

RESEARCH OFFICE Adventist University of the Philippines www.aup.edu.ph/urc/heatth-sciences

JOURNAL OF HEALTH SCIENCES

Vol. 3 No. 2 December 2020

ISSN 2599-5456

A Peer-Reviewed Journal Published Bi-annually by the Adventist University of the Philippines



Mediating Effect of Burnout on the Relationship Between Organizational Factors and Quality of Work Life Among Employees of Selected Sectarian Educational Institutions in Cavite

Rosemalyne H. Byram, April M. Obon and Rowena Ramos

Cardiovascular Disease Risk Factors and Health Status of Senior Citizens in Unisan, Quezon: Basis for a Lifestyle Modification Program Bevry Stefanie E. Tan and Mary Jane Botabara-Yap

"Floating on Cloud 9": Factors Influencing the Use of E-Cigarettes Garee Austen G. Recto and Mary Jane Lourdes Gayadan

Effectiveness of Mentawan Leaves (Poikilospermum suaveolens) as Mosquito Larvicide Azielyn F. Faderogaya, Kurt G. Galus and Pamela O. Nicol

Effects of Short-Term Lifestyle Intervention Program on the Anthropometrics, Biomarkers, Caloric Intake, and Physical Activity of Health workers: A Pilot Study Maria Cecilia B. Torres and Milagros T. Leano

Coping with Coal: Exploring the Experience of Communities Near a Coal-Fired Power Plant-Basis for a Module on COmmunity Capacity Building Program Mary Jane Botabara-Yap, Marife M. Villamiel, Zenaida D. Willison and Mechelle A. Palma

Effects of Acute, Strenuous Exercise on Platelet Count and Bleeding Time Among Women

Princess Red Rose G. Rodriguez, Davielle Mae C. Gobi and Sarah Nicole Aurea P. Merino and Leothel Jane B. Sulteras

The Influence of Resilience Towards Professional Burnout Among Registered Nurses Fiskvik Boahemaa Antwi, Simon Akwasi Osei, Arlidette Myrizel O. Reyes, Reynito D. Reyes Jr., Karen Ablola, Karen Wu, Dina D. Galang and Beryl Ben C. Mergal

Dental Needs Assessment and DMFT Rates of Students from School for the Deaf: Basis for the Development of an Oral Health Promotion Tool

Vivien Lou L. Desabille, Lyke Joy P. Halasan, Karissa D. Pajares, Nhelsar Mel V. Sarmiento, Riomel A. Aguilera, Lychel Lee R. Gabuco, Deborah Cynthia T. Gatchalian, Magda Georgetta R. Resontoc, Herminiano I. Subido Jr., and Lorcelie B. Taclan

Comparing the Effects of Re-Centrifugation with Rimming, Without Rimming, and Preliminary Pipetting of Serum of Blood Samples on the Risk of Hemolysis Bebien Mae Christel P. Andio, Laura Lee S. Clifford, Shanygne R. Paso and Yanna Yvonne C. Macayan

JOURNAL OF HEALTH SCIENCES

Volume 3 | Number 2 December 2020

A Peer-Reviewed Journal Published Bi-annually by Adventist University of the Philippines

Copyright ©2020 by Adventist University of the Philippine Printing Press

All rights reserved

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without permission in writing from the publisher.

PRINTED IN THE PHILIPPINES

ISSN 2599-5456



Adventist University of the Philippines Puting Kahoy, Silang, Cavite, Philippines www.aup.edu.ph/urc/health-sciences

Managing Editor

Beryl Ben C. Mergal, RN, Ph.D, Research Consultant, Research Office, Adventist University of the Philippines

Book Review Editors

Jolly S. Balila, Ph.D, Director, Research Office, Adventist University of the Philippines **Vicky C. Mergal, Ph.D**, Asst. VP for Academics/CGS, Adventist University of the Philippines

Editorial Advisers

Miriam P. Narbarte, Ph.D, Vice-President for Academics, Adventist University of the Philippines Susy A. Jael, RN, Ph.D, Dean, College of Nursing, Adventist University of the Philippines Herminiano Subido Jr., DDM, MPh, Dean, College of Dentistry, Adventist University of the Philippines Miriam R. Estrada, Dr.PH, Dean, College of Health, Adventist University of the Philippines

Copy Editor

Arjem Noryn Caringal-Agum, LPT, Editor, Research Office, Adventist University of the Philippines

