty do you have hearing and understanding words in a normal conversation (even with a hearing aid)?**

1. A great deal      2. Some      3. A little      4. None

1	Do you have deafness in one or both ears?	Yes	Sometimes	No
2	Do you now have any other trouble hearing with one or both ears?	( )	( )	( )
3	Do you now have tinnitus or ringing in one or both ears?	( )	( )	( )
4	Do you now use a hearing aid?	( )	( )	( )

**5. Which statements best describe your hearing in your LEFT ear (without hearing aid)?**

1. Good      2. Little trouble      3. A lot of trouble      4. Deaf

**6. Which statements best describe your hearing in your RIGHT ear (without hearing aid)?**

1. Good      2. Little trouble      3. A lot of trouble      4. Deaf

**34. How many vehicles are your family using for daily transport?**

- 1. Bicycles: \_\_\_\_\_ ( )
- 2. Motorbikes: \_\_\_\_\_ ( )
- 3. Cars: \_\_\_\_\_ ( )
- 4. Others: \_\_\_\_\_ ( )

**35. In which category do you classify your family incomes?**

- 1. Under 10M VND    2. From 10M to 20M VND    3. More than 20M VND

**36. What is your last school or university?**

- 1. \_\_\_\_\_ Secondary School.
- 2. \_\_\_\_\_ High School.
- 3. \_\_\_\_\_ University
- 4. Others \_\_\_\_\_

**37. Please tell us the information below concerning your health condition:**

- (1) Height \_\_\_\_\_ cm
- (2) Weight \_\_\_\_\_ kg
- (3) Maximum blood pressure \_\_\_\_\_ mmHg
- (4) Minimum blood pressure \_\_\_\_\_ mmHg
- (5) Age \_\_\_\_\_ years old

**38. Blood pressure measurement:**

1 <sup>st</sup> , time measurement	2 <sup>nd</sup> time	3 <sup>rd</sup> time
Upper _____ mmHg	Upper _____ mmHg	Upper _____ mmHg
Lower _____ mmHg	Lower _____ mmHg	Lower _____ mmHg
Heart rate _____	Heart rate _____	Heart rate _____

**39. As you wish, please provide your own comments on the living environment:**

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**THANK YOU FOR YOUR COOPERATION!**

**\* The following part can be answered by interviewers according to the respondent's fact. If an interviewer cannot, please ask a respondent again for sure.**

**F1. Gender of respondent**

1. Male ( )

2. Female ( )

**F2. How many floors does your house have? \_\_\_\_\_ floors**

Which floor are you usually sleeping at? \_\_\_\_\_

**F3. Structure of the house**

1 Wooden ( )

2 Bricks ( )

3 Prefabricated ( )

4 Reinforced concrete ( )

5 Reinforced concrete with brick wall ( )

6 Others \_\_\_\_\_ ( )

**F4. How many glass layers do your living room windows and doors have? If they are doubled-pane windows/doors, please specify as 2 layers.**

1 More than 3 layers ( )

2 2 layers ( )

3 1 layer ( )

4 Others \_\_\_\_\_ ( )

**F5. Which type of frame among the following types do your living room windows and doors have?**

1 Aluminum frame ( )

2 Wooden frame ( )

3 Plastic frame ( )

4 Others \_\_\_\_\_ ( )

**F6. How many glass layers do your bedroom windows and doors have? If they are multi-layer doubled-pane windows/doors, please specify as 2 layers.**

1 More than 3 layers ( )

2 2 layers ( )

3 1 layer ( )

4 Others \_\_\_\_\_ ( )

**F7. Which type of frame among the following types do your bedroom windows and doors have?**

- 1 Aluminum frame ( )
- 2 Wooden frame ( )
- 3 Plastic frame ( )
- 4 Others \_\_\_\_\_ ( )

**F8. Does the house have the soundproofing materials and products?**

- 1) No
- 2) Yes

**F9. Are air-conditioners installed in the house?**

- 1) No
- 2) Yes

**THANK YOU VERY MUCH!**



Dự án hợp tác nghiên cứu khoa học giữa

Đại học Nông Lâm Thành phố Hồ Chí Minh và Đại học Shimane

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## PHIẾU KHẢO SÁT VỀ TIỆN NGHI MÔI TRƯỜNG SỐNG VÀ SỨC KHỎE

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ID: 2019-A... - \_\_\_\_\_

Ngày: ...../08/2019

Họ tên người trả lời phỏng vấn: .....

Địa chỉ: .....

GPS: .....

Liên hệ: .....

Người phỏng vấn: .....

MỌI Ý KIẾN XIN GỬI VỀ:

**NGUYỄN THU LAN**

Email: [lan@riko.shimane-u.ac.jp](mailto:lan@riko.shimane-u.ac.jp)

Hoặc

**TRIỆU BẠCH LIÊN**

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KHOA KIẾN TRÚC

ĐẠI HỌC SHIMANE – NHẬT BẢN

Hồ Chí Minh - 2019

**Xin vui lòng trả các câu hỏi sau bằng cách chọn đánh dấu câu trả lời thích hợp:**

**1. Nhà của anh(chị) thuộc loại nào trong số các loại dưới đây?**

1. Nhà riêng                      2. Nhà thuê                      3. Ngoài ra \_\_\_\_\_

**2. Anh(chị) đã ở ngôi nhà hiện tại bao nhiêu năm? \_\_\_\_\_ năm**

**3. Tổng diện tích sàn tầng 1 của nhà anh(chị) ước tính là bao nhiêu? \_\_\_\_\_ m<sup>2</sup>**

**4. Anh(chị) thích khu vực mình đang sinh sống ở mức độ nào?**

1. Cực thích      2. Thích      3. Bình thường      4. Ghét                      5. Cực ghét

**5. Xin hãy đánh giá nơi ở của anh(chị) theo 9 mục dưới đây:**

	Cực tốt	Tốt	Bình thường	Kém	Cực kém
(1) Có môi trường thiên nhiên, cây xanh	( )	( )	( )	( )	( )
(2) Phố xá, quang cảnh được xây dựng sắp đặt sạch đẹp	( )	( )	( )	( )	( )
(3) Tầm nhìn từ nhà	( )	( )	( )	( )	( )
(4) Độ yên tĩnh xung quanh nhà	( )	( )	( )	( )	( )
(5) Thuận tiện cho việc đi làm	( )	( )	( )	( )	( )
(6) Gần trường học, nhà trẻ	( )	( )	( )	( )	( )
(7) Gần cơ sở y tế	( )	( )	( )	( )	( )
(8) Gần bưu điện, ngân hàng, chợ, siêu thị	( )	( )	( )	( )	( )
(9) Thuận tiện trong sử dụng phương tiện giao thông công cộng	( )	( )	( )	( )	( )

**6. Trong 12 tháng qua, những yếu tố dưới đây làm phiền anh(chị) hoặc gây khó chịu cho anh(chị) ở mức độ nào khi anh(chị) ở nhà?**

	Hoàn toàn không	Một phần nào	Không quá mức	Nhiều	Cực kỳ
(1) Tiếng ồn từ máy bay	( )	( )	( )	( )	( )
(2) Tiếng ồn từ các phương tiện giao thông trên đường	( )	( )	( )	( )	( )
(3) Tiếng ồn từ nhà máy	( )	( )	( )	( )	( )
(4) Tiếng ồn từ hàng xóm	( )	( )	( )	( )	( )
(5) Độ rung khi máy bay bay qua	( )	( )	( )	( )	( )

(6) Khí thải	( )	( )	( )	( )	( )
(7) Khói từ nhà máy	( )	( )	( )	( )	( )
(8) Mùi hôi thối	( )	( )	( )	( )	( )

**7. Trong khoảng 12 tháng qua, tiếng ồn từ máy bay đã làm phiền anh(chị), gây khó chịu cho anh(chị) ở mức độ nào?**

0    1    2    3    4    5    6    7    8    9    10

Hoàn toàn không

Cực kỳ

**8. Anh(chị) có thường gặp vấn đề về giấc ngủ không?**

1. Thường xuyên    2. thỉnh thoảng    3. Hầu như không

**9. Anh(chị) thường ngủ khoảng bao nhiêu tiếng vào buổi đêm?**

1. 6 tiếng hoặc ít hơn    2. 7 tiếng    3. 8 tiếng    4. 9 tiếng hoặc hơn

**10. Trong khoảng 4 tuần qua, anh(chị) đánh giá thế nào chất lượng giấc ngủ của mình?**

1. Rất tốt    2. Tốt    3. Không tốt    4. Rất không tốt

**11. Anh(chị) có gặp rắc rối với giấc ngủ không?**

1. Không    2. Có

**(1) Nếu "có", xin hãy chọn câu trả lời cho các mục sau đây:**

	Hiếm khi/ Hoàn toàn không	1-2 lần/ tuần	3 lần/ tuần trở lên
(1) Khó đi vào giấc ngủ	( )	( )	( )
(2) Khó ngủ trở lại sau khi bị thức giấc vào buổi đêm	( )	( )	( )
(3) Bị thức giấc sớm vào buổi sáng	( )	( )	( )
(4) Không cảm thấy đã được ngủ ngon vào sáng hôm sau	( )	( )	( )
(5) Cảm thấy buồn ngủ vào ban ngày và không thể làm việc tốt	( )	( )	( )
(6) Ngoài ra _____	( )	( )	( )

**(2) Nếu anh(chị) có rắc rối với giấc ngủ, anh(chị) có nghĩ nguyên nhân là do tiếng ồn máy bay không? 1. Không    2. Có**

**12. Anh(chị) có thấy máy bay bay qua nhà mình không?** 1. Không 2. Có

Nếu "có" thì khoảng bao nhiêu lần 1 ngày? \_\_\_\_\_

**13. Phòng ngủ của anh(chị) có thường mở cửa sổ không?**

	Hiếm khi	Thỉnh thoảng	Thường xuyên	Luôn luôn
(1) Mùa mưa	( )	( )	( )	( )
(2) Mùa khô	( )	( )	( )	( )

**14. Trong cuộc sống hàng ngày các yếu tố thời tiết cũng như điều kiện môi trường tác động đến chúng ta rất nhiều, anh(chị) nhạy cảm ở mức độ nào đối với các yếu tố dưới đây?**

	Hoàn toàn không	Một phần nào	Không quá mức	Nhiều	Cực kỳ
(1) Lạnh	( )	( )	( )	( )	( )
(2) Nóng	( )	( )	( )	( )	( )
(3) Tiếng ồn	( )	( )	( )	( )	( )
(4) Độ rung	( )	( )	( )	( )	( )
(5) Chất hóa học	( )	( )	( )	( )	( )
(6) Mùi hôi	( )	( )	( )	( )	( )
(7) Bụi, phấn hoa, không khí bẩn	( )	( )	( )	( )	( )

**Trong phần tiếp theo, anh(chị) có thể trả lời một số câu hỏi liên quan đến thông tin cá nhân được hay không?**

**15. Công việc hiện tại của anh(chị) là gì?**

1. Đi làm (Nghề nghiệp: \_\_\_\_\_)
2. Nông dân
3. Học sinh
4. Nội trợ
5. Nghỉ hưu
6. Tự do

**16. Anh(chị) thường ở nhà khoảng bao nhiêu tiếng một ngày?**

1. Dưới 8 tiếng
2. Từ 8 đến 15 tiếng
3. Trên 15 tiếng

**17. Anh(chị) cảm thấy thế nào về tình trạng sức khỏe của bản thân?**

1. Tuyệt vời
2. Rất tốt
3. Tốt
4. Khá
5. Kém

**18. Sử dụng thang đo từ 0 đến 10, trong đó 0 là “Rất không hài lòng” và 10 là “Rất hài lòng”, anh (chị) cảm thấy thế nào về cuộc sống của mình hiện tại?**

0    1    2    3    4    5    6    7    8    9    10

Rất không hài lòng

Rất hài lòng

**19. Nghĩ về những căng thẳng trong cuộc sống, anh (chị) nói thế nào về mức độ căng thẳng trong hầu hết các ngày?**

1. Không chút nào    2. Một chút    3. Khá căng thẳng    4. Cực kỳ căng thẳng

**20. Anh(chị) có thường xuyên kiểm tra sức khỏe định kỳ không?** 1. Không    2. Có

**21. Anh(chị) thường đến cơ sở khám chữa bệnh nào?** \_\_\_\_\_

**22. Dưới đây là danh sách các bệnh lý thường kéo dài trong một thời gian. Anh(Chị) đã từng mắc bệnh nào trong danh chưa?**

1 - Không    2 - Có

Đối với mỗi bệnh ở cột này, nếu "có" xin anh(chị) vui lòng trả lời những câu hỏi ở các cột tiếp theo.	Năm bắt đầu	Gặp bác sĩ chưa? (1/2)	Nhập viện vì nó? (1/2)	Uống thuốc theo đơn chỉ định của bác sĩ? (1/2)(Thuốc gì?)	Mắc trong vòng 12 tháng qua? (1/2)
(1) Bệnh tim mạch					
(2) Huyết áp cao hoặc Bệnh tăng huyết áp					
(3) Tăng lipid máu					
(4) Đột quỵ , Đột quỵ nhẹ hay Con thiếu máu não thoáng qua (TIA)					
(5) Hen suyễn					
(6) Tiểu đường					
(7) Ung thư .....					
(8) Trầm cảm, rối loạn thần kinh					
(9) Khác: ..... ..... ..... .....					

