Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i8.7377

# RISK OF CARDIOVASCULAR DISEASE AMONG NURSES AND OTHER MEDICAL WORKERS WHO TEACH

**Dr. Faisal Saeed[1*], Araj Siddiqui[2], Aqsa Bintae Abid[3], Ahmed KE Khalifa[4], Dr. Avrina Kartika Ririe MD[5], Tariq Rafique[6]**

[1*]Doctor, HBS Medical and Dental College Islamabad, Pakistan
[2]Medical Officer, Department of Accident and Emergency and Critical Care, Bahria Town International Hospital, Pakistan
[3]Medical Officer, Department of OBS/Gynae, Darul Shifa General Hospital, Pakistan
[4]Faculty of Medicine, Ain Shams University, Egypt
[5]Department of Brain & Heart Center, Mohammad Hoesin General Hospital, Indonesia
[6]Assistant Professor Dadabhoy Institute of Higher Education, Karachi, Pakistan

***Corresponding author:** Dr. Faisal Saeed
*Doctor, HBS Medical and Dental College Islamabad, Pakistan

**ABSTRACT:**

**Background:** Approximately two million deaths occur annually due to cardiovascular diseases, predominantly affecting populations in low- and middle-income countries. This study aims to investigate the correlation between cardiovascular risk levels and occupational factors, specifically focusing on instructors at the Faculty of Health Sciences.

**Methods:** A total of 96 professors from the Faculty of Health Sciences participated in this relational, cross-sectional, non-experimental study. Individual cardiovascular risk levels were assessed, and statistical analysis, including the chi-square test with a 95% confidence interval and a significance level set at $p \leq 0.05$, was conducted to evaluate correlations between variables.

**Results:** The study revealed that a significant proportion of the investigated academics exhibited higher-than-recommended average total cholesterol levels (202.57 mg/dl), with lower cardiovascular risk being the predominant category. Statistical analysis confirmed a significant correlation between cardiovascular risk levels and the profession of educators at the Faculty of Health Sciences in labour duality demonstrated a greater disparity between low and moderate cardiovascular risk levels compared to their counterparts.

**Conclusion:** This study provides evidence of a statistically significant association between cardiovascular risk levels and the occupation of educators at the Faculty of Health Sciences. The findings underscore the importance of further research and targeted interventions to mitigate cardiovascular risks among this workforce demographic.

**KEYWORD**: The teaching profession, cardiovascular diseases, and the danger of cardiovascular risks, Statistical analysis, Chi-square test, Risk assessment, Educators, Cholesterol levels, Health interventions.

## INTRODUCTION:

Cardiovascular diseases (CVD) are the leading cause of death in the world, according to the Pakistan Health Organization (PAHO) (Nursing & Professions, 2014). These diseases are

responsible for 2 million fatalities each year, with 80 per cent of those deaths occurring in countries with low and middle incomes (Ockene & Miller, 1997). It is anticipated that mortality from cardiovascular disease will rise by 17% between the years 2025 and 2030 (Ockene & Miller, 1997). In addition to ischemic affections of the heart, cerebrovascular and blood vessel pathologies, such as hypertension and peripheral vascular disease, are among the most common types of pathologies (Hamner & Wilder, 2008). It is anticipated that cardiovascular illnesses will be responsible for 4.3 million fatalities in Pakistan in the year 2020 (Brownstein et al., 2005). Ischemic heart disease is the leading cause of mortality, accounting for 9.3% of all deaths, followed by cerebrovascular diseases, which accounted for 8.1% of all deaths. In the year 2020, cardiovascular disease was responsible for the deaths of 100,000 people in Latin America and the Pakistan which is almost half of the total deaths. Estimates that fatalities from cardiovascular diseases will continue to account for approximately fifty per cent of all deaths until the year 2025 when they will rise to thirty-four per cent of all deaths and then to thirty-seven per cent in the year 2030 (Lanuza et al., 2011). According to the STEPS study and the National Institute of Statistics and Censuses (INEC), the pattern is replicated in Ecuador (Deborah et al., 2021). The pattern is repeated in South America. As of the year 2019, (Lamin & Maduka, 2023). A percentage of the population from the age of 18 to 69 years old had three or more risk factors for cardiovascular disease, including the following: High blood pressure and cholesterol, hyperglycemia, and altered glucose levels are the most common types of patients who have this condition (Grundy et al., 1999). There have been several risk factors that have been described, including those that raise the likelihood of getting cardiovascular disease. When all of these components are considered in an evaluation that takes a global view, it will be possible to gain a reduction in risk if, in each instance, action is made synergistically on the many risk factors. Using algorithms such as the SCORE table, which has been calibrated for Spain, it is possible to estimate the mortality rate from atherosclerotic cardiovascular disease in ten years (Stewart Fahs & Kalman, 2008). These algorithms describe risk factors such as systolic blood pressure, total cholesterol, smoking, sex, and age. Other algorithms, such as REGICOR, take into account variables such as age, smoking habit, diabetes, total cholesterol and CHDL levels, systolic and diastolic blood pressure, and in some instances, risk factors such as family history, poor diet, lack of physical exercise, hypertension, and obesity are also taken into consideration (Riegel et al., 2017). It is vital to improve the evaluation of the RCVC to alleviate this problem. The RCVC is the possibility that a person would suffer from one of these pathologies within a predetermined amount of time (Toledo et al., 2024).