Layout Artist Beryl Ben C. Mergal, RN, Ph.D

Peer Reviewers

Zenaida Agngarayngay, Ph.D, Mariano Marcos State University Zenaida Delica-Willison, MPH, Center for Disaster Preparedness Michael Joseph S. Diňo, RN, Ph.D, Our Lady of Fatima University Doreen Domingo, Ph.D, Mariano Marcos State University Albert Hutapea, Ph.D, Universitas Advent Indonesia Caroline Katemba, Ph.D, Universitas Advent Indonesia Jimmy Kijai, Ph.D, Andrews University Ronny Kontour, Ph.D, Binus University Ronald Mataya, MD, Loma Linda University Edward Nathan, Penang Adventist Hospital Fred B. Ruiz, Ph.D, Our Lady of Fatima University Gina Siapco, Dr.PH, Loma Linda University

Research Council

Jolly S. Balila, Ph.D, Director, Research Office, Research Consultant for Accountancy, Business Administration, IT,Office Administration, Library Science, MBA, PhD-Commerce
Lorcelie B. Taclan, Ph.D Research Consultant for Experimental Researches, Dentistry, Nutrition, Medical Technology, Biology, Chemistry, Math, ECE/ET, DOST Projects
Beryl Ben C. Mergal, RN, Ph.D, Chair, Ethics Review Board, Research Consultant, Dentistry, BS Nursing, MS Nursing, Medical Technology, Nutrition, Master in Public Health, Doctor of Public Health
Sabina B. Pariñas, RN, PhD, Research Consultant, Institutional Research and Theology
Arjem Noryn Caringal-Agum, LPT, Editor, Research Consultant, Education

Ethics Review Board

Beryl Ben C. Mergal, RN, Ph.D, Chair, Research Consultant, Research Office
Jolly S. Balila, Ph.D, Member, Director, Research Office
Doris A. Mendoza, M.D. Member, Dean, College of Medicine
Rico T. Javien, Ph.D, Member, Faculty, College of Theology
Jesse Songcayawon, Ph.D, Member, Faculty, College of Arts and Humanities
Jacqueline G. Polancos, RN, Dr.Ph, Member, College of Nursing
Myrtle C. Orbon, Member; Faculty College of Arts and Humanities
Giselle Lou C. Fugoso, Member; Faculty, College of Business

Journal of Health Sciences

Volume 3 | Number 2 December 2020

Table of Contents

Mediating Effect of Burnout on the Relationship Between Organizational Factors and
Quality of Work Life Among Employees of Selected Sectarian Educational Institutions in Cavite
Roseniaryne n. Byrani, April M. Obon and Rowena Ramos
Cardiovascular Disease Risk Factors and Health Status of Senior Citizens in Unisan, Quezon: Basis for a
Lifestyle Modification Program
Bevvy Stefanie E. Tan and Mary Jane Botabara-Yap
"Floating on Cloud 9": Factors Influencing the Use of E-Cigarettes
Garee Austen G. Recto and Mary Jane Lourdes Gayadan
Effectiveness of Mentawan Leaves (Poikilospermum suaveolens) as Mosquito Larvicide
Azielyn F. Faderogaya, Kurt G. Gatus and Pamela O. Nicol
Effects of Short-Term Lifestyle Intervention Program on the Anthropometrics, Biomarkers,
Caloric Intake, and Physical Activity of Health workers: A Pilot Study
Maria Cecilia B. Torres and Milagros T. Leano
Coping with Coal: Exploring the Experience of Communities Near a Coal-Fired Power Plant-Basis for a
Module on COmmunity Capacity Building Program
Mary Jane Botabara-Yap, Marife M. Villamiel, Zenaida D. Willison and Mechelle A. Palma
Effects of Acute, Strenuous Exercise on Platelet Count and Bleeding Time Among Women
Princess Red Rose G. Rodriguez, Davielle Mae C. Gobi and Sarah Nicole Aurea P. Merino and Leothel Jane B. Sulteras
The Influence of Resilience Towards Professional Burnout Among Registered Nurses
Dental Needs Assessment and DMFT Rates of Students from School for the Deaf: Basis for the
Development of an Oral Health Promotion Tool
Vivien Lou L. Desabille, Lyke Joy P. Halasan, Karissa D. Pajares, Nhelsar Mel V. Sarmiento, Riomel A. Aguilera, Lychel Lee R. Gabuco, Deborah Cynthia T. Gatchalian, Magda Georgetta R. Resontoc, Herminiano I. Subido Jr., and Lorcelie B. Taclan
Comparing the Effects of Re-Centrifugation with Rimming, Without Rimming,
and Preliminary Pipetting of Serum of Blood Samples on the Risk of Hemolysis

