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ORIGINAL

Occupational risks for nursing interns according to their working conditions

Riesgos laborales en los internos de enfermería de acuerdo a su condición de trabajo

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ABSTRACT

Introduction: working conditions are the combination of physical, organizational, and environmental factors present in the workplace. Occupational hazards are those elements that can harm the physical, mental, or emotional well-being of workers. In the field of nursing, these hazards include exposure to biological, chemical, and physical agents.
Method: a quantitative, observational, cross-sectional, and correlational study was conducted with 75 eighth-semester nursing students from the Technical University of Ambato, Ecuador. Two validated questionnaires were used to assess working conditions and occupational hazards. Data were analyzed using Pearson and Spearman correlation tests.
Results: 76 % of students reported a high biological risk, followed by 50,7 % for chemical risk, and 65,3 % for physical risk. Working conditions were perceived as inadequate, especially in intra-work aspects. A significant correlation was observed between poor working conditions and exposure to occupational hazards ($p < 0,05$).
Conclusions: the alternative hypothesis is accepted in all four cases. That is, there is a direct and strong relationship between occupational conditions and hazards and their biological, chemical, and physical dimensions. Improving aspects such as workload and supervision could significantly reduce these risks, highlighting the need to establish safety policies and protocols in healthcare institutions.

Keywords: Occupational Hazards; Working Conditions; Nursing Practitioners; Biological Risk; Chemical Risk.

RESUMEN

Introducción: las condiciones laborales son la combinación de factores físicos, organizativos y ambientales presentes en el lugar de trabajo, mientras que, los riesgos laborales son aquellos elementos que pueden perjudicar el bienestar físico, mental o emocional de los trabajadores. En el campo de la enfermería, estos riesgos abarcan la exposición a agentes biológicos, químicos y físicos.
Método: se llevó a cabo un estudio cuantitativo, observacional, transversal y correlacional con 75 estudiantes de octavo semestre de enfermería de la Universidad Técnica de Ambato, Ecuador. Se emplearon dos cuestionarios validados que permite evaluar las condiciones laborales como los riesgos laborales. Los datos fueron analizados mediante pruebas de correlación de Pearson y Spearman.
Resultados: el 76 % de los estudiantes reportaron un alto riesgo biológico, seguido por un 50,7 % en riesgo químico y un 65,3 % en riesgo físico. Las condiciones laborales fueron percibidas como inadecuadas, especialmente en aspectos intralaborales. Se observó una correlación significativa entre las condiciones laborales deficientes y la exposición a riesgos laborales ($p < 0,05$).
Conclusiones: se acepta la hipótesis alterna en los 4 casos. Es decir, existe relación directa y fuerte entre las condiciones y riesgos laborales y sus dimensiones: biológico, químico y físico. Mejorar aspectos como la carga de trabajo y la supervisión podría reducir de manera significativa estos riesgos, lo que resalta la necesidad de establecer políticas y protocolos de seguridad en las instituciones de salud.

Palabras clave: Riesgos Laborales; Condiciones de Trabajo; Practicantes de Enfermería; Riesgo Biológico; Riesgo Químico.

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INTRODUCTION

Occupational hazards are defined as those factors present in the work environment that can cause harm to the physical, mental, or emotional well-being of workers.[1] These hazards can range from physical accidents to exposure to biological and chemical agents. Their prevention is essential to establish safe and health-promoting workplaces.[2] Within the nursing profession, these hazards are of particular importance due to the direct and continuous interaction that nursing staff maintain with patients, materials, and procedures, which require a considerable degree of responsibility and exposure.[3]

Nursing Rotating Internship students face various types of occupational hazards, including biological hazards (exposure to pathogens), physical hazards (patient movement), psychosocial hazards (stress and burnout), and chemical hazards (handling medications and disinfectants).[4] These circumstances are compounded by a lack of experience and the need to adapt to a new and highly rigorous work environment, which increases the likelihood of accidents and adverse health outcomes.[5]

Working conditions, defined as the combination of physical, organizational, and environmental elements[6] are directly related to the emergence of occupational hazards.[7] The World Health Organization (WHO) has observed that students in health sciences disciplines, including nursing students, are subject to working conditions that entail significant risks, such as long working hours, excessive workloads, and insufficient supervision.[8] Data from several countries illustrate this concern: in Spain, 30 % of nursing students reported experiencing at least one occupational accident during their internships, while in Mexico, 25 % of interns were exposed to potentially infectious body fluids.[9]

Exploring this topic is vital to identifying and mitigating the occupational hazards faced by nursing interns, thereby improving their well-being and professional development. This research aims not only to develop preventive measures but also to advocate for safer and more health-friendly working conditions, which will have a beneficial effect on the quality of patient care and reduce costs related to occupational accidents. Furthermore, it will provide empirical data to inform the development of specific policies and protocols designed to protect future healthcare professionals.