**Table 1: Global Mortality and Projections for Cardiovascular Diseases**

| Source | Information |
|---|---|
| Nursing & Professions, 2014 | CVD is the leading cause of death globally, responsible for 2 million fatalities annually. |
| Ockene & Miller, 1997 | 80% of CVD deaths occur in low and middle-income countries. |
| Ockene & Miller, 1997 | CVD mortality is expected to rise by 17% between 2025 and 2030. |
| Hamner & Wilder, 2008 | Common CVD types include ischemic heart disease, cerebrovascular diseases, hypertension, and peripheral vascular disease. |
| Brownstein et al., 2005 | CVD was responsible for 4.3 million deaths in Pakistan in 2020. |
| Lanuza et al., 2011 | CVD is expected to account for 50% of all deaths until 2025, rising to 34% in 2030. |
| Lamin & Maduka, 2023 | CVD was responsible for 100,000 deaths in Latin America and the Caribbean in 2020. |
| Deborah et al., 2021 | The pattern of CVD prevalence in Ecuador replicates global trends. |

**Table 2: Risk Factors for Cardiovascular Diseases**

| Source | Information |
|---|---|
| Grundy et al., 1999 | Common risk factors include high blood pressure, high cholesterol, hyperglycemia, and altered glucose levels. |
| Stewart Fahs & Kalman, 2008 | SCORE algorithm predicts atherosclerotic CVD mortality using factors like blood pressure, cholesterol, smoking, sex, and age. |
| Riegel et al., 2017 | REGICOR algorithm considers age, smoking, diabetes, cholesterol levels, blood pressure, and other risk factors. |
| Toledo et al., 2024 | RCVC probability of CVD is based on the number of risk factors present. |

**Table 3: Cardiovascular Risk Factors in Professional Context**

| Source | Information |
|---|---|
| Boutin-Foster et al., 2008 | Study on cardiovascular risk, profession, and work duality in the teaching profession. |
| Faculty of Health Sciences, 2021-2022 | Investigation into cardiovascular risk among teachers. |

This probability is primarily defined by the number of risk factors that are present in the subject. According to the Faculty of Health Sciences at the Universidad Técnica del Norte in Ibarra, 2021-2022, the purpose of this study is to investigate the relationship between the degree of cardiovascular risk, the profession, and the use of work duality in the teaching profession (Boutin-Foster et al., 2008).

**METHOD:** In the years 2021 and 2022, a study that was relational, cross-sectional, and non-experimental was conducted with a quantitative focus on the faculty members of the Faculty of Health Sciences at the Technical University of the North in Ibarra. The individuals who made up the study universe were professors working in the FCS of the UTN (106) (Williams et al., 2001). Consideration was given to them as criteria. Included in the study were instructors who were in a labour dependency connection with the UTN during the study period (Drew et al., 2004). These teachers ranged in age from 35 to 74 years old and provided their informed agreement to take part in the investigation (Mittelmark et al., 1986). Educators who disclosed that they had previously experienced a cardiovascular event, such as a heart attack or heart failure, were not permitted to participate. The sample consisted of 96 teachers once these criteria were applied; the participants included those who had been diagnosed with coronary heart disease as well as those who had lost their job relationship with the institution during the project's execution time (Mittelmark et al., 1986). For the purpose of the study, the following were identified as association variables: occupation and work duality; the level of cardiovascular risk was identified as a monitoring variable of interest. The Research Committee of the Faculty of Sciences at the University of the North of England Health was initially consulted to obtain approval for the project (Driggin et al., 2020). In conclusion, 96 educators participated in the study group. This information was gathered and stored in a database that was formatted in Excel. The procedure consisted of multiple processes, including the following: 1.- Identification of instructors by the use of their identity card numbers, age, gender, profession, habit of teaching, smoking, personal history of diabetes mellitus, and references to carrying out another job activity in addition to teaching at the UTN (whether or not it is relevant to the profession). 2. The monitoring of blood pressure was carried out with a manual blood pressure monitor of the Riester brand, following the conditions that are listed below: The patient was allowed to stay at rest for a minimum of five minutes before the administration of the test (Balady et al., 1998). The right arm was left exposed and put on a table in such a way that it was at the level of the heart and in a semi-flexed position (Bernard et al., 2009). With the hoses of the blood pressure monitor located on the inner side of the arm, the cuff was positioned approximately three centimetres above the crease of the elbow (Pearson et al., 2003). The systolic blood pressure (SBP) was initially determined by palpation of the radial artery. Subsequently, the cuff was inflated twenty millimetres of mercury (mmHg) above the SBP that was estimated by palpation. Finally, the cuff