**23. Anh(Chị) vui lòng cho biết cha mẹ đẻ của anh(chị) có từng mắc các bệnh dưới đây?**

1 - Không ; 2 - Có ; 3 - Không biết

	Cha đẻ	Mẹ đẻ
(1) Bệnh tim mạch		
(2) Huyết áp cao		
(3) Đột quỵ hoặc TIA		
(4) Tiểu đường		

**24. Lượng muối anh(chị) sử dụng trong mỗi bữa ăn có nhiều không?**

1. Rất nhiều      2. Một chút      3. Không nhiều lắm      4. Không

**25. Anh(Chị) có hay ăn những món dưới đây không?**

	Không nhiều lắm	1 lần/ ngày	Mọi bữa ăn
(1) Dưa muối	( )	( )	( )
(2) Nước mắm	( )	( )	( )
(3) Nước tương	( )	( )	( )
(4) Cá kho	( )	( )	( )
(5) Các món mặn khác: .....	( )	( )	( )

**26. Anh(Chị) có ăn những loại thức ăn mặn và nhiều muối không?**

1. Không ăn nhiều lắm      2. Ngày 1 lần      3. Mọi bữa ăn

**27. Anh(Chị) có nghĩ về cân bằng dinh dưỡng trong các bữa ăn không?**

1. Hoàn toàn không      2. Một chút      3. Bình thường      4. Nghĩ nhiều

**28. Anh(Chị) có thường uống đồ uống có cồn (rượu, bia...) không?**

1. Hoàn toàn không      2. Một tháng 2-3 lần hoặc ít hơn  
3. Một tuần 1-4 ngày      4. Hầu như hàng ngày

**29. Anh(Chị) có thường xuyên hút thuốc không?**

1. Hoàn toàn không      2. Trước có hút giờ ngừng  
3. Một ngày 20 điếu hoặc ít hơn      4. Hơn 20 điếu một ngày

**30. Anh(Chị) có thường xuyên tập thể dục trên 30 phút không?**

1. Hoàn toàn không      2. Một tháng 1-2 lần      3. Một tuần 1 lần  
4. Một tuần 2-3 lần      5. Một tuần 4-5 lần      6. Hầu như hàng ngày

**31. Anh(Chị) có cảm thấy khó khăn khi nghe hiểu trong hội thoại bình thường không? (kể cả khi sử dụng máy trợ thính)**

1. Rất khó khăn      2. Thỉnh thoảng      3. Chỉ một chút      4. Hoàn toàn không

**Anh(Chị) vui lòng cho biết đó là khó khăn gì bằng cách trả lời các câu hỏi dưới đây. Nếu "hoàn toàn không" xin bỏ qua.**

		Có	Thỉnh thoảng	Không
1	Điếc 1 hoặc cả 2 tai	( )	( )	( )
2	Gặp các vấn đề khác về thính lực ở 1 hoặc 2 tai	( )	( )	( )
3	Ù tai ở 1 hoặc cả 2 bên	( )	( )	( )
4	Sử dụng máy trợ thính	( )	( )	( )

**Miêu tả đúng nhất về tình trạng thính lực hiện tại của anh(chị) (không tính máy trợ thính)**

		Tốt	Một chút khó khăn	Khá khó khăn	Điếc
5	Tai trái	( )	( )	( )	( )
6	Tai phải	( )	( )	( )	( )

**32. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(Chị) có thường xuyên cảm thấy như vậy không?**

		Tuần trước				Hầu như mọi ngày trong 2 tuần qua
		Hoàn toàn không hoặc ít hơn 1 lần 2 ngày	1-2 ngày trong tuần	3-4 ngày trong tuần	5-7 ngày trong tuần	
1	Tôi cảm thấy ăn không ngon miệng	( )	( )	( )	( )	( )
2	Tôi không thể rũ bỏ sự buồn chán	( )	( )	( )	( )	( )
3	Tôi gặp vấn đề trong việc tập trung vào những việc tôi đang làm	( )	( )	( )	( )	( )
4	Tôi cảm thấy rất chán nản	( )	( )	( )	( )	( )
5	Ngủ không yên	( )	( )	( )	( )	( )
6	Tôi cảm thấy buồn	( )	( )	( )	( )	( )
7	Tôi không thể bắt đầu một việc gì	( )	( )	( )	( )	( )
8	Không gì khiến tôi cảm thấy vui	( )	( )	( )	( )	( )

9	Tôi thấy mình như 1 người xấu vậy	( )	( )	( )	( )	( )
10	Tôi mất hứng thú với các hoạt động thường làm trước đây	( )	( )	( )	( )	( )
11	Tôi ngủ nhiều hơn bình thường	( )	( )	( )	( )	( )
12	Tôi cảm giác tôi đang di chuyển quá chậm	( )	( )	( )	( )	( )
13	Tôi cảm thấy bồn chồn	( )	( )	( )	( )	( )
14	Tôi đã ước tôi có thể chết đi	( )	( )	( )	( )	( )
15	Tôi muốn tổn thương bản thân mình	( )	( )	( )	( )	( )
16	Tôi thấy mệt mỗi mọi lúc	( )	( )	( )	( )	( )
17	Tôi không thích chính mình	( )	( )	( )	( )	( )
18	Tôi giảm cân rất nhiều mà không cần nỗ lực gì cả	( )	( )	( )	( )	( )
19	Tôi gặp nhiều vấn đề về giấc ngủ	( )	( )	( )	( )	( )
20	Tôi không thể tập trung vào những điều quan trọng	( )	( )	( )	( )	( )

**33. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(Chị) có thường xuyên cảm thấy như vậy không?**

		Có	Thỉnh thoảng	Không
1	Đau đầu	( )	( )	( )
2	Cảm giác chóng mặt	( )	( )	( )
3	Cảm giác không minh mẫn	( )	( )	( )
4	Tay chân nặng nề	( )	( )	( )
5	Đau ở các phần trên cơ thể	( )	( )	( )
6	Nặng đầu	( )	( )	( )
7	Tiết nhiều nước bọt	( )	( )	( )
8	Cứng hay đau cổ vai gáy	( )	( )	( )
9	Mắt mờ	( )	( )	( )
10	Đau thắt lưng	( )	( )	( )
11	Thấy nóng hay sốt nhẹ	( )	( )	( )

12	Đau lưng cao	( )	( )	( )
13	Tim đập nhanh khi đi vội	( )	( )	( )
14	Cảm thấy mệt mỏi	( )	( )	( )
15	Đau hay nóng mắt	( )	( )	( )
16	Nghẹt mũi	( )	( )	( )
17	Ợ nóng	( )	( )	( )
18	Trong ngày có lúc muốn nghỉ hoặc nằm trên giường	( )	( )	( )
19	Ngứa hay đau họng	( )	( )	( )
20	Nóng mặt hoặc đầu	( )	( )	( )

**34. Gia đình anh(chị) có bao nhiêu phương tiện tham gia giao thông?**

1. Xe đạp ( \_\_\_ xe )      2. Xe máy ( \_\_\_ xe )      3. Ô tô ( \_\_\_ xe )  
 4. Khác: \_\_\_\_\_ ( \_\_\_ xe )

**35. Xin anh(chị) vui lòng cho biết khoảng thu nhập của gia đình**

1. Dưới 10 triệu đồng      2. Khoảng 10-20 triệu đồng      3. Hơn 20 triệu đồng

**36. Anh(Chị) từng học ở những trường nào?**

1. Trường THCS \_\_\_\_\_  
 2. Trường THPT \_\_\_\_\_  
 3. Đại học/ Học viện \_\_\_\_\_  
 4. Khác \_\_\_\_\_

**37. Xin anh(chị) cho biết một số thông tin liên quan đến tình trạng sức khỏe.**

- (1) Chiều cao \_\_\_\_\_ cm      (2) Cân nặng \_\_\_\_\_ kg  
 (3) Huyết áp trên \_\_\_\_\_ mmHg      (4) Huyết áp dưới \_\_\_\_\_ mmHg  
 (5) Tuổi \_\_\_\_\_

**38. Đo huyết áp**

Lần 1	Lần 2	Lần 3
Upper _____ mmHg	Upper _____ mmHg	Upper _____ mmHg
Lower _____ mmHg	Lower _____ mmHg	Lower _____ mmHg
Nhịp tim _____	Nhịp tim _____	Nhịp tim _____

39. Ngoài các câu hỏi trên, nếu anh(chị) có ý kiến gì về môi trường sống hiện nay, xin cho biết:

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**\* Phần này sinh viên thực hiện phỏng vấn xin hãy quan sát và tự điền câu trả lời (nếu không rõ, xin hỏi lại người trả lời phỏng vấn để có câu trả lời đúng)**

F1. Giới tính của người trả lời phỏng vấn? 1. Nam 2. Nữ

F2. Cấu tạo ngôi nhà thuộc loại nào trong các cấu tạo dưới đây?

- 1 Làm từ gỗ ( )
- 2 Xây từ gạch ( )
- 3 Nhà lắp ghép ( )
- 4 Nhà bê tông cốt thép ( )
- 5 Tường gạch và khung bê tông cốt thép ( )
- 6 Ngoài ra \_\_\_\_\_ ( )

F3. Kính các loại cửa hướng ra bên ngoài của phòng khách của ngôi nhà (cửa sổ, cửa ra vào) là loại kính bao nhiêu lớp? nếu là kính đôi nhiều lớp, xin xếp vào loại kính hai lớp.

- 1. Trên 3 lớp 2. Hai lớp 3. Một lớp 4. Ngoài ra \_\_\_\_\_

F4. Khung các loại cửa phòng khách của ngôi nhà thuộc loại nào trong số các loại khung dưới đây? Xin chọn đánh giá câu trả lời thích hợp:

- 1. Nhôm 2. Gỗ 3. Nhựa 4. Ngoài ra \_\_\_\_\_

F5. Các cửa của phòng khách (cửa sổ, cửa ra vào) của ngôi nhà có hướng ra mặt đường hay không? 1. Không 2. Có

F6. Kính các loại cửa hướng ra bên ngoài của phòng ngủ của ngôi nhà (cửa sổ, cửa ra vào) là loại kính bao nhiêu lớp? nếu là kính đôi nhiều lớp, xin xếp vào loại kính hai lớp.

- 1. Trên 3 lớp 2. Hai lớp 3. Một lớp 4. Ngoài ra \_\_\_\_\_

F7. Khung các loại cửa phòng ngủ của ngôi nhà thuộc loại nào trong số các loại khung dưới đây? Xin chọn đánh giá câu trả lời thích hợp:

- 1. Nhôm 2. Gỗ 3. Nhựa 4. Ngoài ra \_\_\_\_\_

F8. Các cửa của phòng ngủ (cửa sổ, cửa ra vào) của ngôi nhà có hướng ra mặt đường hay không? 1. Không 2. Có

F9. Nhà anh(chị) có lắp đặt điều hòa không? 1. Không 2. Có

**XIN CHÂN THÀNH CẢM ƠN SỰ HỢP TÁC !**

# **QUESTIONNAIRE ON ENVIRONMENT AND HEALTH**

**(FOR STAFF)**

ID: 202x-00x

Date: August xx, 202x

Interviewee:

Address:

GPS:

Contact:

Interviewer:

**\* Interviewers can answer the following part according to the respondent's facts. If an interviewer cannot, please ask a respondent again for sure.**

**F1. Gender of respondent** 1. Male      2. Female

**F2. How long have you worked at this hospital?** \_\_\_\_\_

**F3. Which room is the respondent staying?** \_\_\_\_\_

**F4. Are air-conditioners operated in the room?**      1. No      2. Yes

**Please answer the following questions by choosing and checking the corresponding answer:**

**1. How many hours do you spend in your room everyday?** \_\_\_\_\_ hours

**2. How much do you like your room?**

- |                             |  |
|-----------------------------|--|
| 1) Like very much           |  |
| 2) Like                     |  |
| 3) Neither like nor dislike |  |
| 4) Dislike                  |  |
| 5) Dislike very much        |  |

**3. Please evaluate the hospital environment according to the following items:**

	1 Extremely good	2 Good	3 Neither good nor bad	4 Bad	5 Extremely bad
(1) Surrounding environment and natural green	( )	( )	( )	( )	( )
(2) Surrounding street sceneries and buildings	( )	( )	( )	( )	( )
(3)View from your room	( )	( )	( )	( )	( )

(4) Quietness around the room	( )	( )	( )	( )	( )
(9) Convenience to access to public transportation	( )	( )	( )	( )	( )

**4. When you stay at the hospital, how much does each of the following factors bother, disturb, or annoy you when you are here?**