Several studies have been conducted around the world in this regard, for example: In China, Wang[10] conducted a meta-analysis of 32 studies from different countries, with a sample of 11622 nursing students. According to this study, 35 % of nursing interns reported experiencing needlestick injuries.

Ladredo and Pérez[11] evaluated the biological risks to which Spanish university nursing students during hospital internships were exposed, using a sample of 167 students. In this study, they observed that the main biological risks to which students were exposed were needle recapping, medication preparation, and opening medication ampoules. Furthermore, they identified that students who performed their internships in emergency departments were the most likely to suffer accidents. However, a notable finding was that students who suffered these types of biological accidents did not report them for fear of censure.

Another study conducted in Turkey by Eyi & Eyi[12] on the occupational conditions and risks faced by nursing interns concluded that long work hours contributed to students' exposure to blood, body fluids, and chemicals. Furthermore, they observed that another factor that increased the risk of accidents was pressure from patients, family members, and medical staff. In the Latin American context, research on this topic has also been conducted. Pauta and Almache in Mexico[13] conducted a study in the gynecology department of a public institution with the aim of identifying various types of occupational hazards to which they were exposed. The population included 320 professionals, including nursing interns. In this study, they identified various types of occupational hazards, including biological hazards (contact with bodily fluids and infectious materials), chemical hazards (exposure to anesthetic gases and medications), and physical hazards (insufficient lighting).

Another study conducted by Fernández [14] included a sample of 231 students completing their pre-professional internships at two public health institutions in Argentina. The most common risks observed in this study were percutaneous injuries from sharp tools (40 %) and biological fluid splashes (30 %). Among the chemical risks, exposure to irritating or toxic substances was identified, and among the physical risks, falls and burns were detected. These risks were related to the safety environment present in health institutions.

In Ecuador, research by Eras et al[15] identified the risks to which students were exposed during their internships. Among the biological risks, 34 % of the most frequent accidents occurred when recapping needles, 25 % when treating wounds, and 12,5 % due to fluid splashes. This topic is of great importance today because nursing internship students often fail to report accidents to university authorities, who are still held accountable for their actions. The results of accidents suffered by nursing interns are reflected when they experience serious problems in their academic performance. Therefore, it is essential to study this problem faced by rotating internship students to obtain more concrete answers, since upon completing their internships, they will have more experience managing occupational hazards depending on the working conditions offered by the healthcare institutions where they complete their rotating internship.

With all the above, the research question arises: What are the occupational hazards faced by nursing interns according to their work conditions? To this end, this study aims to analyze the occupational hazards faced by nursing interns according to their work conditions.

METHOD

The research was conducted in the Ambato canton of Ecuador, on the Ingahurco campus of the Technical University of Ambato, during the academic period from September 2024 to August 2025.

Approach, design, and scope

The study has a quantitative approach, as numerical data were identified; an observational design, as no variables were

manipulated; a cross-sectional approach, as information was collected at a single time point; and a correlational approach, as the objective was to identify patterns of association between working conditions and occupational hazards faced by nursing interns.[16]

Population

This population consists of eighth-semester nursing students at the Technical University of Ambato who are completing their rotating internships. Considering the small population, the questionnaire was administered on a-census basis,[17] taking into account inclusion and exclusion criteria. Students legally enrolled during the September 2024–August 2025 academic period and those who voluntarily agreed to participate in the study by signing an informed consent form were included. Students absent at the time of data collection, as well as those who did not complete the questionnaires, were excluded. 18. The final result was the participation of 75 students.[18]

Techniques and instruments

Data were collected using two questionnaires, one for each variable, developed by Alonzo.[19] The questionnaire on working conditions consists of 15 items, divided into two dimensions: physical conditions (6 items) and work-related conditions (9 items). The questionnaire collecting data on occupational hazards consists of 7 items organized into three dimensions: biological risk (2 items), chemical risk (3 items), and physical risk (3 items). Both instruments have 5 response options, ranging from: 1 = never, 2 = almost never, 3 = sometimes, 4 = almost always, and 5 = always. The instruments showed satisfactory reliability, as demonstrated by a Cronbach's alpha of 0,71 for working conditions and 0,73 for occupational hazards.