was slowly deflated, and the systolic and diastolic pressures were recorded (Wold et al., 1999). 3. A sample of blood taken from the veins was used to determine the levels of total cholesterol as well as HDL cholesterol. Taken from each participant in the study, following the indications, a venous puncture was performed in the elbow fold, and a blood sample was placed in test tubes. Following the verification of the quality standards of the samples, the samples were processed in a clinical laboratory located in the city of Ibarra using an Automatic Biochemical Analyzer model TC 200 (Algamdi et al., 2022). 4. After that, the individual levels of global cardiovascular risk were estimated. This was accomplished by utilizing the Framingham Risk Assessment Scale, which was adapted from REGICOR and utilized in the Latin American population. This scale employs a scoring mechanism that is based on the following variables: age, sex, total cholesterol, HDL cholesterol, and total cholesterol (Ostrowski-Winkler, 2014). The coronary risk can be predicted in the next ten years based on factors such as systolic and diastolic blood pressure, smoking, and diabetes. With these factors, coronary death, angina pectoris, and acute myocardial infarction are all included in the cardiovascular risk (Jadhav & Devi, 2020). The percentage of cardiovascular risk is obtained through the use of the calculator that incorporates the Framingham function, which was developed by REGICOR. This percentage is then appraised qualitatively as follows: Cardiovascular risk is classified as high if it is equal to or greater than 20, medium if it is between 10 and 19, and low if it is between 0 and 9. In conclusion, the findings that were acquired from the estimation of the levels of cardiovascular risk were entered into the database that the researchers had intended to produce (Magnani et al., 2018). For the purpose of estimating the RCVC level and descriptively analyzing the phenomenon that was studied, the results that were obtained are presented in tables and graphs that summarize the information that was obtained through the survey, the determination of blood pressure, and the taking of a blood sample (Bonow et al., 2011). This information was obtained in order to obtain the figures of total cholesterol and HDL. Using summary measures, the mean, the standard deviation, frequencies, and percentages were applied in order to establish the descriptive analysis of the variables (Abrahams-Gessel, 2016). Excel 2016 and the statistical program (SPSS) version 22 were utilized in order to analyze the data, which enabled the ordering and interpretation of the analysis of the data that was entered. In order to assess the correlation between variables, the Chi Square statistical test was employed, taking into account a confidence interval of 95% and a p value that was less than or equal to 0.05. Respecting the right to autonomy and the adoption of informed decisions, the research was developed in line with the authorities of the Ministry of Public Health and the Organic Health Law, and it was developed in accordance with the ethical standards that were established by the code of professional ethics.

**RESULT:** As shown in Table 1, the majority of the participants are of the female gender, accounting for 79.2%, and certified teachers are nursing professionals, accounting for 46.9%. It was found that 57.3% of the population that was surveyed had dual employment; this means that teachers who, in addition to teaching, provided services to students also had dual employment. It provides professional services in hospitals as well as private consultations in a variety of medical specialities.

This table presents the population's distribution according to profession, dual employment, and gender by profession.

| Characteristics of the sample | | NO | % | accumulation of percentage |
|---|---|---|---|---|
| The occupation | The physician | 26 | 27,1 | 27,1 |
| | Earning a nursing degree | 45 | 46,9 | 74,0 |
| | Obtaining a degree in nutrition | 12 | 12,5 | 86,5 |
| | Master of Science in Physical Therapy | 13 | 13,5 | 100,0 |
| | Iteration of labor | 55 | 57,3 | 57,3 |
| | It's true. | 41 | 42,7 | 100,0 |
| sex | Female | 20 | 20,8 | 20,8 |
| | Male | 76 | 79,2 | 100 |

The total cholesterol levels of the FCSS teachers were found to have an average of 202.57 mg/dl, with a standard deviation of +/- 47.75820 mg/dl. This information is displayed in Graph 1. As evidenced by the standard deviation, this average is slightly higher than the target values of 200 mg/dl; nonetheless, it can still be considered to be at the upper end of the normal range. This is because the target values are set at 200 mg/dl.