	<b>1</b> Not at all	<b>2</b> Slightly	<b>3</b> Moderately	<b>4</b> Very	<b>5</b> Extremely
(1) Aircraft noise	( )	( )	( )	( )	( )
(2) Road traffic noise	( )	( )	( )	( )	( )
(3) Factory noise	( )	( )	( )	( )	( )
(4) Noise from the roommates	( )	( )	( )	( )	( )
(5) Vibration by aircraft flyover	( )	( )	( )	( )	( )
(6) Exhausted gas	( )	( )	( )	( )	( )
(7) Smoke discharged from factories	( )	( )	( )	( )	( )
(8) Odors	( )	( )	( )	( )	( )

**5. In daily activity, how disturbed are you by aircraft flyovers in the following cases?**

	1 Not at all	2 Slightl v	3 Moderately	4 Ver v	5 Extremely
(1) When you have a conversation indoor	( )	( )	( )	( )	( )
(2) When you communicate on the phone	( )	( )	( )	( )	( )
(3) When you listen to TV/radio indoor	( )	( )	( )	( )	( )



1. Often                      2. Sometimes                      3. Almost never

**8. At what time do you go to bed, and when do you wake up every day?**

	Go to bed	Wake up
Weekdays	_____h(2)	_____h(1)
Weekends ( holidays)	_____h(4)	_____h(3)

**9. During the past four weeks, how would you rate the quality of your sleep overall?**

1. Very good                      2. Fairly good                      3. Fairly bad                      4. Very bad

**10. Please answer this question concerning your sleep when you stay at the hospital:**

**(6) Do you have any trouble with your sleep?** 1. No                      2. Yes

**(7) If you answered “Yes” to the above question, please choose appropriate numbers for each item.**

	1 Occasionally	2 Once or twice a week	3 More than 3 times a week
(19) Difficult to fall asleep	( )	( )	( )
(20) When awakened during the night, it is difficult to sleep again.	( )	( )	( )
(21) Awakened early in the morning	( )	( )	( )
(22) Do not feel as having slept well the next morning.	( )	( )	( )
(23) Sleepy during daytime	( )	( )	( )
(24) Others (                      )	( )	( )	( )

**(8) If you have trouble with your sleep, do you think it is due to the aircraft noise?**

1. No                      2. Yes

**11. Do you see the airplane flying through your windows?**                      1. No                      2. Yes

If "yes," how many times a day? \_\_\_\_\_ times

**12. How often are your room windows opened?**

1. Rarely                      2. Sometimes                      3. Often                      4. Always

**13. In daily life, climatic factors and environmental conditions affect us much, so how much are you sensitive to the following factors?**

	1 Not at all	2 Slightly	3 Moderately	4 Very	5 Extremely
(1) Coldness	( )	( )	( )	( )	( )
(2) Hotness	( )	( )	( )	( )	( )
(3) Noise	( )	( )	( )	( )	( )
(4) Vibration	( )	( )	( )	( )	( )
(5) Chemicals	( )	( )	( )	( )	( )
(6) Odors	( )	( )	( )	( )	( )
(7) Dust, pollen, polluted air	( )	( )	( )	( )	( )

**In the next part, do you mind answering some questions relating personal information?**

**14. What is your present job?**

1)                      Employed                      ->

(Occupation) \_\_\_\_\_

2) Student                     

**15. In general, would you say your health is?**

1) Excellent                     

2) Very good                     

3) Good                     

4) Fair

5) Poor

**16. Using a scale of 0 to 10, where 0 means "Very dissatisfied" and 10 means "Very satisfied", how do you feel about your life as a whole right now?**

0	1	2	3	4	5	6	7	8	9	10
↓					↓					
Very dissatisfied					Very satisfied					

**17. Thinking about the amount of stress in your life, would you say that most days are?**

1) Not at all stressful	<input type="checkbox"/>
2) Not very stressful	<input type="checkbox"/>
3) A bit stressful	<input type="checkbox"/>
4) Quite a bit stressful	<input type="checkbox"/>
5) Extremely stressful	<input type="checkbox"/>

**18. Do you usually have periodic health examinations?**      1. No      2. Yes

**19. Here is a list of medical conditions that usually last for some time. Have you ever had any of these conditions? In the first column, check "yes" or "no" for each condition; then, for each "yes", please answer every question across the page.**

Have you ever had...? 1. No 2. Yes	What year did it start?	Did you ever see a doctor about it? 5. No 6. Yes	Have you ever been hospitalized for it? 5. No 6. Yes	Have you ever taken medicines prescribed for it? 5. No 6. Yes	Have you had it in the last 12 months? 5. No 6. Yes
Heart trouble ( )		( )	( )	( )	( )
High blood pressure or Hypertension ( )		( )	( )	( )	( )
Hyperlipidemia ( )		( )	( )	( )	( )

Stroke, Small stroke or TIA ( )		( )	( )	( )	( )
Asthma ( )		( )	( )	( )	( )
Diabetes ( )		( )	( )	( )	( )
Cancer ( ) Type of cancer: _____ _____ _____		( ) ( ) ( )	( ) ( ) ( )	( ) ( ) ( )	( ) ( ) ( )
Depression or neurosis ( )		( )	( )	( )	( )
Others: _____ _____ _____ _____		( ) ( ) ( ) ( )	( ) ( ) ( ) ( )	( ) ( ) ( ) ( )	( ) ( ) ( ) ( )

**20. Please indicate if your biological (natural) father and mother ever had any of the conditions below.**

**1-No**

**2-Yes**

**3-Do not know**

	Biological Father	Biological Mother
A. Heart trouble	( )	( )
B. High blood pressure	( )	( )
C. Stroke or "TIA"	( )	( )

D. Diabetes	( )	( )
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**21. How much salt do you eat?**

1. Very much ( )    2. Some ( )    3. Not much ( )    4. None ( )

**22. How much do you eat the following foods:**

	1. Not eat much	2. Once a day	3. Every meal
Pickles	( )	( )	( )
Fish sauce	( )	( )	( )
Soy sauce	( )	( )	( )
Braised fish	( )	( )	( )
Other salty foods:	( )	( )	( )
_____	( )	( )	( )
_____	( )	( )	( )
_____	( )	( )	( )

**23. Do you eat or drink salty food or soup?**

1. Not eat much    2. Once a day    3. Every meal

**24. Do you think about the nutritional balance of the diet?**

1. Don't think    2. Think a little    3. Think    4. Think a lot

**25. How often do you drink alcohol?**

1. Not at all    2. 2-3 times a month or less  
3. 1-4 days a week    4. Almost everyday

**26. Do you smoke cigarettes?**

- 1. Not at all
- 2. I smoked before but stopped
- 3. 20 or less per day
- 4. More than 20 per day

**27. How often do you do physical activity over 30 minutes?**

- 1) Not at all
- 2) Once or twice a month
- 3) About once a week
- 4) 2-3 times a week
- 5) 4-5 times a week
- 6) Almost everyday

**28. How much difficulty do you have hearing and understanding words in a normal conversation (even with a hearing aid)?**

- 1. A great deal
- 2. Some
- 3. A little
- 4. None

1	Do you have deafness in one or both ears?	Yes	Sometimes	No
2	Do you now have any other trouble hearing with one or both ears?	( )	( )	( )
3	Do you now have tinnitus or ringing in one or both ears?	( )	( )	( )
4	Do you now use a hearing aid?	( )	( )	( )

**5. Which statements best describe your hearing in your LEFT ear (without hearing aid)?**

- 1. Good
- 2. Little trouble
- 3. A lot of trouble
- 4. Deaf

**6. Which statements best describe your hearing in your RIGHT ear (without hearing aid)?**

- 1. Good
- 2. Little trouble
- 3. A lot of trouble
- 4. Deaf

**29. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so.**

		Last week				Nearly every day for 2 weeks
		Not at all or less than 1 day	1-2 days	3-4 days	5-7 days	
1	My appetite was poor	( )	( )	( )	( )	( )
2	I could not shake off the blues	( )	( )	( )	( )	( )
3	I had trouble keeping my mind on what I was doing	( )	( )	( )	( )	( )
4	I felt depressed	( )	( )	( )	( )	( )
5	My sleep was restless	( )	( )	( )	( )	( )
6	I felt sad	( )	( )	( )	( )	( )
7	I could not get going	( )	( )	( )	( )	( )
8	Nothing made me happy	( )	( )	( )	( )	( )
9	I felt like a bad person	( )	( )	( )	( )	( )
10	I lost interest in my usual activities	( )	( )	( )	( )	( )
11	I slept much more than usual	( )	( )	( )	( )	( )
12	I felt like I was moving too slowly	( )	( )	( )	( )	( )
13	I felt fidgety	( )	( )	( )	( )	( )
14	I wished I were dead	( )	( )	( )	( )	( )
15	I wanted to hurt myself	( )	( )	( )	( )	( )
16	I was tired all the time	( )	( )	( )	( )	( )
17	I did not like myself	( )	( )	( )	( )	( )
18	I lost a lot of weight without any effort	( )	( )	( )	( )	( )
19	I had a lot of trouble getting to sleep	( )	( )	( )	( )	( )
20	I could not focus on the important things	( )	( )	( )	( )	( )

**30. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way.**

		Yes	Sometimes	No
1	Do you have headaches?	( )	( )	( )
2	Do you experience feelings of dizziness?	( )	( )	( )
3	Have you experienced a sense of dullness or a heavy feeling in your head?	( )	( )	( )
4	Have you experienced a sense of dullness or a heavy sensation in your hands or legs?	( )	( )	( )
5	Do you have pains in various parts of your body?	( )	( )	( )
6	Does your head feel "heavy" or "dull"?	( )	( )	( )
7	Does your mouth "water" a lot ; that is, produce a lot of saliva?	( )	( )	( )
8	Do you have any stiffness or pain in your neck or shoulders?	( )	( )	( )
9	Do you have blurred vision?	( )	( )	( )
10	Do you have low back pain?	( )	( )	( )
11	Do you feel flushed or feverish?	( )	( )	( )
12	Do you have high back pain?	( )	( )	( )
13	Does your heart pound or beat faster when you walk in a hurry?	( )	( )	( )
14	Are you tired recently?	( )	( )	( )
15	Do you feel pain or hot in your eyes?	( )	( )	( )
16	Is your nose stuffy?	( )	( )	( )
17	Do you have heart burn?	( )	( )	( )
18	Are there times when you would like to take a rest or lie down in bed during the day?	( )	( )	( )

19	Do you feel irritation or pain in your throat?	( )	( )	( )
20	Do you have hot flashes in your face or head?	( )	( )	( )

**31. How many vehicles are your family using for daily transport?**

- 1. Bicycles: \_\_\_\_\_ ( )
- 2. Motorbikes: \_\_\_\_\_ ( )
- 3. Cars: \_\_\_\_\_ ( )
- 4. Others: \_\_\_\_\_ ( )

**32. How much do you use the following means of transportation?**

	<b>1 Actively use</b>	<b>2 Use</b>	<b>3 No preference</b>	<b>4 Seldom use</b>	<b>5 Not use at all</b>
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**33. How good is the use of the following means of transportation for the society?**

	<b>1 Should be used frequently</b>	<b>2 Should be used</b>	<b>3 No preference</b>	<b>4 Should be seldom use</b>	<b>5 Should not be used at all</b>
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )

<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**34. How safe is the following means of transportation?**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**35. Please tell us the information below concerning your health condition:**

- (1) Height \_\_\_\_\_cm
- (2) Weight \_\_\_\_\_kg
- (3) Maximum blood pressure \_\_\_\_\_mmHg
- (4) Minimum blood pressure \_\_\_\_\_mmHg
- (5) Age\_\_\_\_\_ years old

**36. In which category do you classify your family incomes?**

- 1. Under 10M VND    2. From 10M to 20M VND    3. More than 20M VND

**37. As you wish, please provide your comments on the living environment:**

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**\* The following part can be input by interviewers according to the respondent's room's facts. If an interviewer cannot, please ask a respondent again for sure.**

**F1. What floor is the current room? \_\_\_\_\_ floor**

**F2. Structure of the building**

- 1 Wooden ( )
- 2 Bricks ( )
- 3 Prefabricated ( )
- 4 Reinforced concrete ( )
- 5 Reinforced concrete with a brick wall ( )
- 6 Others \_\_\_\_\_ ( )

**F3. How many glass layers do the room windows and doors have? If they are doubled-pane windows/doors, please specify two layers.**

- 1 More than 3 layers ( )
- 2 2 layers ( )
- 3 1 layer ( )
- 4 Others \_\_\_\_\_ ( )

**F4. Which type of frame among the following types do the room windows and doors have?**

- 1 Aluminum frame ( )
- 2 Wooden frame ( )
- 3 Plastic frame ( )
- 4 Others \_\_\_\_\_ ( )

**F5. Does the room have soundproofing materials and products?**

1) No

2) Yes


**This question will be asked by the interviewer repeatedly every day when checking the measuring device**

**(1) Overall, how do you describe your room environment today?**

1. Very unpleasant/unbearable
2. Unpleasant/unbearable
3. Not unpleasant nor pleasant
4. Pleasant/ bearable
5. Very pleasant/ bearable

**(2) How is the sound of aircraft today?**

1. Very unpleasant/unbearable
2. Unpleasant/unbearable
3. Not unpleasant nor pleasant
4. Pleasant/ bearable
5. Very pleasant/ bearable

**(3) How would you rate the quality of your sleep last night?**

1. Very good      2. Fairly good      3. Fairly bad      4. Very bad

**(4) How do you feel about the noise level of aircraft in your room today?**

1. Very strong/loud    2. Fairly strong/loud    3. Fairly weak/quiet    4. Very weak/quiet

**THANK YOU VERY MUCH!**



人とともに 地域とともに

島根大学

SHIMANE UNIVERSITY

Dự án hợp tác nghiên cứu khoa học giữa

Bệnh viện Quân Y 175 Thành phố Hồ Chí Minh và Đại học Shimane

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**PHIẾU KHẢO SÁT VỀ MÔI TRƯỜNG VÀ SỨC KHỎE**

**TẠI BỆNH VIỆN QUÂN Y 175**

**(dành cho Cán bộ nhân viên)**

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ID: 202x -175- 00...