Processing and analysis

After collecting information virtually through a link shared in student WhatsApp groups, the data was organized in Excel, while coding and analysis were carried out using SPSS version 27 (Statistical Package for the Social Sciences). Quantitative variables were analyzed using measures of central tendency, while categorical variables were analyzed using frequency tables and crosstabs. To analyze the association between occupational conditions and risks (categorical variables), the items from each questionnaire were summed to create new numerical variables, which were then tested for normality. Based on the results obtained, the Pearson and Spearman correlation tests were applied.[20]

Ethical Aspects. For the development of this research, authorization was requested from the Ethics Committee of the Faculty of Health Sciences of the Technical University of Ambato, which established the guidelines to be followed. Furthermore, the ethical principles outlined in the Declaration of Helsinki were considered, specifically informed consent, beneficence, nonmaleficence, justice, and respect for the dignity and rights of participants. These principles were designed to protect the rights, health, and well-being of the students involved in the study.[21]

During the process of obtaining informed consent, participants were informed of the purpose of the research, its benefits, and potential risks, as well as the guarantee of absolute confidentiality of their personal information. Students were free to withdraw from the study at any time without any difficulty, while their autonomy was always respected. The information obtained was handled with strict confidentiality and used solely for academic purposes. During data collection, no discrimination based on race, skin color, sex, or ethnicity was permitted.

RESULTS

Demographic information

The 75 eighth-semester nursing students at the Technical University of Ambato had a minimum age of 20 years and a maximum age of 32, with a mean age of 23,4 and a standard deviation of 2,4 years. Table 1 describes the absolute and relative frequencies of the students' demographic variables.

Table 1. Demographic information

Variables	Categorías	Frecuencia	Porcentaje
Sexo	Femenino	58	77,3
	Masculino	17	22,7
Estado civil	Casado	2	2,7
	Convivencia	4	5,3
	Soltero	69	92,1
Hospital	Hospital General Docente Ambato	45	60
	Hospital General Latacunga	15	20
	IESS Ambato	10	13,3
	IESS Latacunga	5	6,7
Rotación	Centro obstétrico	11	14,7
	Cirugía	11	14,7

Clínica	6	8
Emergencia	8	10,7
Maternidad	8	10,5
Neonatología	4	5,3
Pediatría	6	8
Quirófano	6	8
Salud comunitaria	8	10,7
UCI	7	9,3

Working conditions

According to the perceptions of students completing their rotating internships, working conditions in healthcare institutions are poor. By size, the physical conditions are average, while the intra-work conditions are poor (table 2).

Table 2. Working conditions

Cuestionario y dimensiones	Categorías	Frecuencia	Porcentaje
Ambiente laboral	Deficiente	46	61,3
	Regular	28	37,3
	Buena	1	1,3
Física	Regular	58	77,3
	Deficiente	13	17,3
	Buena	4	5,3
Intralaboral	Deficiente	45	60
	Regular	30	40

Occupational Hazards

Overall, and by dimension, the results indicate that the occupational hazards faced by rotating internship students are high (table 3).

Table 3. Occupational Hazards

Cuestionario y dimensiones	Categorías	Frecuencia	Porcentaje
Riesgo laboral	Alto	50	66,7
	Medio	23	30,7
	Bajo	2	2,7
Biológico	Alto	57	76,0
	Medio	17	22,7
	Bajo	1	1,3
Químico	Alto	38	50,7
	Medio	31	41,3
	Bajo	6	8,0
Físico	Alto	49	65,3
	Medio	21	28,0
	Bajo	5	6,7

Hypothesis testing

With a 95 % confidence level and a 0,5 % margin of error, the following hypotheses were proposed:

General hypothesis

H1: Working conditions are related to occupational hazards.

H0: Working conditions are not related to occupational hazards.

Independent variable: working condition.

Dependent variable: occupational hazards.

Specific Hypotheses

H1: Working conditions are related to biological occupational hazards.
H0: Working conditions are not related to biological occupational hazards.
Independent variable: Working condition.
Dependent variable: Occupational hazards.

H1: Working conditions are related to chemical occupational hazards.
H0: Working conditions are not related to chemical occupational hazards.
Independent variable: Working condition.
Dependent variable: Chemical occupational hazards.

H1: Working conditions are related to physical occupational hazards.
H0: Working conditions are not related to physical occupational hazards.
Independent variable: Working condition.
Dependent variable: Physical occupational hazards.