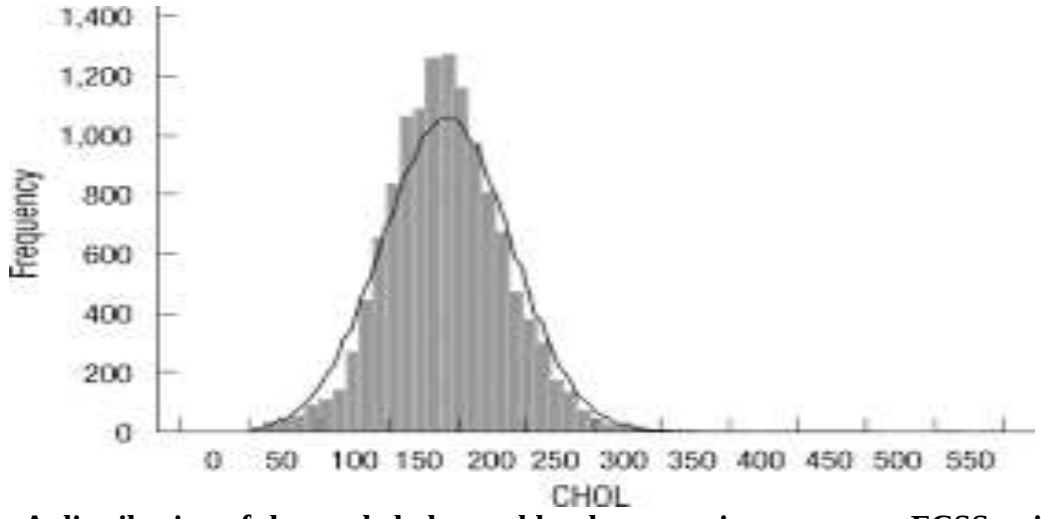



**Figure 1: A distribution of the total cholesterol levels among instructors at FCSS universities**

Graph 2 displays the HDL cholesterol levels that were measured in the female group that was considered for this study. Assuming As a point of reference to the required values (50 mg/dl), we can confirm that the average HDL cholesterol of the female FCS teachers is 44.57 mg/dl, with a standard deviation of +/- 7.9 mg/dl, indicating levels that are lower than the desired values. Wanted, which is a factor that is taken into consideration as an essential component in the assessment of possible cardiovascular risk.

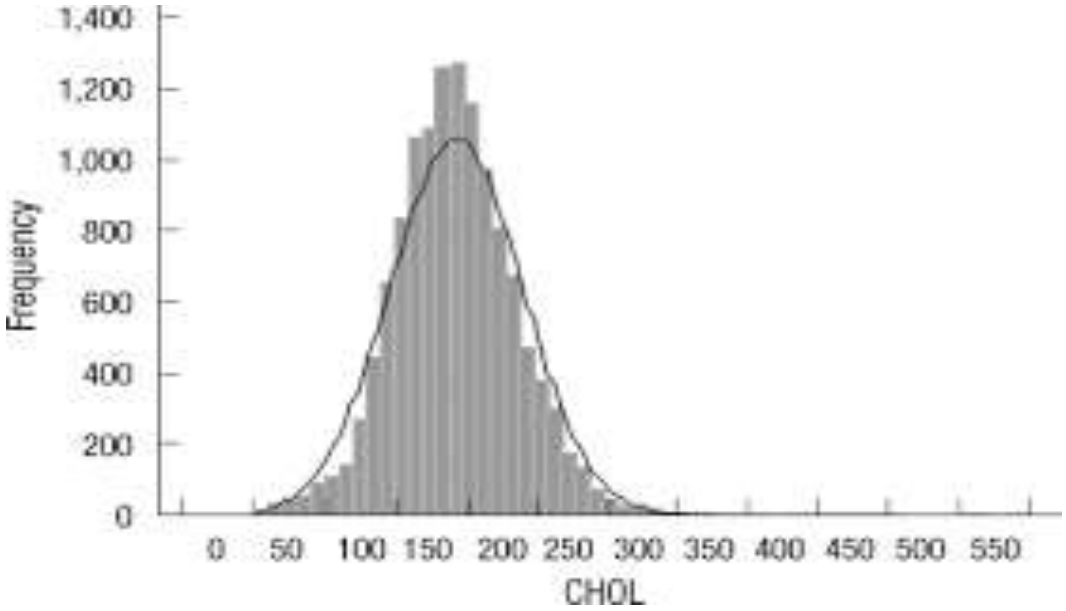
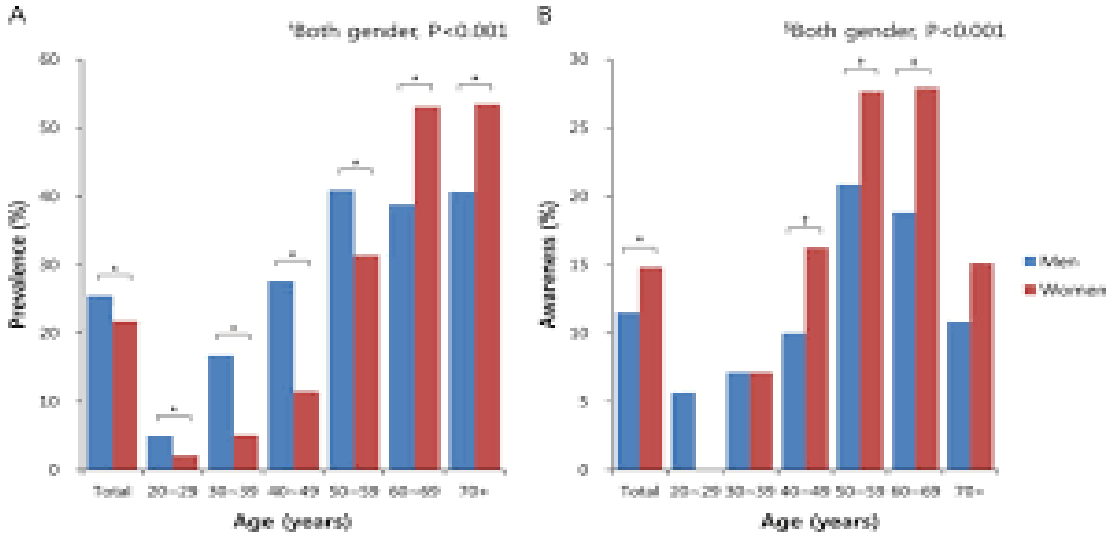