Ngày: ...../08/202x

Họ tên người trả lời phỏng vấn: .....

Địa chỉ: .....

GPS: .....

Liên hệ: .....

Người phỏng vấn: .....

MỌI Ý KIẾN XIN GỬI VỀ:

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Hoặc

**NGUYỄN TRẦN THỊ HỒNG NHUNG**

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KHOA KIẾN TRÚC

ĐẠI HỌC SHIMANE – NHẬT BẢN

**Thành phố Hồ Chí Minh, 08/202x**

**Xin vui lòng trả lời các câu hỏi sau bằng cách chọn và đánh dấu câu trả lời thích hợp:**

**1. Anh (chị) đã ở phòng này bao lâu rồi?** \_\_\_\_\_

**2. Hàng ngày anh(chị) dành bao nhiêu thời gian ở trong phòng?** \_\_\_\_\_ tiếng

**3. Anh (chị) thích căn phòng đang ở mức độ thế nào?**

1. Rất thích    2. Thích    3. Bình thường    4. Không thích    5. Rất không thích

**4. Xin vui lòng đánh giá môi trường bệnh viện theo các mục dưới đây:**

	1 Cực tốt	2 Tốt	3 Bình thường	4 Kém	5 Cực kém
(1) Có môi trường xung quanh thiên nhiên, cây xanh	( )	( )	( )	( )	( )
(2) Xung quanh phố xá, cảnh quan, các tòa nhà sạch đẹp	( )	( )	( )	( )	( )
(5) Tầm nhìn từ phòng của anh (chị)	( )	( )	( )	( )	( )
(4) Độ yên tĩnh xung quanh phòng	( )	( )	( )	( )	( )
(5) Thuận tiện trong sử dụng phương tiện giao thông công cộng	( )	( )	( )	( )	( )

**5. Trong suốt thời gian làm việc tại bệnh viện, những yếu tố sau đây làm phiền anh(chị) hoặc gây khó chịu cho anh(chị) ở mức độ nào?**

	1 Hoàn toàn không	2 Một phần nào	3 Không quá mức	4 Nhiều	5 Cực nhiều
(1) Tiếng ồn từ máy bay	( )	( )	( )	( )	( )
(2) Tiếng ồn từ các phương tiện giao thông trên đường	( )	( )	( )	( )	( )
(3) Tiếng ồn từ nhà máy	( )	( )	( )	( )	( )
(4) Tiếng ồn từ hàng xóm	( )	( )	( )	( )	( )
(5) Độ rung khi máy bay bay qua	( )	( )	( )	( )	( )

(6) Khí thải	( )	( )	( )	( )	( )
(7) Khói từ nhà máy	( )	( )	( )	( )	( )
(8) Mùi hôi					

**6. Trong cuộc sống hàng ngày tại bệnh viện, anh(chị) bị làm phiền bởi tiếng ồn của môi trường như thế nào trong các trường hợp sau đây?**

	1 Hầu như không	2 Một chút	3 Không	4 Nhiều	5 Cực nhiều
(1) Làm phiền anh(chị) khi đang nói chuyện trong phòng?	( )	( )	( )	( )	( )
(2) Làm phiền anh(chị) khi nghe điện thoại trong phòng?	( )	( )	( )	( )	( )
(3) Làm phiền anh(chị) khi nghe đài, vô tuyến trong phòng?	( )	( )	( )	( )	( )
(4) Làm phiền anh(chị) khi anh(chị) đang tập trung suy nghĩ, hay đọc sách trong phòng?	( )	( )	( )	( )	( )
(5) Làm phiền anh(chị) khi anh(chị) nghỉ ngơi trong phòng?	( )	( )	( )	( )	( )
(6) Làm anh(chị) khó khăn khi bắt đầu vào giấc ngủ?	( )	( )	( )	( )	( )
(7) Làm anh(chị) bị thức giấc khi đang ngủ say?	( )	( )	( )	( )	( )
(8) Làm anh(chị) không thể mở cửa sổ bởi quá ồn trong khi anh(chị) muốn mở cửa sổ?	( )	( )	( )	( )	( )
(9) Làm anh(chị) khó chịu vì rung do máy bay bay qua?	( )	( )	( )	( )	( )
(10) Làm anh(chị) lo sợ bị ảnh hưởng khi tai nạn máy bay xảy ra?	( )	( )	( )	( )	( )

**Nếu nhà anh(chị) có danh thời gian ra bên ngoài, xin hãy trả lời 3 câu hỏi dưới đây**

(11) Làm phiền anh(chị) khi anh(chị) làm gì đó ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )
(12) Làm phiền anh(chị) khi nói chuyện ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )
(13) Làm phiền anh(chị) khi anh(chị) nghỉ ngơi ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )



không thể làm việc tốt			
(18) Khác ( )	( )	( )	( )

(3) Nếu anh(chị) gặp rắc rối với giấc ngủ, anh(chị) có nghĩ đó là do tiếng ồn máy bay không? 1. Không 2. Có

12. Trong thời gian ở phòng, anh(chị) có thường xuyên nhìn thấy máy bay bay qua cửa sổ phòng mình không? 1. Không 2. Có

Nếu “có” thì khoảng bao nhiêu lần 1 ngày? \_\_\_\_\_

13. Anh(chị) có thường mở cửa sổ phòng mình không?

	1	2	3	4
	Hiếm khi/ Hoàn toàn không	Thỉnh thoảng	Thường hay	Luôn luôn
(1) Mùa khô	( )	( )	( )	( )
(2) Mùa mưa	( )	( )	( )	( )

14. Trong cuộc sống hàng ngày các yếu tố thời tiết cũng như điều kiện môi trường tác động đến chúng ta rất nhiều, anh(chị) nhạy cảm ở mức độ nào đối với các yếu tố dưới đây?

	1	2	3	4	5
(1) Lạnh	( )	( )	( )	( )	( )
(2) Nóng	( )	( )	( )	( )	( )
(3) Tiếng ồn	( )	( )	( )	( )	( )
(4) Độ rung	( )	( )	( )	( )	( )
(5) Chất hóa học	( )	( )	( )	( )	( )
(6) Mùi hôi	( )	( )	( )	( )	( )
(7) Bụi, phấn hoa, không khí bẩn	( )	( )	( )	( )	( )

**Trong phần tiếp theo, anh(chị) có thể trả lời một số câu hỏi liên quan đến thông tin cá nhân được không?**

15. Công việc hiện tại của anh(chị) là gì?

1. Đi làm (Nghề nghiệp: \_\_\_\_\_)

2. Sinh viên

**16. Anh(chị) cảm thấy thế nào về tình trạng sức khỏe bản thân?**

1. Tuyệt vời 2. Rất tốt 3. Tốt 4. Khá 5. Kém

**17. Sử dụng thang đo từ 0 đến 10, trong đó 0 là “Rất không hài lòng” và 10 là “Rất hài lòng”, anh(chị) cảm thấy thế nào về cuộc sống của mình hiện tại?**

0 1 2 3 4 5 6 7 8 9 10

Rất không hài lòng

Rất hài lòng

**18. Nghĩ về những căng thẳng trong cuộc sống, anh(chị) nói thế nào về mức độ căng thẳng trong hầu hết các ngày?**

1. Hoàn toàn không 2. Không hẳn lắm 3. Một chút

4. Khá căng thẳng 5. Cực kỳ căng thẳng

**19. Anh(chị) có thường xuyên kiểm tra sức khỏe định kỳ không?** 1. Không 2. Có

**20. Dưới đây là danh sách các bệnh lý thường kéo dài trong một thời gian. Trong cột đầu tiên, hãy kiểm tra “Có” hoặc “Không” đối với mỗi điều kiện, sau đó đối với mỗi điều kiện “Có”, vui lòng trả lời câu hỏi trang dưới đây.**

Bạn đã bao giờ mắc.....?	Năm bắt đầu?	Đã gặp bác sĩ chưa?	Đã bao giờ nhập viện vì nó?	Uống thuốc theo chỉ định bác sĩ?	Mắc trong vòng 12 tháng qua?
1. Không 2. Có		5. Chưa 6. Có	5. Chưa 6. Có	5. Chưa 6. Có	5. Chưa 6. Có
Bệnh tim mạch ( )		( )	( )	( )	( )
Huyết áp cao hoặc tăng huyết áp ( )		( )	( )	( )	( )
Tăng lipid máu ( )		( )	( )	( )	( )
Đột quy, đột quy nhẹ hay Con thiếu máu não thoáng qua (TIA) ( )		( )	( )	( )	( )

Hen suyễn ( )		( )	( )	( )	( )
Tiểu đường ( )		( )	( )	( )	( )
Ung thư _____ ( )		( )	( )	( )	( )
Trầm cảm hoặc rối loạn thần kinh ( )		( )	( )	( )	( )
Khác: _____		( )	( )	( )	( )
_____		( )	( )	( )	( )

**21. Anh(chị) vui lòng cho biết cha mẹ đẻ của anh(chị) có từng mắc các bệnh dưới đây?**

- 1. Không                      2. Có                      3. Không biết**

Điền 1, 2, 3 vào ô tương ứng bên dưới

	Cha đẻ	Mẹ đẻ
(1) Bệnh tim mạch	( )	( )
(2) Huyết áp cao	( )	( )
(3) Đột quỵ hoặc TIA	( )	( )
(4) Tiểu đường	( )	( )

**22. Lượng muối anh(chị) sử dụng trong mỗi bữa ăn có nhiều không?**

1. Rất nhiều      2. Một chút      3. Không nhiều lắm      4. Không

**23. Anh(chị) có hay ăn những món dưới đây không?**

	1. Không nhiều lắm	2. 1 lần/ngày	3. Mọi bữa ăn
(1) Dưa muối	( )	( )	( )

(2) Nước mắm	( )	( )	( )
(3) Nước tương	( )	( )	( )
(4) Cá kho	( )	( )	( )
(5) Các món mặn khác: .....	( )	( )	( )

**24. Anh(chị) có ăn những loại thức ăn mặn và nhiều muối không?**

1. Không nhiều lắm                      2. Ngày 1 lần                      3. Mọi bữa ăn

**25. Anh(chị) có nghĩ về cân bằng dinh dưỡng trong các bữa ăn không?**

1. Hoàn toàn không    2. Một chút    3. Bình thường    4. Nghĩ nhiều

**26. Anh(chị) có thường uống đồ uống có cồn (rượu, bia...) không?**

1. Hoàn toàn không                      2. Một tháng 2-3 lần hoặc ít hơn  
3. Một tuần 1-4 ngày                      4. Hầu như hàng ngày

**27. Anh(chị) có thường xuyên hút thuốc không?**

1. Hoàn toàn không                      2. Trước có hút giờ ngừng  
3. Một ngày 20 điếu hoặc ít hơn    4. Hơn 20 điếu một ngày

**28. Anh(chị) có thường xuyên tập thể dục trên 30 phút không?**

1. Hoàn toàn không                      2. Một tháng 1-2 lần                      3. Một tuần 1 lần  
4. Một tuần 2-3 lần                      5. Một tuần 4-5 lần                      6. Hầu như hàng ngày

**29. Anh(chị) có cảm thấy khó khăn để nghe và hiểu các từ trong cuộc trò chuyện bình thường (kể cả khi sử dụng máy trợ thính)?**

1. Rất khó khăn    2. Thỉnh thoảng    3. Chỉ một chút    4. Hoàn toàn không

**Anh(chị) vui lòng cho biết đó là khó khăn gì bằng cách trả lời câu hỏi dưới đây. Nếu “hoàn toàn không” xin bỏ qua.**

		Có	Thỉnh thoảng	Không
1	Anh(chị) có bị điếc ở một hoặc cả 2 tai không ?	( )	( )	( )
2	Anh (chị) có bao giờ gặp khó khăn nào khi nghe với một hoặc 2 tai không ?	( )	( )	( )
3	Bây giờ anh (chị) có bị ù tai hay ù ở 1 hoặc 2 tai không ?	( )	( )	( )
4	Bây giờ anh (chị) có sử dụng máy trợ thính không ?	( )	( )	( )

**Miêu tả đúng nhất về tình trạng thính lực hiện tại của anh(chị) (không có máy trợ thính)**

		Tốt	Một chút khó khăn	Khá khó khăn	Điếc
5	Tai trái	( )	( )	( )	( )
6	Tai phải	( )	( )	( )	( )