Normality test

table 4 presents the results of the normality tests performed to check the distribution of the variables related to the conditions and occupational risks: biological, chemical and physical, to which the nursing internship students are exposed. According to the number of cases in the sample (75), the results of the Kolmogorov-Smirnov test indicated that the variables: working condition 0,2 > 0,05 and occupational risk 0,061 > 0,05 follow a normal distribution. However, the dimensions: biological risk (0,001), chemical risk (0,010) and physical risk (0,001) did not present a normal distribution, since their significance values were < 0,05.

Table 4. Normality tests

Variables	Kolmogorov-Smirnov			Shapiro-Wilk		
	Estadístico	gl	Sig.	Estadístico	gl	Sig.
Condiciones laborales	0,056	75	0,2	0,978	75	0,209
Riesgos laborales	0,100	75	0,061	0,965	75	0,035
Riesgo biológico	0,245	75	0,001	0,824	75	0,001
Riesgo químico	0,120	75	0,010	0,958	75	0,012
Riesgo físico	0,171	75	0,001	0,925	75	0,001

Correlation coefficient

Table 5 presents the significance values for the correlation tests. The results showed a significant correlation between conditions and occupational hazards (0,001 < 0,05) and a strong correlation (0,748). Direct positive correlations were also observed between working conditions and the dimensions of occupational hazards: biological (0,001 < 0,05) and a strong correlation (0,686); chemical (0,001 < 0,05) with a strong correlation (0,569); and physical (0,000 < 0,05) with a strong correlation (0,604).

Table 5. Correlation coefficients

Pruebas estadísticas		Condiciones laborales	Riesgos laborales	Riesgo biológico	Riesgo químico	Riesgo físico
R de Pearson	Coeficiente de correlación		0,748			
	(Sig. bilateral)		0,001			
Rho de Spearman	Coeficiente de correlación	1,000		0,686	0,569	0,604
	Sig. (bilateral)			0,001	0,001	0,001
	N	75		75	75	75

DISCUSSION

The results of this research determine that working conditions are inadequate, especially in intra-work aspects such as workload and supervision. This perception of rotating internship students aligns with the observations of the World Health Organization (WHO)[8] which highlights that health science students face working conditions that entail significant risks, such as long work hours and insufficient supervision. This coincidence suggests that, internationally, working conditions in the health sector are a crucial factor affecting exposure to occupational hazards.

This research finds a significant relationship between working conditions and risks, supporting the hypothesis that inadequate working conditions increase exposure to risks. This finding is consistent with the results of Tituana et al.[5], who identified a relationship between workload and occupational accidents among nursing staff. Furthermore, the strong correlation observed between working

conditions and biological, chemical, and physical risks suggests that improving working conditions could significantly reduce exposure to these hazards.

Nursing interns are exposed to a high level of occupational risks, encompassing biological, chemical, and physical aspects, depending on their working conditions. These findings are consistent with previous research conducted in diverse geographical and cultural contexts, highlighting the need to address this issue comprehensively. The results obtained in this study align with those of Wang[10], who, through a meta-analysis involving 11622 nursing students from different countries, reported that 35 % of interns experience needlestick injuries. In our study, 76 % of students indicated a high biological risk, which includes exposure to bodily fluids and percutaneous injuries. This coincidence may be attributed to the typical nursing activities, which require handling needles and other sharp instruments, as well as exposure to bodily fluids. However, the discrepancy in percentages could be explained by differences in working conditions and safety protocols applied in each country. On the other hand, the study conducted by Ladredo and Pérez[11] in Spain reveals that nursing students are exposed to biological hazards, such as needle recapping and medication preparation, which is also reflected in our results, where biological hazard is the most prevalent. Furthermore, both studies agree that students do not report these incidents for fear of retaliation, suggesting the existence of an organizational culture that does not promote accident reporting, a common problem in the healthcare field. This is confirmed by Eyi & Eyi[12], who observe that long work hours and pressure exerted by patients and family members increase the risk of contact with bodily fluids and chemical substances. In our study, 60 % of students rated working conditions as inadequate, which could be linked to work overload and lack of adequate supervision, aspects also highlighted in the Turkish study. This suggests that, regardless of the cultural context, poor working conditions are a common factor contributing to exposure to occupational hazards.