**Chart 2: The distribution of high-density lipoprotein cholesterol levels among female educators**

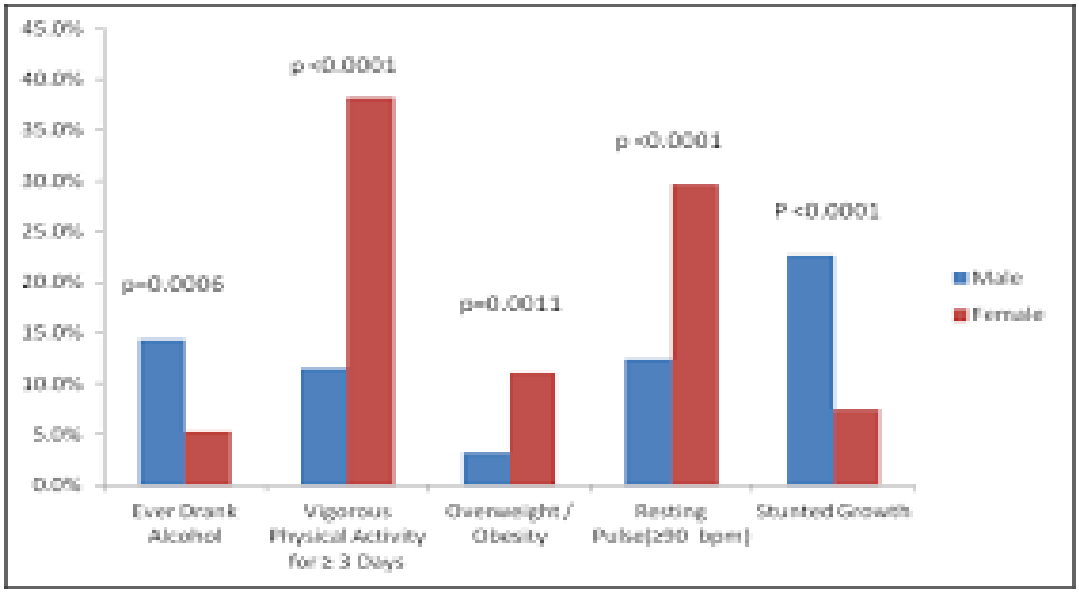
The levels of HDL cholesterol that were obtained by the male population that was investigated are shown in Graph 3. The minimal value for men is 40 mg/dl, which means that the average HDL cholesterol represented is 37.41 mg/dl, with a standard variation of +/- 9.03 mg/dl. This information suggests that lower values are present. In comparison to individuals who are deemed to be normal,

this results in an increased likelihood of suffering from coronary heart disease. There is a higher dispersion of HDL values among males, which indicates that there is a greater concentration of these among women, which is seen in Graphs 2 and 3. The data obtained in men deviate to a greater extent, which indicates that there is a greater concentration of these among women.