**30. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Tuần trước				Gần như mỗi ngày trong 2 tuần
		Hầu như không hoặc ít hơn 1 lần/ngày	1-2 ngày	3-4 ngày	5-7 ngày	
1	Tôi cảm thấy ăn không ngon miệng	( )	( )	( )	( )	( )
2	Tôi không thể rũ bỏ buồn chán	( )	( )	( )	( )	( )
3	Tôi gặp vấn đề trong việc tập trung vào những việc tôi đang làm	( )	( )	( )	( )	( )
4	Tôi cảm thấy rất chán nản	( )	( )	( )	( )	( )
5	Ngủ không yên	( )	( )	( )	( )	( )
6	Tôi cảm thấy buồn	( )	( )	( )	( )	( )
7	Tôi không thể bắt đầu một việc gì	( )	( )	( )	( )	( )
8	Không gì khiến tôi cảm thấy vui	( )	( )	( )	( )	( )
9	Tôi cảm thấy mình như một người xấu	( )	( )	( )	( )	( )
10	Tôi mất hứng thú với các hoạt động thường làm trước đây	( )	( )	( )	( )	( )
11	Tôi ngủ nhiều hơn bình thường	( )	( )	( )	( )	( )

12	Tôi cảm thấy tôi đang di chuyển quá chậm	( )	( )	( )	( )	( )
13	Tôi cảm thấy bồn chồn	( )	( )	( )	( )	( )
14	Tôi đã ước tôi có thể chết đi	( )	( )	( )	( )	( )
15	Tôi muốn làm đau bản thân mình	( )	( )	( )	( )	( )
16	Tôi thấy mệt mỏi trong mọi lúc	( )	( )	( )	( )	( )
17	Tôi không thích bản thân mình	( )	( )	( )	( )	( )
18	Tôi giảm cân rất nhiều mà không cần nỗ lực gì cả	( )	( )	( )	( )	( )
19	Tôi gặp nhiều vấn đề về giấc ngủ	( )	( )	( )	( )	( )
20	Tôi không thể tập trung vào những điều quan trọng	( )	( )	( )	( )	( )

**31. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Có	Thỉnh thoảng	Không
1	Anh (chị) có đau đầu không?	( )	( )	( )
2	Anh (chị) có cảm giác chóng mặt không?	( )	( )	( )
3	Anh (chị) có trải qua cảm giác không minh mẫn không?	( )	( )	( )
4	Anh (chị) có trải qua cảm giác tay chân nặng nề không?	( )	( )	( )
5	Anh (chị) có bị đau ở nhiều nơi trên cơ thể không?	( )	( )	( )
6	Anh (chị) của bạn có nặng nề hoặc không minh mẫn không?	( )	( )	( )
7	Miệng của Anh (chị) có tiết nhiều nước bọt không?	( )	( )	( )
8	Anh (chị) có cứng hay đau cổ vai gáy không?	( )	( )	( )
9	Anh (chị) có bị mờ mắt không?	( )	( )	( )
10	Anh (chị) có bị đau thắt lưng không?	( )	( )	( )

11	Anh (chị) có cảm thấy nóng hoặc sốt nhẹ không?	( )	( )	( )
12	Anh (chị) có bị đau lưng cao không?	( )	( )	( )
13	Tim của Anh (chị) có đập mạnh hoặc nhanh hơn khi vội vàng?	( )	( )	( )
14	Gần đây Anh (chị) có cảm thấy mệt mỏi không?	( )	( )	( )
15	Anh (chị) có cảm thấy đau hay nóng mắt không?	( )	( )	( )
16	Mũi của Anh (chị) có nghẹt không?	( )	( )	( )
17	Anh (chị) có ợ nóng không?	( )	( )	( )
18	Có những lúc Anh (chị) muốn nghỉ ngơi hoặc nằm trên giường vào ban ngày không?	( )	( )	( )
19	Anh (chị) có cảm thấy ngứa hay đau họng không?	( )	( )	( )
20	Anh (chị) có cảm thấy nóng mặt hoặc đau đầu không?	( )	( )	( )

**32. Gia đình anh(chị) có bao nhiêu phương tiện tham gia giao thông?**

1. Xe đạp (\_\_\_xe)    2. Xe máy (\_\_\_xe)    3. Ô tô (\_\_\_xe)    4. Khác \_\_\_\_\_ (\_\_\_xe)

**33. Anh(chị) sử dụng các phương tiện giao thông dưới đây ở mức độ nào?**

	1 Sử dụng tích cực	2 Cố gắng sử dụng	3 Sử dụng cũng được, không cũng được	4 Cố gắng không sử dụng	5 Hoàn toàn không sử dụng
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**34. Xin anh(chị) đánh giá cho về việc sử dụng các phương tiện giao thông dưới đây như thế nào thì tốt cho xã hội?**

	1 Phải sử dụng tích cực	2 Nên sử dụng nhiều hơn	3 Sao cũng được	4 Không cần sử dụng nhiều	5 Hoàn toàn không cần
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**35. Xin anh(chị) đánh giá cho mức độ an toàn của các phương tiện giao thông dưới đây:**

	1 Cực kỳ an toàn	2 An	3 Không an toàn	4 Nguy hiểm	5 Cực kỳ nguy
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**36. Xin anh(chị) vui lòng cho biết khoảng thu nhập của gia đình?**

1. Dưới 10 triệu đồng                      2. Khoảng 10-20 triệu đồng                      3. Hơn 20 triệu đồng

**37. Anh(chị) từng học ở những trường nào?**

1. Trường THCS \_\_\_\_\_
2. Trường THPT \_\_\_\_\_
3. Đại học/ Học viện \_\_\_\_\_
4. Khác \_\_\_\_\_

**38. Xin vui lòng cho chúng tôi biết thông tin dưới đây liên quan đến tình trạng sức khỏe của anh(chị) :**

- (1) Chiều cao \_\_\_\_\_ cm      (2) Cân nặng \_\_\_\_\_ kg  
(3) Huyết áp trên \_\_\_\_\_ mmHg      (4) Huyết áp dưới \_\_\_\_\_ mmHg  
(5) Độ tuổi \_\_\_\_\_ tuổi

**39. Ngoài các câu hỏi trên, nếu anh(chị) có ý kiến gì về môi trường sống hiện nay, xin cho biết**

\_\_\_\_\_

\_\_\_\_\_

**\* Phần này sinh viên thực hiện phỏng vấn xin hãy quan sát và tự điền câu trả lời (nếu không rõ, xin hỏi lại người trả lời phỏng vấn để có câu trả lời đúng)**

**F1. Giới tính của người trả lời phỏng vấn?**    1. Nam      2. Nữ

**F2. Người trả lời phỏng vấn đã làm việc ở bệnh viện bao lâu rồi?** \_\_\_\_\_

**F3. Người trả lời phỏng vấn đang ở phòng nào? (ghi rõ số phòng, tầng, khoa/ tòa nhà)**

(1) Số phòng \_\_\_\_\_

(2) Tầng \_\_\_\_\_

(3) Khoa/ Tòa nhà \_\_\_\_\_

**F4. Trong phòng có lắp đặt điều hòa không?**    1. Không      2. Có

**F5. Trong phòng có sử dụng sản phẩm hoặc vật liệu cách âm không?**    1. Không      2. Có

**F6. Cấu tạo tòa nhà thuộc loại nào trong các cấu tạo dưới đây?**

1. Làm từ gỗ    2. Xây từ gạch      3. Nhà lắp ghép

4. Nhà bê tông cốt thép      5. Tường gạch và khung bê tông cốt thép

6. Ngoài ra \_\_\_\_\_

**F7. Kính các loại cửa hướng ra bên ngoài của phòng bệnh (cửa sổ, cửa ra vào) là loại kính bao nhiêu lớp? nếu là kính đôi nhiều lớp, xin xếp vào loại kính hai lớp.**

1. Trên 3 lớp    2. Hai lớp    3. Một lớp    4. Ngoài ra \_\_\_\_\_

**F8. Khung các loại cửa phòng bệnh (cửa sổ, cửa ra vào) thuộc loại nào trong số các loại khung dưới đây? Xin chọn đánh giá câu trả lời thích hợp:**

1. Nhôm      2. Gỗ      3. Nhựa      4. Ngoài ra \_\_\_\_\_

**\*Câu hỏi này sẽ được người phỏng vấn hỏi lặp đi lặp lại hàng ngày khi kiểm tra thiết bị đo**

**(1) Nhìn chung, anh(chị) cảm thấy môi trường phòng hôm nay thế nào?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
--	---------------	--------------	-------------

1. Rất khó chịu / không thể chịu đựng được	( )	( )	( )
2. Khó chịu / không thể chịu đựng được	( )	( )	( )
3. Không khó chịu cũng không dễ chịu	( )	( )	( )
4. Dễ chịu / có thể chịu đựng	( )	( )	( )
5. Rất dễ chịu / có thể chịu đựng	( )	( )	( )

**(2) Tiếng máy bay hôm nay như thế nào?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
1. Rất khó chịu / không thể chịu đựng được	( )	( )	( )
2. Khó chịu / không thể chịu đựng được	( )	( )	( )
3. Không khó chịu cũng không dễ chịu	( )	( )	( )
4. Dễ chịu / có thể chịu đựng	( )	( )	( )
5. Rất dễ chịu / có thể chịu đựng	( )	( )	( )

**(3) Anh(chị) đánh giá chất lượng giấc ngủ đêm qua của mình như thế nào?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
1. Rất tốt	( )	( )	( )
2. Khá tốt	( )	( )	( )
3. Khá tệ	( )	( )	( )
4. Rất tệ	( )	( )	( )

**(4) Anh(chị) cảm thấy thế nào về độ ồn của máy bay trong phòng của mình hiện nay?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
1. Rất lớn/ ồn ào	( )	( )	( )
2. Khá lớn/ ồn ào	( )	( )	( )
3. Khá nhỏ / yên tĩnh	( )	( )	( )
4. Rất nhỏ / yên tĩnh	( )	( )	( )

## QUESTIONNAIRE ON ENVIRONMENT AND HEALTH

(FOR PATIENT)

ID: 202x-00x

Date: August ....., 202x

Interviewee:

Address:

GPS:

Contact:

Interviewer:

**\* Interviewers can answer the following part according to the respondent's facts. If an interviewer cannot, please ask a respondent again for sure.**

**F1. Gender of respondent**

- 1. Male ( )
- 2. Female ( )

**F2. Which room is the respondent staying? \_\_\_\_\_**

**F3. Are air-conditioners operated in the room?**

- 1) No
- 2) Yes

**Please answer the following questions by choosing and checking the corresponding answer:**

**1. How long have you been staying in your present room? \_\_\_\_\_ days**

**2. What treatment are you receiving? \_\_\_\_\_**

**3. How much do you like your room?**

- 1) Like very much
- 2) Like
- 3) Neither like nor dislike
- 4) Dislike
- 5) Dislike very much

**4. Please evaluate the hospital environment according to the following items:**

	<b>1</b> <b>Extremely good</b>	<b>2</b> <b>Good</b>	<b>3</b> <b>Neither good nor bad</b>	<b>4</b> <b>Bad</b>	<b>5</b> <b>Extremely bad</b>
<b>(1) Surrounding environment and natural green</b>	( )	( )	( )	( )	( )

<b>(2) Surrounding street sceneries and buildings</b>	( )	( )	( )	( )	( )
<b>(3) View from your room</b>	( )	( )	( )	( )	( )
<b>(4) Quietness around the room</b>	( )	( )	( )	( )	( )
<b>(9) Convenience to access to public transportation</b>	( )	( )	( )	( )	( )

**5. Thinking about the last 12 months or so, how much does each of the following factors bother, disturb, or annoy you when you are here (at the hospital)?**

	<b>1 Not at all</b>	<b>2 Slightly</b>	<b>3 Moderately</b>	<b>4 Very</b>	<b>5 Extremely</b>
<b>(1) Aircraft noise</b>	( )	( )	( )	( )	( )
<b>(2) Road traffic noise</b>	( )	( )	( )	( )	( )
<b>(3) Factory noise</b>	( )	( )	( )	( )	( )
<b>(4) Noise from the roommates</b>	( )	( )	( )	( )	( )
<b>(5) Vibration by aircraft flyover</b>	( )	( )	( )	( )	( )
<b>(6) Exhausted gas</b>	( )	( )	( )	( )	( )
<b>(7) Smoke discharged from factories</b>	( )	( )	( )	( )	( )
<b>(8) Odors</b>					

**6. In daily activity, how disturbed are you by aircraft flyovers in the following cases?**

	<b>1 Not at all</b>	<b>2 Slightly</b>	<b>3 Moderately</b>	<b>4 Very</b>	<b>5 Extremely</b>
<b>(1) When you have a conversation indoor</b>	( )	( )	( )	( )	( )
<b>(2) When you communicate on the phone</b>	( )	( )	( )	( )	( )
<b>(3) When you listen to TV/radio indoor</b>	( )	( )	( )	( )	( )