In Latin America, the results of this study are consistent with the findings of Pauta and Almache[13] in Mexico, who report that nursing interns face biological, chemical, and physical risks, including exposure to anesthetic gases and medications. In our study, 50,7 % of students reported a high chemical risk, which aligns with what was reported in Mexico. This may be a consequence of handling medications and disinfectants, activities that are common in nursing practices. Similarly, Fernández[14] in Argentina found that puncture injuries and splashes of biological fluids were the most frequent risks among nursing students, which is comparable to our results, where 76 % of students reported a high biological risk. This suggests that, despite variations in healthcare systems and working conditions across countries, biological risks are a constant in the training of nursing students. In Ecuador, Eras et al.[15] identified that 34 % of the most common accidents occur when recapping needles, which our study also identified as one of the main biological risks. This indicates that, at the local level, nursing students also face similar challenges.

It is important to mention that this study has several limitations. First, the relatively small sample size (75 students), which could limit the generalizability of the results. Furthermore, the cross-sectional design does not allow for establishing causal relationships. However, the findings are consistent with current and relevant studies, suggesting that the results are valid for the context of nursing internship students.

CONCLUSIONS

Nursing interns perceive their working conditions as inadequate, especially with regard to intra-work factors such as workload and supervision. The majority of students rated the physical conditions as average, while 60 % of participants considered the intra-work conditions to be poor. This suggests that the healthcare institutions where they conduct their internships do not provide an appropriate working environment, which could increase their exposure to occupational hazards.

Nursing interns are exposed to a high incidence of occupational hazards, with biological hazards being the most common, with 76 % of students reporting a high risk in this category. Chemical and physical hazards are also relevant, with 50,7 % and 65,3 %, respectively, indicating a high risk in these areas. Lack of experience and adaptation to a demanding work environment are factors that contribute to this high incidence of risks.

The significance values of the Pearson R and Spearman's Rho statistical tests yielded values below 0,05, indicating a correlation between working conditions and hazards. There is also a correlation between working conditions and the dimensions of occupational hazards: biological, chemical, and physical. Furthermore, the correlation coefficients indicate a direct and strong correlation in all cases: conditions and occupational hazards (0,748), and between conditions and biological hazards (0,686), followed by physical hazards (0,604) and chemical hazards (0,569). Therefore, the null hypothesis is rejected in all 4 cases.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Judith Maribel Apo Campos, Miriam Fernández Nieto.
Data curation: Judith Maribel Apo Campos, Miriam Fernández Nieto.
Formal analysis: Judith Maribel Apo Campos, Miriam Fernández Nieto.
Research: Judith Maribel Apo Campos, Miriam Fernández Nieto.
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Writing - proofreading and editing: Judith Maribel Apo Campos, Miriam Fernández Nieto.

BIBLIOGRAPHIC REFERENCES

1. Cárdenas H. Comparative study of occupational risk factors for nursing staff in a surgical center and the surgical service. [Internet] [Specialty Thesis]. [Tacna-Peru]: Jorge Basadre Grohmann National University; 2021 [cited 2025 Feb 20]. Available from: https://repositorio.unjbg.edu.pe/items/3c3156a9-8874-490b-92f2-f759c612de89

2. Panunzio A. Occupational accidents in nursing. Nursing research [Internet]. 2020 [cited 2025 Feb 20];5(2):1–3. Available from: https://revistas.uta.edu.ec/erevista/index.php/enfi/article/view/866/821

3. Guiracocha J. Risk factors associated with occupational accidents in nursing staff at a private hospital. Guayaquil, 2021. [Online] [Postgraduate thesis]. [Piura-Peru]: César Vallejo University; 2022 [cited 2025 Feb 20]. Available from: https://repositorio.ucv.edu.pe/handle/20.500.12692/81804

4. Escobar D, Vargas R. Occupational risks in nursing professionals at the Zacarias Correa Valdivia Regional Hospital in Huancavelica – 2017. [Online] [Undergraduate thesis]. [Huancavelica-Peru]: Huancavelica National University; 2017 [cited 2025 Feb 20]. Available from: https://repositorio.unh.edu.pe/items/b4d0de12-8420-4cf6-b6cc-2af1d68a2016

5. Tituana E, Rojas H, Almache V. Relationship between Workload Factors and Occupational Accidents in Nursing Staff. Ciencia Latina Multidisciplinary Scientific Journal [Internet]. 2024 Apr 15 [cited 2025 Feb 20];8(1):11517–36. Available from: DOI: https://doi.org/10.37811/cl_rcm.v8i1.10458

6. Morocho S, Figueroa C, Guiracocha J, Cerezo B. Research Article: Nursing and risk factors associated with work accidents. 2023;7(47):174–85. Available from: https://doi.org/10.29018/issn.2588-1000vol7iss47.