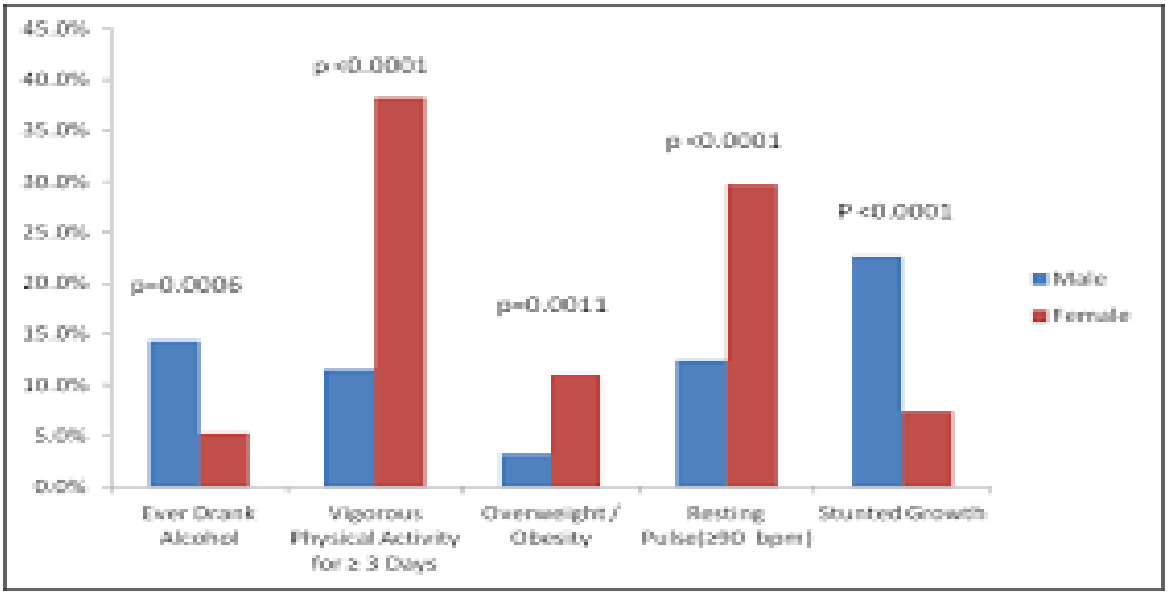

**3. The distribution of high-density lipoprotein cholesterol values among male educators**

Based on the calculation of the RCVC that was carried out using the calculator with the Framingham function that was derived from REGICOR, it was determined that no FCS instructor possesses a high level of RCVC, only 30.2% of teachers demonstrate a medium level, and the majority of teachers, which is represented by 69.2%, demonstrate a low-risk level. When the association between the degree of RCVC and the occupation is taken into consideration, According to the data presented in Graph 4, the medium CRVC level is more prevalent among physiotherapists (27.6%) than the low-risk level (7.5%). The results of the Medicine and Nursing careers are comparable; the low level that prevails among its teachers is Medicine with 31.3% and Nursing with 52.2% respectively; the behaviour of graduates in Nutrition is different from that of the rest of the FCSS professionals since the medium and low CRVC levels are divided equally, with 50% for each one. According to the results of the Chi-Square test that was performed on this data, there is a statistically significant correlation between the level of RCVC and the profession of the UTN FCS teachers. This conclusion was reached with a level of confidence of 95%.



The graphical representation of the correlation between the level of cardiovascular risk and the profession.

A preponderance of low RCVC, which corresponds to 69.8%, is depicted in Graph 5, which shows all of the teachers that were studied. It is important to emphasize that the difference in the number of instructors with a level of low and medium RCVC among those who practice dual employment is far bigger than the difference that exists between both levels of dual employment. This phenomenon is true regardless of whether or not the teachers engage in dual work. The information that was analyzed using the Chi-square test reveals that the variables level of CVR and employment duality are strongly connected, with a confidence level of 95%. This is the case, particularly for teachers who do not work in two different institutions.




**Graph 5. Relationship of the level of cardiovascular risk according to dual employment**

**DISCUSSION:** As per the data published by the World Health Organization (WHO), cardiovascular diseases are regarded as one of the primary causes of morbidity and mortality. According to the findings of the current research, the relationship between RCVC, profession, and work duality was investigated in 96 educators who were employed by the Faculty of Health Sciences. When it comes to the UTN FCS teachers that were investigated, most of them were of the female gender, and the majority of them were nursing professionals. Dual employment is a widespread practice among professionals working in the health sciences. These specialists, in addition to devoting their careers to improving the health of the general population, also ensure their replacement by providing instruction to younger generations. According to the information provided by the same survey, teaching is a dual activity that is present in the majority of careers, particularly in the health sector. It was determined that the average value of total cholesterol was 202.57 mg/dl, which is considered to be among the highest normal values. In the study that was conducted in 2019 and published by the Colombian Journal of Cardiology on the determination of cardiovascular risk in a population that was comparable to the prototype of the present investigation, the mean levels of total cholesterol were 216.18 mg/dl, which was also over the normal range. (9) According to Velez and Álvarez, in a study on risk factors cardiovascular and associated variables, a higher risk of suffering from a cardiovascular pathology was found in individuals aged 20 to 79 years in Manizales, Colombia. Following the determination of an average of 211.6 mg/dl, with a deviation standard of ±42.4 mg/dl in total cholesterol and 45.67 mg/dl with a standard deviation of ±11.87 mg/dl in HDL cholesterol, the researchers found values that were comparable to those found in the study subjects of the FCS of the UTN. (8,10) The mean HDL cholesterol values that were calculated in the female and male groups that were analyzed were found to be much lower than what was desired. Accordingly, a study that was conducted by Cabrera and Aguinaga at the Private University

of Lambayeque in Madrid, Spain, concerning the determination of cardiovascular risk, states that the results of the average HDL cholesterol levels, which are below normal ranges, further conclude that the HDL value in males and females is not a determining factor in the frequency of cardiovascular risk. This is in contrast to what was proposed by multiple bibliographies that were analyzed. (Ten, Eleven) Similar findings were found in a study that was published in the Cuban Journal of Public Health in the year 2020. The study was titled "Vascular risk values of metabolic indicators in a young and older population, which show HDL cholesterol values with frequencies considered risk." In other words, the findings that were presented describe a high prevalence of presenting cardiovascular risk with several lipid indicators, including HDL lipoprotein value. When the cardiovascular risk level of the people who participated in the study was estimated, it was discovered that none of them had a high level. Instead, the low level was the most prevalent, accounting for 69.2% of the total. This finding is in agreement with the authors who were contacted, who stated that the series that was investigated had a majority of individuals who had a low cardiovascular risk. How the amount of CVR is related to the interaction between According to the profession, it demonstrated a statistically significant correlation, with the Physical Therapy profession being the most prominent example. The medium level was higher than the low level; among nutritionists, there was a clear equilibrium between the two levels; nevertheless, in the fields of medicine and nursing, the low level was higher than the medium level. Take into consideration the high level of knowledge that the health professionals possess concerning all of the behaviours that raise the likelihood of getting a cardiovascular illness. This is possible since none of the people who participated in the study displayed a high degree of risk. The figure that was obtained by the study in Physiotherapist and Nutritionist teachers is high. This is, even more, the case when we take into consideration the fact that the participants in the present investigation of these specialities are the youngest in the series that was studied. This could potentially mean that there is a lower frequency of associated pathologies and the practice of healthy lifestyles. When it comes to nursing professionals, the findings are consistent with those discovered in the literature that was reviewed. In addition, they expressed the prevalence of a low level of RCVC (51.4%), which is equivalent to the teachers of the FCS of the UTN, who express a value of 69.2% at this level. Conducted a study in Bogotá on cardiovascular risk profiles, but they did not find anywhere in the population that they studied to have high levels of cardiovascular risk. This finding coincides with the current research. Several authors concur with the findings of this research work, Álvarez and Ochoa conducted a study that focused on the factors that contribute to cardiovascular risk in health professionals. Their findings demonstrate that, within the various fields of health, human resources possess distinct characteristics and risk factors. These differences are influenced by factors such as shifts of work, hours spent in operational units, and whether or not they carry out their work in two or three different institutions.