**10. Before and after admitting to the hospital, how would you rate the quality of your sleep overall?**

- Before:**      1. Very good              2. Fairly good              3. Fairly bad              4. Very bad  
**After:**        1. Very good              2. Fairly good              3. Fairly bad              4. Very bad

**11. Please answer this question concerning your sleep since you were admitted to the hospital:**

**(9) Do you have any trouble with your sleep?**

- 1) No                
 2) Yes

**(2) If you answered "Yes" to the above question, please choose appropriate numbers for each item.**

	1 Occasionally	2 Once or twice a week	3 More than 3 times a week
(25) Difficult to fall asleep	( )	( )	( )
(26) When awakened during the night, it is difficult to sleep again.	( )	( )	( )
(27) Awakened early in the morning	( )	( )	( )
(28) Do not feel as having slept well the next morning.	( )	( )	( )
(29) Sleepy during daytime	( )	( )	( )
(30) Others (              )	( )	( )	( )

**(3) If you have trouble with your sleep, do you think it is due to the aircraft noise?**

- 1) No                
 2) Yes

**12. How often do you see the airplane flying through your windows?**

1. Rarely              2. Sometimes              3. Often              4. Always

- 1) No
- 2) Yes

If "yes," how many times a day? \_\_\_\_\_ times

**13. How often are your room windows opened?**

- 1. Rarely
- 2. Sometimes
- 3. Often
- 4. Always

**14. In daily life, climatic factors and environmental conditions affect us much, so how much are you sensitive to the following factors?**

	1	2	3	4	5
<b>(1) Coldness</b>	( )	( )	( )	( )	( )
<b>(2) Hotness</b>	( )	( )	( )	( )	( )
<b>(3) Noise</b>	( )	( )	( )	( )	( )
<b>(4) Vibration</b>	( )	( )	( )	( )	( )
<b>(5) Chemicals</b>	( )	( )	( )	( )	( )
<b>(6) Odors</b>	( )	( )	( )	( )	( )
<b>(7) Dust, pollen, polluted air</b>	( )	( )	( )	( )	( )

**In the next part, do you mind answering some questions relating personal information?**

**15. What is your present job?**

- 1)  Employed ->
- (Occupation) \_\_\_\_\_
- 2)  Farmer
- 3)  Student
- 4)  Housewife
- 5)  Retired

6) Unemployed

( )
-----

16. In general, would you say your health is?

1) Excellent

( )
-----

2) Very good

( )
-----

3) Good

( )
-----

4) Fair

( )
-----

5) Poor

( )
-----

17. Using a scale of 0 to 10, where 0 means "Very dissatisfied" and 10 means "Very satisfied", how do you feel about your life as a whole right now?

0

1

2

3

4

5

6

7

8

9

10



Very dissatisfied



Very satisfied

18. Thinking about the amount of stress in your life, would you say that most days are?

1) Not at all stressful

( )
-----

2) Not very stressful

( )
-----

3) A bit stressful

( )
-----

4) Quite a bit stressful

( )
-----

5) Extremely stressful

( )
-----

19. Do you usually have periodic health examinations?

1) No

( )
-----

2) Yes

( )
-----

20. Here is a list of medical conditions that usually last for some time. Have you ever had any of these conditions? In the first column, check "yes" or "no" for each condition; then, for each "yes", please answer every question across the page.

Have you ever had...? 1. No 2. Yes	What year did it start?	Did you ever see a doctor about it? 7. No 8. Yes	Have you ever been hospitalized for it? 7. No 8. Yes	Have you ever taken medicines prescribed for it? 7. No 8. Yes	Have you had it in the last 12 months? 7. No 8. Yes
Heart trouble		( )	( )	( )	( )
High blood pressure or Hypertension		( )	( )	( )	( )
Hyperlipidemia		( )	( )	( )	( )
Stroke, Small stroke or TIA		( )	( )	( )	( )
Asthma		( )	( )	( )	( )
Diabetes		( )	( )	( )	( )
Cancer Type of cancer:  _____  _____  _____		( )  ( )  ( )  ( )	( )  ( )  ( )  ( )	( )  ( )  ( )  ( )	( )  ( )  ( )  ( )
Depression or neurosis		( )	( )	( )	( )
Others: _____  _____  _____		( )  ( )  ( )	( )  ( )  ( )	( )  ( )  ( )	( )  ( )  ( )

_____		( )	( )	( )	( )
-------	--	-----	-----	-----	-----

**21. Please indicate if your biological (natural) father and mother ever had any of the conditions below.**

**1-No                      2-Yes                      3-Do not know**

	Biological Father	Biological Mother
A. Heart trouble	( )	( )
B. High blood pressure	( )	( )
C. Stroke or "TIA"	( )	( )
D. Diabetes	( )	( )

**22. How much salty do you eat?**

1. Very much ( )    2. Some ( )    3. Not much ( )    4. None ( )

**23. How much do you eat the following foods:**

	1. Not eat much	2. Once a day	3. Every meal
Pickles	( )	( )	( )
Fish sauce	( )	( )	( )
Soy sauce	( )	( )	( )
Braised fish	( )	( )	( )
Other salty foods:	( )	( )	( )
_____	( )	( )	( )
_____	( )	( )	( )
_____	( )	( )	( )

**24. Do you eat or drink salty food or soup?**

1. Not eat much      2. Once a day      3. Every meal

**25. Do you think about the nutritional balance of the diet?**

1. Don't think      2. Think a little      3. Think      4. Think a lot

**26. How often do you drink alcohol?**

1. Not at all      2. 2-3 times a month or less  
3. 1-4 days a week      4. Almost everyday

**27. Do you smoke cigarettes?**

1. Not at all      2. I smoked before but stopped  
3. 20 or less per day      4. More than 20 per day

**28. How often do you do physical activity over 30 minutes?**

- |                          |     |
|--------------------------|-----|
| 1) Not at all            | ( ) |
| 2) Once or twice a month | ( ) |
| 3) About once a week     | ( ) |
| 4) 2-3 times a week      | ( ) |
| 5) 4-5 times a week      | ( ) |
| 6) Almost everyday       | ( ) |

**29. How much difficulty do you have hearing and understanding words in a normal conversation (even with a hearing aid)?**

1. A great deal      2. Some      3. A little      4. None

1	Do you have deafness in one or both ears?	Yes	Sometimes	No
2	Do you now have any other trouble hearing with one or both ears?	( )	( )	( )
3	Do you now have tinnitus or ringing in one or both ears?	( )	( )	( )
4	Do you now use a hearing aid?	( )	( )	( )

5. Which statements best describe your hearing in your LEFT ear (without hearing aid)?

1. Good      2. Little trouble      3. A lot of trouble      4. Deaf

6. Which statements best describe your hearing in your RIGHT ear (without hearing aid)?

1. Good      2. Little trouble      3. A lot of trouble      4. Deaf

**30. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so.**

		Last week				Nearly every day for 2 weeks
		Not at all or less than 1 day	1-2 days	3-4 days	5-7 days	
1	My appetite was poor	( )	( )	( )	( )	( )
2	I could not shake off the blues	( )	( )	( )	( )	( )
3	I had trouble keeping my mind on what I was doing	( )	( )	( )	( )	( )
4	I felt depressed	( )	( )	( )	( )	( )
5	My sleep was restless	( )	( )	( )	( )	( )
6	I felt sad	( )	( )	( )	( )	( )
7	I could not get going	( )	( )	( )	( )	( )
8	Nothing made me happy	( )	( )	( )	( )	( )
9	I felt like a bad person	( )	( )	( )	( )	( )
10	I lost interest in my usual activities	( )	( )	( )	( )	( )
11	I slept much more than usual	( )	( )	( )	( )	( )
12	I felt like I was moving too slowly	( )	( )	( )	( )	( )
13	I felt fidgety	( )	( )	( )	( )	( )

14	I wished I were dead	( )	( )	( )	( )	( )
15	I wanted to hurt myself	( )	( )	( )	( )	( )
16	I was tired all the time	( )	( )	( )	( )	( )
17	I did not like myself	( )	( )	( )	( )	( )
18	I lost a lot of weight without any effort	( )	( )	( )	( )	( )
19	I had a lot of trouble getting to sleep	( )	( )	( )	( )	( )
20	I could not focus on the important things	( )	( )	( )	( )	( )

**31. Below is a list of the way you might have felt or behaved. Please check the boxes to tell me how often you have felt this way.**

		Yes	Sometimes	No
1	Do you have headaches?	( )	( )	( )
2	Do you experience feelings of dizziness?	( )	( )	( )
3	Have you experienced a sense of dullness or a heavy feeling in your head?	( )	( )	( )
4	Have you experienced a sense of dullness or a heavy sensation in your hands or legs?	( )	( )	( )
5	Do you have pains in various parts of your body?	( )	( )	( )
6	Does your head feel "heavy" or "dull"?	( )	( )	( )
7	Does your mouth "water" a lot ; that is, produce a lot of saliva?	( )	( )	( )
8	Do you have any stiffness or pain in your neck or shoulders?	( )	( )	( )
9	Do you have blurred vision?	( )	( )	( )
10	Do you have low back pain?	( )	( )	( )
11	Do you feel flushed or feverish?	( )	( )	( )

12	Do you have high back pain?	( )	( )	( )
13	Does your heart pound or beat faster when you walk in a hurry?	( )	( )	( )
14	Are you tired recently?	( )	( )	( )
15	Do you feel pain or hot in your eyes?	( )	( )	( )
16	Is your nose stuffy?	( )	( )	( )
17	Do you have heart burn?	( )	( )	( )
18	Are there times when you would like to take a rest or lie down in bed during the day?	( )	( )	( )
19	Do you feel irritation or pain in your throat?	( )	( )	( )
20	Do you have hot flashes in your face or head?	( )	( )	( )

**32. How many vehicles are your family using for daily transport?**

1. Bicycles: \_\_\_\_\_ ( )
2. Motorbikes: \_\_\_\_\_ ( )
3. Cars: \_\_\_\_\_ ( )
4. Others: \_\_\_\_\_ ( )

**33. How much do you use the following means of transportation?**

	<b>1</b> <b>Actively</b> <b>use</b>	<b>2</b> <b>Use</b>	<b>3</b> <b>No preference</b>	<b>4</b> <b>Seldom</b> <b>use</b>	<b>5</b> <b>Not use</b> <b>at all</b>
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**34. How good is the use of the following means of transportation for society?**

	<b>1</b> <b>Should be used frequently</b>	<b>2</b> <b>Should be used</b>	<b>3</b> <b>No preference</b>	<b>4</b> <b>Should be seldom use</b>	<b>5</b> <b>Should not be used at all</b>
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )
<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**35. How safe is the following means of transportation?**

	<b>1</b> <b>Extremely safe</b>	<b>2</b> <b>Safe</b>	<b>3</b> <b>Neither safe nor dangerous</b>	<b>4</b> <b>Dangerous</b>	<b>5</b> <b>Extremely dangerous</b>
<b>(1) Cars</b>	( )	( )	( )	( )	( )
<b>(2) Trains</b>	( )	( )	( )	( )	( )
<b>(3) Motorbikes</b>	( )	( )	( )	( )	( )
<b>(4) Buses</b>	( )	( )	( )	( )	( )
<b>(5) Airplanes</b>	( )	( )	( )	( )	( )

<b>(6) Bicycles</b>	( )	( )	( )	( )	( )
<b>(7) Walking</b>	( )	( )	( )	( )	( )

**36. In which category do you classify your family incomes?**

1. Under 10M VND    2. From 10M to 20M VND    3. More than 20M VND

**37. What is your last school or university?**

1. \_\_\_\_\_ Secondary School.
2. \_\_\_\_\_ High School.
3. \_\_\_\_\_ University
4. Others \_\_\_\_\_

**38. Please tell us the information below concerning your health condition:**

- (1) Height \_\_\_\_\_ cm
- (2) Weight \_\_\_\_\_ kg
- (3) Maximum blood pressure \_\_\_\_\_ mmHg
- (4) Minimum blood pressure \_\_\_\_\_ mmHg
- (5) Age \_\_\_\_\_ years old

**39. As you wish, please provide your comments on the living environment:**

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**\* The following part can be input by interviewers according to the respondent's room's facts. If an interviewer cannot, please ask a respondent again for sure.**

**F1. What floor is the current patient room? \_\_\_\_\_ floor**

**F2. Structure of the building**

- 1 Wooden ( )
- 2 Bricks ( )
- 3 Prefabricated ( )
- 4 Reinforced concrete ( )
- 5 Reinforced concrete with a brick wall ( )
- 6 Others \_\_\_\_\_ ( )

**F3. How many glass layers do the patient room windows and doors have? If they are doubled-pane windows/doors, please specify two layers.**

- 1 More than 3 layers ( )
- 2 2 layers ( )
- 3 1 layer ( )
- 4 Others \_\_\_\_\_ ( )

**F4. Which type of frame among the following types do the patient room windows and doors have?**

- 1 Aluminum frame ( )
- 2 Wooden frame ( )
- 3 Plastic frame ( )
- 4 Others \_\_\_\_\_ ( )

**F5. Does the room have soundproofing materials and products?**

1) No

2) Yes

**This question will be asked by the interviewer repeatedly every day when checking the measuring device**

**(5) Overall, how do you describe your room environment today?**

- 6. Very unpleasant/unbearable
- 7. Unpleasant/unbearable
- 8. Not unpleasant nor pleasant
- 9. Pleasant/ bearable
- 10. Very pleasant/ bearable

**(6) How is the sound of aircraft today?**

6. Very unpleasant/unbearable
7. Unpleasant/unbearable
8. Not unpleasant nor pleasant
9. Pleasant/ bearable
10. Very pleasant/ bearable

**(7) How would you rate the quality of your sleep last night?**

1. Very good
2. Fairly good
3. Fairly bad
4. Very bad

**(8) How do you feel about the noise level of aircraft in your room today?**

1. Very strong/loud
2. Fairly strong/loud
3. Fairly weak/quiet
4. Very weak/quiet

**THANK YOU VERY MUCH!**



人とともに 地域とともに  
**島根大学**  
SHIMANE UNIVERSITY

Dự án hợp tác nghiên cứu khoa học giữa  
Đại học Nông Lâm Thành phố Hồ Chí Minh và Đại học Shimane

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**PHIẾU KHẢO SÁT VỀ MÔI TRƯỜNG VÀ SỨC KHỎE**  
**TẠI BỆNH VIỆN QUÂN Y 175**  
**(dành cho Bệnh nhân)**

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ID: 202x -175- 00...