7. Vergara T, Véliz E, Dabanch J. Exposure to risk fluids in healthcare personnel. Assessment of direct costs in their management. 2018 [cited 2025 Feb 20];35(5):490–7. Available from: https://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0716-10182018000500490

8. World Health Organization. WHO. 2022 [cited 2025 Feb 20]. Occupational health: health workers. Available from: https://acortar.link/4pWtIZ

9. Torres J, Alves C, Rutz R, Cezar-Vaz M. Profile of occupational accidents involving nursing professionals in hospitals Perfil dos acidentes de trabalho envolvendo profissionais de saludgem em hospitais. 2022 [cited 2025 Feb 23];26(64):239–06. Available from: http://dx.doi.org/10.14198/cuid.2022. 64.20

10. Xu X, Yin Y, Wang H, Wang F. Prevalence of needle-stick injury among nursing students: A systematic review and meta-analysis. 2022 [cited 2025 Feb 23];10:937887:1–8. Available from: DOI 10.3389/fpubh.2022.937887

11. Ladrero I, Pérez M. Biological risks in nursing students at San Jorge University. 2020 [cited 2025 Feb 20];3(9):45–55. Available from: https://www.conocimientoenfermero.es/index.php/ce/article/view/119

12. Eyi S, Eyi I. Nursing Students' Occupational Health and Safety Problems in Surgical Clinical Practice. Sage Open [Internet]. 2020 Jan 1 [cited 2025 Feb 23];10(1):1–21. Available from: https://doi.org/10.1177/21582440209018

13. Lata K, Pauta, Lady, Almache V. Occupational Diseases in Work Environments at Teofilo Davila Hospital Related to Nursing Staff. Ciencia Latina Multidisciplinary Scientific Journal [Internet]. 2024 Apr 11 [cited 2025 Feb 23];8(1):10920–40. Available from: DOI: https://doi.org/10.37811/cl_rcm.v8i1.10405

14. Fernández N. Determinants that influence the application of biosafety measures and the occurrence of accidents [Internet] [Master's thesis]. [Misiones-Argentina]: National University of Misiones; 2019 [cited 2025 Feb 23]. Available from: https://rid.unam.edu.ar/handle/20.500.12219/3065

15. Eras J, Avila K, Cedillo Y. Occupational accidents during clinical practice in nursing students. Nursing Research: Research,

Outreach, Teaching and Management [Internet]. 2018 Jul 4 [cited 2025 Feb 23];3(2, Jun):85–94. Available from: DOI: http://dx.doi.org/10.29033/ei.v3n2.2018.06

16. Arias-Gonzales J. Research design and methodology [Internet]. 1st ed. ENFOQUES CONSULTING EIRL, editor. Arequipa, Peru; 2021. 134 p. Available from: https://www.researchgate.net/publication/352157132

17. Pérez-Flores A. Response to the editor's letter. Population and sample. International journal of interdisciplinary dentistry [Internet]. 2024 Aug [cited 2025 Feb 24];17(2):67–67. Available from: DOI: https://10.4067/S2452-55882024000200067

18. Otzen T, Manterola C. Sampling Techniques on a Population Study. Int J Morphol [Internet]. 2017 [cited 2025 Feb 24];35(1)(1):227–32. Available from: https://scielo.conicyt.cl/pdf/ijmorphol/v35n1/art37.pdf

19. Alonso D. Working conditions and occupational risks in nursing in the Neonatal Intermediate Care area at a health institute in Lima 2020 [Internet] [Master's thesis]. [Lima, Peru]: César Vallejo University; 2020 [cited 2025 Feb 24]. Available from: https://repositorio.ucv.edu.pe/handle/20.500.12692/52041

20. Paliz C, Maracón C, Mazacón M, Suárez P. BIOSTATISTICS. Introduction to statistics in health sciences [Internet]. 1st ed. Guayaquil-Ecuador: BINARY; 2024 [cited 2025 Feb 24]. 214 p. Available from: https://binario.com.ec/wp-content/uploads/2024/01/Libro-Bioestadistica.pdf

21. Hernandez Á. Helsinki declaration: ethical principles of medical research with human beings. 2024 review. Primary Care Pediatrics [Internet]. 2024 Oct 1 [cited 2025 Feb 24];26(e917):439–43.Availablefrom: https://revmedmilitar.sld.cu/index.php/mil/article/view/76247