According to Álvarez, who revealed a prevalence of low and intermediate risk in the population investigated in both sexes using multiple prediction measures, the results obtained are in agreement with those given by Álvarez. It is common knowledge that employment can influence behavioural changes in a variety of areas, including dietary habits, levels of physical activity, and stress levels, among other things; these behaviour changes can either promote or inhibit the development of cardiovascular illnesses. The physical exercise that generates work dualism vs the sedentary activity of the teaching work are components that should be taken into consideration in the results that were achieved. This is the case even though the stress that creates work overload can come across as a contradictory factor. A high percentage of CRVC level was found in workers who work professionally in two institutions, according to a study that was developed in workers who are sensitive to cardiac pathologies in 2019. The findings of this study were justified by the presence of comorbidities of cardiovascular origin and the predisposition to sustained stressful events. The study was published in the Journal of Public Health in 2019.

## CONCLUSION:

That there is a statistically significant link between the degree of CRVC and the profession of UTN FCS teachers was proved by the fact that this association was found to exist. When compared to those who are in a relationship, the number of professionals who engage in dual employment and who have a low to moderate risk of cardiovascular disease is significantly higher. The utilization of labour reliance inside a single establishment proves a connection between these variables.

## REFERENCE.


1. Abrahams-Gessel, S. (2016). *An examination of the ability of community health workers to effectively conduct community-based screening for cardiovascular disease in South Africa, Guatemala, and Mexico* Boston University].
2. Algamdi, A. A., Alrowili, S. H., Al Dawsri, W. M., Alonazi, S. L., Aldawsari, A. S., Alaslab, H. F., Alabead, H. R., Alahmari, S. A., Albarrak, N. S., & Alrugaib, H. M. (2022). PREPARING NURSES FOR LEADERSHIP POSITIONS IN THE PREVENTION OF CARDIOVASCULAR DISEASE. *Chelonian Research Foundation*, *17*(2), 1377-1388.
3. Balady, G. J., Chaitman, B., Driscoll, D., Foster, C., Froelicher, E., Gordon, N., Pate, R., Rippe, J., & Bazzarre, T. (1998). Recommendations for cardiovascular screening, staffing, and emergency policies at health/fitness facilities. *Circulation*, *97*(22), 2283-2293.
4. Bernard, S. L., Lux, L., & Lohr, K. N. (2009). *Healthcare delivery models for prevention of cardiovascular disease (CVD)*. Health Foundation.
5. Bonow, R. O., Mann, D. L., Zipes, D. P., & Libby, P. (2011). *Braunwald's heart disease e-book: A textbook of cardiovascular medicine*. Elsevier Health Sciences.
6. Boutin-Foster, C., George, K. S., Samuel, T., Fraser-White, M., & Brown, H. (2008). Training community health workers to be advocates for health promotion: Efforts taken by a community-based organization to reduce health disparities in cardiovascular disease. *Journal of Community Health*, *33*, 61-68.
7. Brownstein, J. N., Bone, L. R., Dennison, C. R., Hill, M. N., Kim, M. T., & Levine, D. M. (2005). Community health workers as interventionists in the prevention and control of heart disease and stroke. *American journal of preventive medicine*, *29*(5), 128-133.
8. Deborah, N. T., Eze, N. C., Christian, E. I., & Fortune, C. A. (2021). Knowledge and Compliance with Preventive Measures of Cardiovascular Diseases among Health Workers in the University of Port Harcourt Teaching Hospital, Port Harcourt. *Journal of Complementary and Alternative Medical Research*, *12*(3), 52-61.
9. Drew, B. J., Califf, R. M., Funk, M., Kaufman, E. S., Krucoff, M. W., Laks, M. M., Macfarlane, P. W., Sommargren, C., Swiryn, S., & Van Hare, G. F. (2004). Practice standards for electrocardiographic monitoring in hospital settings: an American Heart Association scientific statement from the Councils on Cardiovascular Nursing, Clinical Cardiology, and Cardiovascular Disease in the Young: endorsed by the International Society of Computerized Electrocardiology and the American Association of Critical-Care Nurses. *Circulation*, *110*(17), 2721-2746.
10. Driggin, E., Madhavan, M. V., Bikdeli, B., Church, T., Laracy, J., Biondi-Zoccai, G., Brown, T. S., Der Nigoghossian, C., Zidar, D. A., & Haythe, J. (2020). Cardiovascular considerations for patients, health care workers, and health systems during the COVID-19 pandemic. *Journal of the American College of Cardiology*, *75*(18), 2352-2371.
11. Grundy, S. M., Pasternak, R., Greenland, P., Smith Jr, S., & Fuster, V. (1999). Assessment of cardiovascular risk by use of multiple-risk-factor assessment equations: a statement for healthcare professionals from the American Heart Association and the American College of Cardiology. *Circulation*, *100*(13), 1481-1492.
12. Hamner, J., & Wilder, B. (2008). Knowledge and risk of cardiovascular disease in rural Alabama women. *Journal of the American Association of Nurse Practitioners*, *20*(6), 333-338.