Ngày: ...../08/202x

Họ tên người trả lời phỏng vấn: .....

Địa chỉ: .....

GPS: .....

Liên hệ: .....

Người phỏng vấn: .....

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KHOA KIẾN TRÚC

ĐẠI HỌC SHIMANE – NHẬT BẢN

**Thành phố Hồ Chí Minh, 08/202x**

**Xin vui lòng trả lời các câu hỏi sau bằng cách chọn và đánh dấu câu trả lời thích hợp:**

**1. Anh (chị) đã ở phòng này bao lâu rồi?** \_\_\_\_\_

**2. Anh (chị) đang tiếp nhận điều trị nào?** \_\_\_\_\_

**3. Anh (chị) thích căn phòng đang ở mức độ thế nào?**

1. Rất thích    2. Thích    3. Bình thường    4. Không thích    5. Rất không thích

**4. Xin vui lòng đánh giá môi trường bệnh viện theo các mục dưới đây:**

	1 Cực tốt	2 Tốt	3 Bình thường	4 Kém	5 Cực kém
(1) Có môi trường xung quanh thiên nhiên, cây xanh	( )	( )	( )	( )	( )
(2) Xung quanh phố xá, cảnh quan, các tòa nhà sạch đẹp	( )	( )	( )	( )	( )
(6) Tầm nhìn từ phòng của anh (chị)	( )	( )	( )	( )	( )
(4) Độ yên tĩnh xung quanh phòng	( )	( )	( )	( )	( )
(5) Thuận tiện trong sử dụng phương tiện giao thông công cộng	( )	( )	( )	( )	( )

**5. Trong suốt thời gian nằm viện, những yếu tố sau đây làm phiền anh(chị) hoặc gây khó chịu cho anh(chị) ở mức độ nào?**

	1 Hoàn toàn không	2 Một phần nào	3 Không quá mức	4 Nhiều	5 Cực nhiều
(1) Tiếng ồn từ máy bay	( )	( )	( )	( )	( )
(2) Tiếng ồn từ các phương tiện giao thông trên đường	( )	( )	( )	( )	( )
(3) Tiếng ồn từ nhà máy	( )	( )	( )	( )	( )
(4) Tiếng ồn từ hàng xóm	( )	( )	( )	( )	( )

(5) Độ rung khi máy bay bay qua	( )	( )	( )	( )	( )
(6) Khí thải	( )	( )	( )	( )	( )
(7) Khói từ nhà máy	( )	( )	( )	( )	( )
(8) Mùi hôi					

**6. Trong cuộc sống hàng ngày tại bệnh viện, anh(chị) bị làm phiền bởi tiếng ồn của môi trường như thế nào trong các trường hợp sau đây?**

	1 Hoàn	2 Một	3 Không	4 Nhiều	5 Cực
(1) Làm phiền anh(chị) khi đang nói chuyện trong phòng?	( )	( )	( )	( )	( )
(2) Làm phiền anh(chị) khi nghe điện thoại trong phòng?	( )	( )	( )	( )	( )
(3) Làm phiền anh(chị) khi nghe đài, vô tuyến trong phòng?	( )	( )	( )	( )	( )
(4) Làm phiền anh(chị) khi anh(chị) đang tập trung suy nghĩ, hay đọc sách trong phòng?	( )	( )	( )	( )	( )
(5) Làm phiền khi anh(chị) nghỉ ngơi trong phòng?	( )	( )	( )	( )	( )
(6) Làm anh(chị) khó khăn khi bắt đầu vào giấc ngủ?	( )	( )	( )	( )	( )
(7) Làm anh(chị) bị thức giấc khi đang ngủ say?	( )	( )	( )	( )	( )
(8) Làm anh(chị) không thể mở cửa sổ bởi quá ồn trong khi anh(chị) muốn mở cửa sổ?	( )	( )	( )	( )	( )
(9) Làm anh(chị) khó chịu vì rung do máy bay bay qua?	( )	( )	( )	( )	( )
(10) Làm anh(chị) lo sợ bị ảnh hưởng khi tai nạn máy bay xảy ra?	( )	( )	( )	( )	( )

**Nếu nhà anh(chị) có danh thời gian ra bên ngoài, xin hãy trả lời 3 câu hỏi dưới đây**

(11) Làm phiền anh(chị) khi anh(chị) làm gì đó ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )
(12) Làm phiền anh(chị) khi nói chuyện ở sân vườn, ban công, sân thượng?	( )	( )	( )	( )	( )
(13) Làm phiền anh(chị) khi anh(chị) nghỉ ngơi ở sân vườn, ban công, sân	( )	( )	( )	( )	( )

**7. Từ khi anh(chị) nhập viện đến nay, tiếng ồn môi trường đã làm phiền anh(chị) hoặc gây khó chịu cho anh (chị) ở mức độ nào (thang đo từ 0 đến 10)?**

0    1    2    3    4    5    6    7    8    9    10

Hoàn toàn không

Cực kỳ

**8. Anh(chị) có thường xuyên gặp vấn đề về giấc ngủ không?**

1. Thường xuyên

2. thỉnh thoảng

3. Hầu như không

**9. Mỗi ngày, anh(chị) thường đi ngủ và thức dậy lúc mấy giờ?**

	Đi ngủ	Thức dậy
Các ngày trong tuần	_____h(2)	_____h(1)
Cuối tuần (ngày lễ)	_____h(4)	_____h(3)

**10. Trước và sau khi nhập viện, anh(chị) đánh giá thế nào về chất lượng giấc ngủ của mình?**

(1) Trước khi nhập viện: 1. Rất tốt    2. Khá tốt    3. Khá tệ    4. Rất tệ

(2) Trong khi nằm viện: 1. Rất tốt    2. Khá tốt    3. Khá tệ    4. Rất tệ

**11. Hãy trả lời câu hỏi này liên quan đến giấc ngủ của anh(chị) kể từ khi nhập viện:**

(1) Anh(chị) có gặp rắc rối với giấc ngủ không? 1. Không    2. Có

(2) Nếu trả lời “Có” ở câu hỏi trên, vui lòng chọn số thích hợp cho từng mục sau:

	1	2	3
	Hiếm khi/ Hoàn toàn không	1-2 lần/ tuần	Nhiều hơn 3 lần/ tuần

(19) Khó đi vào giấc ngủ	( )	( )	( )
(20) Khi bị thức giấc vào buổi đêm, khó ngủ trở lại.	( )	( )	( )
(21) Bị thức giấc sớm vào buổi sáng	( )	( )	( )
(22) Không cảm thấy đã được ngủ ngon vào sáng hôm sau.	( )	( )	( )
(23) Cảm giác buồn ngủ vào ban ngày và không thể làm việc tốt	( )	( )	( )
(24) Khác ( )	( )	( )	( )

**(3) Nếu anh(chị) gặp rắc rối với giấc ngủ, anh(chị) có nghĩ đó là do tiếng ồn máy bay không?** 1. Không 2. Có

**12. Trong thời gian nằm viện, anh(chị) có thường xuyên nhìn thấy máy bay bay qua cửa sổ phòng bệnh không?** 1. Không 2. Có

Nếu “có” thì khoảng bao nhiêu lần 1 ngày? \_\_\_\_\_

**13. Anh(chị) có thường mở cửa sổ phòng bệnh không?**

	1 Hiếm khi/ Hoàn toàn không	2 Thỉnh thoảng	3 Thường hay	4 Luôn luôn
(1) Mùa khô	( )	( )	( )	( )
(2) Mùa mưa	( )	( )	( )	( )

**14. Trong cuộc sống hàng ngày các yếu tố thời tiết cũng như điều kiện môi trường tác động đến chúng ta rất nhiều, anh(chị) nhạy cảm ở mức độ nào đối với các yếu tố dưới đây?**

	1	2	3	4	5
(1) Lạnh	( )	( )	( )	( )	( )
(2) Nóng	( )	( )	( )	( )	( )
(3) Tiếng ồn	( )	( )	( )	( )	( )
(4) Độ rung	( )	( )	( )	( )	( )
(5) Chất hóa học	( )	( )	( )	( )	( )

(6) Mùi hôi	( )	( )	( )	( )	( )
(7) Bụi, phấn hoa, không khí bẩn	( )	( )	( )	( )	( )

**Trong phần tiếp theo, anh(chị) có thể trả lời một số câu hỏi liên quan đến thông tin cá nhân được không?**

**15. Công việc hiện tại của anh(chị) là gì?**

1. Đi làm (Nghề nghiệp: \_\_\_\_\_)  
 2. Nông dân 3. Học sinh 4. Nội trợ 5. Nghỉ hưu 6. Tự do

**16. Anh(chị) cảm thấy thế nào về tình trạng sức khỏe bản thân?**

1. Tuyệt vời 2. Rất tốt 3. Tốt 4. Khá 5. Kém

**17. Sử dụng thang đo từ 0 đến 10, trong đó 0 là “Rất không hài lòng” và 10 là “Rất hài lòng”, anh(chị) cảm thấy thế nào về cuộc sống của mình hiện tại?**

- 0 1 2 3 4 5 6 7 8 9 10  
 Rất không hài lòng Rất hài lòng

**18. Nghĩ về những căng thẳng trong cuộc sống, anh(chị) nói thế nào về mức độ căng thẳng trong hầu hết các ngày?**

1. Hoàn toàn không 2. Không hẳn lắm 3. Một chút  
 4. Khá căng thẳng 5. Cực kỳ căng thẳng

**19. Anh(chị) có thường xuyên kiểm tra sức khỏe định kỳ không? 1. Không 2. Có**

**20. Dưới đây là danh sách các bệnh lý thường kéo dài trong một thời gian. Trong cột đầu tiên, hãy kiểm tra “Có” hoặc “Không” đối với mỗi điều kiện, sau đó đối với mỗi điều kiện “Có”, vui lòng trả lời câu hỏi trang dưới đây.**

Bạn đã bao giờ mắc.....? 1. Không 2. Có	Năm bắt đầu?	Đã gặp bác sĩ chưa? 7. Chưa 8. Có	Đã bao giờ nhập viện vì nó? 7. Chưa 8. Có	Uống thuốc theo chỉ định bác sĩ? 7. Chưa 8. Có	Mắc trong vòng 12 tháng qua? 7. Chưa 8. Có
Bệnh tim mạch ( )		( )	( )	( )	( )

Huyết áp cao hoặc tăng huyết áp ( )		( )	( )	( )	( )
Tăng lipid máu ( )		( )	( )	( )	( )
Đột quỵ, đột quỵ nhẹ hay Con thiếu máu não thoáng qua (TIA) ( )		( )	( )	( )	( )
Hen suyễn ( )		( )	( )	( )	( )
Tiểu đường ( )		( )	( )	( )	( )
Ung thư _____ ( )		( )	( )	( )	( )
Trầm cảm hoặc rối loạn thần kinh ( )		( )	( )	( )	( )
Khác: _____ _____		( ) ( )	( ) ( )	( ) ( )	( ) ( )

**21. Anh(chị) vui lòng cho biết cha mẹ đẻ của anh(chị) có từng mắc các bệnh dưới đây?**

- 1. Không                      2. Có                      3. Không biết**

Điền 1, 2, 3 vào ô tương ứng bên dưới

	Cha đẻ	Mẹ đẻ
(1) Bệnh tim mạch	( )	( )
(2) Huyết áp cao	( )	( )
(3) Đột quỵ hoặc TIA	( )	( )
(4) Tiểu đường	( )	( )

**22. Lượng muối anh(chị) sử dụng trong mỗi bữa ăn có nhiều không?**

1. Rất nhiều    2. Một chút    3. Không nhiều lắm    4. Không

**23. Anh(chị) có hay ăn những món dưới đây không?**

	1. Không nhiều lắm	2. 1 lần/ngày	3. Mọi bữa ăn
(1) Dưa muối	( )	( )	( )
(2) Nước mắm	( )	( )	( )
(3) Nước tương	( )	( )	( )
(4) Cá kho	( )	( )	( )
(5) Các món mặn khác: .....	( )	( )	( )

**24. Anh(chị) có ăn những loại thức ăn mặn và nhiều muối không?**

1. Không nhiều lắm                      2. Ngày 1 lần                      3. Mọi bữa ăn

**25. Anh(chị) có nghĩ về cân bằng dinh dưỡng trong các bữa ăn không?**

1. Hoàn toàn không    2. Một chút    3. Bình thường    4. Nghĩ nhiều

**26. Anh(chị) có thường uống đồ uống có cồn (rượu, bia...) không?**

1. Hoàn toàn không                      2. Một tháng 2-3 lần hoặc ít hơn  
3. Một tuần 1-4 ngày                      4. Hầu như hàng ngày

**27. Anh(chị) có thường xuyên hút thuốc không?**

1. Hoàn toàn không                      2. Trước có hút giờ ngừng  
3. Một ngày 20 điếu hoặc ít hơn                      4. Hơn 20 điếu một ngày

**28. Anh(chị) có thường xuyên tập thể dục trên 30 phút không?**

1. Hoàn toàn không                      2. Một tháng 1-2 lần                      3. Một tuần 1 lần  
4. Một tuần 2-3 lần                      5. Một tuần 4-5 lần                      6. Hầu như hàng ngày

**29. Anh(chị) có cảm thấy khó khăn để nghe và hiểu các từ trong cuộc trò chuyện bình thường (kể cả khi sử dụng máy trợ thính)?**

1. Rất khó khăn                      2. Thỉnh thoảng                      3. Chỉ một chút                      4. Hoàn toàn không

**Anh(chị) vui lòng cho biết đó là khó khăn gì bằng cách trả lời câu hỏi dưới đây. Nếu “hoàn toàn không” xin bỏ qua.**

	Có	Thỉnh thoảng	Không

1	Anh(chị) có bị điếc ở một hoặc cả 2 tai không ?	( )	( )	( )
2	Anh (chị) có bao giờ gặp khó khăn nào khi nghe với một hoặc 2 tai không ?	( )	( )	( )
3	Bây giờ anh (chị) có bị ù tai hay ù ở 1 hoặc 2 tai không ?	( )	( )	( )
4	Bây giờ anh (chị) có sử dụng máy trợ thính không ?	( )	( )	( )

**Miêu tả đúng nhất về tình trạng thính lực hiện tại của anh(chị) (không có máy trợ thính)**

		Tốt	Một chút khó khăn	Khá khó khăn	Điếc
5	Tai trái	( )	( )	( )	( )
6	Tai phải	( )	( )	( )	( )

**30. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Tuần trước				Gần như mỗi ngày trong 2 tuần
		Hầu như không hoặc ít hơn 1 lần/ ngày	1-2 ngày	3-4 ngày	5-7 ngày	
1	Tôi cảm thấy ăn không ngon miệng	( )	( )	( )	( )	( )
2	Tôi không thể rũ bỏ buồn chán	( )	( )	( )	( )	( )
3	Tôi gặp vấn đề trong việc tập trung vào những việc tôi đang làm	( )	( )	( )	( )	( )
4	Tôi cảm thấy rất chán nản	( )	( )	( )	( )	( )
5	Ngủ không yên	( )	( )	( )	( )	( )
6	Tôi cảm thấy buồn	( )	( )	( )	( )	( )
7	Tôi không thể bắt đầu một việc gì	( )	( )	( )	( )	( )
8	Không gì khiến tôi cảm thấy vui	( )	( )	( )	( )	( )

9	Tôi cảm thấy mình như một người xấu	( )	( )	( )	( )	( )
10	Tôi mất hứng thú với các hoạt động thường làm trước đây	( )	( )	( )	( )	( )
11	Tôi ngủ nhiều hơn bình thường	( )	( )	( )	( )	( )
12	Tôi cảm thấy tôi đang di chuyển quá chậm	( )	( )	( )	( )	( )
13	Tôi cảm thấy bồn chồn	( )	( )	( )	( )	( )
14	Tôi đã ước tôi có thể chết đi	( )	( )	( )	( )	( )
15	Tôi muốn làm đau bản thân mình	( )	( )	( )	( )	( )
16	Tôi thấy mệt mỏi trong mọi lúc	( )	( )	( )	( )	( )
17	Tôi không thích bản thân mình	( )	( )	( )	( )	( )
18	Tôi giảm cân rất nhiều mà không cần nỗ lực gì cả	( )	( )	( )	( )	( )
19	Tôi gặp nhiều vấn đề về giấc ngủ	( )	( )	( )	( )	( )
20	Tôi không thể tập trung vào những điều quan trọng	( )	( )	( )	( )	( )

**31. Dưới đây là danh sách những điều anh(chị) cảm thấy và hành xử. Anh(chị) có thường xuyên cảm thấy như vậy không?**

		Có	Thỉnh thoảng	Không
1	Anh (chị) có đau đầu không?	( )	( )	( )
2	Anh (chị) có cảm giác chóng mặt không?	( )	( )	( )
3	Anh (chị) có trải qua cảm giác không minh mẫn không?	( )	( )	( )
4	Anh (chị) có trải qua cảm giác tay chân nặng nề không?	( )	( )	( )
5	Anh (chị) có bị đau ở nhiều nơi trên cơ thể không?	( )	( )	( )
6	Anh (chị) của bạn có nặng nề hoặc không minh mẫn không?	( )	( )	( )

7	Miệng của Anh (chị) có tiết nhiều nước bọt không?	( )	( )	( )
8	Anh (chị) có cứng hay đau cổ vai gáy không?	( )	( )	( )
9	Anh (chị) có bị mờ mắt không?	( )	( )	( )
10	Anh (chị) có bị đau thắt lưng không?	( )	( )	( )
11	Anh (chị) có cảm thấy nóng hoặc sốt nhẹ không?	( )	( )	( )
12	Anh (chị) có bị đau lưng cao không?	( )	( )	( )
13	Tim của Anh (chị) có đập mạnh hoặc nhanh hơn khi vội vàng?	( )	( )	( )
14	Gần đây Anh (chị) có cảm thấy mệt mỏi không?	( )	( )	( )
15	Anh (chị) có cảm thấy đau hay nóng mắt không?	( )	( )	( )
16	Mũi của Anh (chị) có nghẹt không?	( )	( )	( )
17	Anh (chị) có ợ nóng không?	( )	( )	( )
18	Có những lúc Anh (chị) muốn nghỉ ngơi hoặc nằm trên giường vào ban ngày không?	( )	( )	( )
19	Anh (chị) có cảm thấy ngứa hay đau họng không?	( )	( )	( )
20	Anh (chị) có cảm thấy nóng mặt hoặc đau đầu không?	( )	( )	( )

**32. Gia đình anh(chị) có bao nhiêu phương tiện tham gia giao thông?**

1. Xe đạp (\_\_\_xe)    2. Xe máy (\_\_\_xe)    3. Ô tô (\_\_\_xe)    4. Khác \_\_\_\_\_ (\_\_\_xe)

**33. Anh(chị) sử dụng các phương tiện giao thông dưới đây ở mức độ nào?**

	1 Sử dụng tích cực	2 Cố gắng sử dụng	3 Sử dụng cũng được, không cũng được	4 Cố gắng không sử dụng	5 Hoàn toàn không sử dụng
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )

(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**34. Xin anh(chị) đánh giá cho về việc sử dụng các phương tiện giao thông dưới đây như thế nào thì tốt cho xã hội?**

	1 Phải sử dụng tích cực	2 Nên sử dụng nhiều hơn	3 Sao cũng được	4 Không cần sử dụng nhiều	5 Hoàn toàn không cần
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**35. Xin anh(chị) đánh giá cho mức độ an toàn của các phương tiện giao thông dưới đây:**

	1 Cực kỳ an toàn	2 An	3 Không an toàn	4 Nguy hiểm	5 Cực kỳ nguy
(1) Xe hơi	( )	( )	( )	( )	( )
(2) Tàu	( )	( )	( )	( )	( )
(3) Xe gắn máy	( )	( )	( )	( )	( )
(4) Xe buýt	( )	( )	( )	( )	( )
(5) Máy bay	( )	( )	( )	( )	( )
(6) Xe đạp	( )	( )	( )	( )	( )
(7) Đi bộ	( )	( )	( )	( )	( )

**36. Xin anh(chị) vui lòng cho biết khoảng thu nhập của gia đình?**

1. Dưới 10 triệu đồng                      2. Khoảng 10-20 triệu đồng                      3. Hơn 20 triệu đồng

**37. Anh(chị) từng học ở những trường nào?**

1. Trường THCS \_\_\_\_\_
2. Trường THPT \_\_\_\_\_
3. Đại học/ Học viện \_\_\_\_\_
4. Khác \_\_\_\_\_

**38. Xin vui lòng cho chúng tôi biết thông tin dưới đây liên quan đến tình trạng sức khỏe của anh(chị) :**

- (1) Chiều cao \_\_\_\_\_ cm
- (2) Cân nặng \_\_\_\_\_ kg
- (3) Huyết áp trên \_\_\_\_\_ mmHg
- (4) Huyết áp dưới \_\_\_\_\_ mmHg
- (5) Độ tuổi \_\_\_\_\_ tuổi

**39. Ngoài các câu hỏi trên, nếu anh(chị) có ý kiến gì về môi trường sống hiện nay, xin cho biết**

\_\_\_\_\_

**\* Phần này sinh viên thực hiện phỏng vấn xin hãy quan sát và tự điền câu trả lời (nếu không rõ, xin hỏi lại người trả lời phỏng vấn để có câu trả lời đúng)**

**F1. Giới tính của người trả lời phỏng vấn?** 1. Nam 2. Nữ

**F2. Người trả lời phỏng vấn đang ở phòng nào?** (ghi rõ số phòng, tầng, khoa/ tòa nhà)

- (1) Số phòng \_\_\_\_\_
- (2) Tầng \_\_\_\_\_
- (3) Khoa/ Tòa nhà \_\_\_\_\_

**F3. Trong phòng có lắp đặt điều hòa không?** 1. Không 2. Có

**F4. Trong phòng có sử dụng sản phẩm hoặc vật liệu cách âm không?** 1. Không 2. Có

**F5. Cấu tạo tòa nhà thuộc loại nào trong các cấu tạo dưới đây?**

1. Làm từ gỗ
2. Xây từ gạch
3. Nhà lắp ghép
4. Nhà bê tông cốt thép
5. Tường gạch và khung bê tông cốt thép
6. Ngoài ra \_\_\_\_\_

**F6. Kính các loại cửa hướng ra bên ngoài của phòng bệnh (cửa sổ, cửa ra vào) là loại kính bao nhiêu lớp? nếu là kính đôi nhiều lớp, xin xếp vào loại kính hai lớp.**

1. Trên 3 lớp
2. Hai lớp
3. Một lớp
4. Ngoài ra \_\_\_\_\_

**F7. Khung các loại cửa phòng bệnh (cửa sổ, cửa ra vào) thuộc loại nào trong số các loại khung dưới đây? Xin chọn đánh giá câu trả lời thích hợp:**

1. Nhôm
2. Gỗ
3. Nhựa
4. Ngoài ra \_\_\_\_\_

**\*Câu hỏi này sẽ được người phỏng vấn hỏi lặp đi lặp lại hàng ngày khi kiểm tra thiết bị đo**

**(1) Nhìn chung, anh(chị) cảm thấy môi trường phòng hôm nay thế nào?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
1. Rất khó chịu / không thể chịu đựng được	( )	( )	( )
2. Khó chịu / không thể chịu đựng được	( )	( )	( )
3. Không khó chịu cũng không dễ chịu	( )	( )	( )
4. Dễ chịu / có thể chịu được	( )	( )	( )
5. Rất dễ chịu / có thể chịu được	( )	( )	( )

**(2) Tiếng máy bay hôm nay như thế nào?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
1. Rất khó chịu / không thể chịu đựng được	( )	( )	( )
2. Khó chịu / không thể chịu đựng được	( )	( )	( )
3. Không khó chịu cũng không dễ chịu	( )	( )	( )
4. Dễ chịu / có thể chịu được	( )	( )	( )
5. Rất dễ chịu / có thể chịu được	( )	( )	( )

**(3) Anh(chị) đánh giá chất lượng giấc ngủ đêm qua của mình như thế nào?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
1. Rất tốt	( )	( )	( )

2. Khá tốt	( )	( )	( )
3. Khá tệ	( )	( )	( )
4. Rất tệ	( )	( )	( )

**(4) Anh(chị) cảm thấy thế nào về độ ồn của máy bay trong phòng của mình hiện nay?**

	Ngày thứ nhất	Ngày thứ hai	Ngày thứ ba
1. Rất lớn/ ồn ào	( )	( )	( )
2. Khá lớn/ ồn ào	( )	( )	( )
3. Khá nhỏ / yên tĩnh	( )	( )	( )
4. Rất nhỏ / yên tĩnh	( )	( )	( )