13. Jadhav, K. E., & Devi, S. (2020). Effectiveness of Video-Assisted Teaching Program Regarding Risk Factors of Cardiovascular Diseases on Knowledge, Attitude, and Practice among IT Professionals. *Indian Journal of Forensic Medicine & Toxicology*, *14*(4).
14. Lamin, F. A., & Maduka, O. (2023). 10-year predicted cardiovascular disease risk among clinical health workers in the University of Port Harcourt Teaching Hospital. *Sierra Leone Journal of Biomedical Research*, *14*(2), 26-37.
15. Lanuza, D. M., Davidson, P. M., Dunbar, S. B., Hughes, S., & Geest, S. D. (2011). Preparing nurses for leadership roles in cardiovascular disease prevention. *Pakistan Journal of Cardiovascular Nursing*, *10*(2_suppl), S51-S57.
16. Magnani, J. W., Mujahid, M. S., Aronow, H. D., Cené, C. W., Dickson, V. V., Havranek, E., Morgenstern, L. B., Paasche-Orlow, M. K., Pollak, A., & Willey, J. Z. (2018). Health literacy and cardiovascular disease: fundamental relevance to primary and secondary prevention: a scientific statement from the American Heart Association. *Circulation*, *138*(2), e48-e74.
17. Mittelmark, M. B., Luepker, R. V., Jacobs, D. R., Bracht, N. F., Carlaw, R. W., Crow, R. S., Finnegan, J., Grimm, R. H., Jeffery, R. W., & Kline, F. G. (1986). Community-wide prevention of cardiovascular disease: education strategies of the Minnesota Heart Health Program. *Preventive Medicine*, *15*(1), 1-17.
18. Nursing, W. G. o. t. E. C. o. t. E. C. o. C., & Professions, A. (2014). Education for nurses working in cardiovascular care: a Pakistanan survey. *Pakistan Journal of Cardiovascular Nursing*, *13*(6), 532-540.
19. Ockene, I. S., & Miller, N. H. (1997). Cigarette smoking, cardiovascular disease, and stroke: a statement for healthcare professionals from the American Heart Association. *Circulation*, *96*(9), 3243-3247.
20. Ostrowski-Winkler, L. A. (2014). The effects of education on cardiovascular disease knowledge.
21. Pearson, T. A., Bazzarre, T. L., Daniels, S. R., Fair, J. M., Fortmann, S. P., Franklin, B. A., Goldstein, L. B., Hong, Y., Mensah, G. A., & Sallis Jr, J. F. (2003). American Heart Association guide for improving cardiovascular health at the community level: a statement for public health practitioners, healthcare providers, and health policymakers from the American Heart Association Expert Panel on Population and Prevention Science. *Circulation*, *107*(4), 645-651.
22. Riegel, B., Moser, D. K., Buck, H. G., Dickson, V. V., Dunbar, S. B., Lee, C. S., Lennie, T. A., Lindenfeld, J., Mitchell, J. E., & Treat-Jacobson, D. J. (2017). Self-care for the prevention and management of cardiovascular disease and stroke: A scientific statement for healthcare professionals from the American Heart Association. *Journal of the American Heart Association*, *6*(9), e006997.
23. Stewart Fahs, P., & Kalman, M. (2008). Matters of the heart: cardiovascular disease and rural nursing. *Annual Review of Nursing Research*, *26*.
24. Toledo, N. d. N., Almeida, G. S. d., Silva, N. C. d., Coimbra, L., Monteiro, S. A., Bitar, A. C. O., Homem, F. d. B., & Brito, I. (2024). Cardiovascular Risk and Lifestyle: comparison between teaching workers in Portugal and Brazil. *Revista Brasileira de Enfermagem*, *77*(2), e20230354.
25. Williams, A., Mason, A., & Wold, J. (2001). Cultural sensitivity and daycare workers: an examination of a worksite-based cardiovascular disease prevention project. *Aaohn Journal*, *49*(1), 35-43.
26. Wold, J. L., Williams, A., & Kobaladze, A. (1999). Health Risks of Health Care Workers: Health Risks of Health Care Workers: Health Risk Appraisal Results from the Newly Independent Country of Georgia. *Aaohn Journal*, *47*(4), 151-155.