Mediating Effect of Burnout on the Relationship Between Organizational Factors and Quality of Work Life Among Employees of Selected Sectarian Educational Institutions in Cavite

Rosemalyne H. Byram, April M. Obon and Rowena A. Ramos Adventist University of the Philippines

amobon@aup.edu.ph

Abstract

urnout is not only an alarming issue in the Philippines, but it has become a global phenomenon. Literatures indicate link between organizational factors, burnout and job satisfaction, yet, studies on the role of burnout in the relationship between organizational factors and quality of work life has not been sufficiently explored. Thus, the study determined the mediating role of burnout on the relationship between organizational factors and quality of work life of employees. This descriptive-correlational study was conducted to 151 employees from selected sectarian educational institutions in Cavite using purposive sampling. They answered adapted and modified questionnaires on Organizational factors, Copenhagen Burnout Inventory, and Work-Related Quality of Life (WRQoL) Scale. Data gathered were analyzed using descriptive and inferential statistics such as mean, standard deviation, Pearson's correlation coefficient, analysis of variance (ANOVA), and Smart PLS as an approach for SEM. The results revealed high level of organizational factors and quality of work life and low level of burnout. There was a positive correlation between organizational factors and quality of work life while, there was negative correlation between organizational factors and burnout and between burnout and quality of work life. Furthermore, there was no significant difference in the quality of work life when age, gender, marital status, educational attainment, employment status, job type, and years of tenure were considered. Lastly, burnout partially mediates the relationship between organizational factors and quality of work life. The study demonstrated that a positive perception on organizational factors has better quality of work life and low level of burnout.

Keywords: organization, stress, structural equation model

Organizations hire quality employees to provide quality output to achieve organizational success. On this matter, organizational factors are commonly associated to employee's burnout (Ghavidel et al., 2019; Ochoa, 2018) and quality of work life (Leitao et al., 2019). Saleem and Sumaya (2015) considered organizational factors as the cornerstone in achieving psychological and professional security at work reflected in job performance both quantitatively and qualitatively. Additionally, organizations who constantly scan for opportunities, experimentation and flexible organizational design allows managers to keep firms open to multiple possibilities and allows exploration to foster innovations (Urban, 2017). It is also specified that leadership, task requirements and individual skills or abilities, work climate organizational system, and individual values and beliefs are the best employee perception on the organization that should be instilled in each employee (Dapula & Castano, 2017; Harder et al., 2015). The studies implied the need to put importance on the development of best approach on organizational factors to avoid employee burnout and attract employees to stay committed and grow internally and externally. Burnout is not only an alarming issue in the Philippines, but it has become a global phenomenon in the modern world and deemed to be a chronic reaction to prolonged emotional and relational stressors at work (George & Reves, 2017). Globally, about 264 million suffer from depression associated with burnout and it is recognized as an occupational threat (Maslach & Leiter, 2016). Over the years, research showed that burnout may perhaps initiate a lot of organizational risk factors in different occupations in countries across the world (Maslach & Leiter, 2016). It has been proven that with higher levels of stress and fatigue among employees, there is subsequent lower quality of work life and low level of perceptions towards their organization (Leitao et al., 2019). Moreover, the role of burnout in relation to organizational factors and quality of work life of employees can be as important as the purpose of the organization as a whole because burnout can cause significant problem among employees where it does not only negatively influence the quality of work life but high levels of burnout can also have deleterious effects on the physical and mental well-being of employees (Green, 2014). Maslach and Leiter (2016) also mentioned that employees with a sustainable and manageable workload are more likely to experience job engagement and are effective in their work areas. It is, therefore, relevant for institutions to create quality standards for their employees for with these standards, quality of work life is imminent.

Quality of work life (QoWL) is defined as the employee's perceptions of how work conditions in an organization can satisfy their personal and work needs while achieving the organization's goals (Ogbuabor & Okononkwo, 2019). Fontinha et al. (2018) define quality of work life as part of the overall quality of life that is influenced by work. Literatures have emphasized that employees aspire for quality of work life along with changes of work culture, traditional work concept while meeting the basic needs of people (Duyan et al., 2013). A study in Nigeria by Ogbuabor and Okononkwo (2019) wrote that improving employee wellbeing and organizational performance are the focus of quality of work life. This concept basically pronounces the way by which an organization can safeguard the holistic wellbeing of an employee rather than only concentrating on job-related features, organizational and personal relations, and work life stability (Kelbiso et al., 2017). It appears that quality of work life, as well as their commitment to the organization they are in.

Literatures indicate link between organizational factors, burnout and job satisfaction, and the effects of burnout to employees; yet studies on the role of burnout in the relationship between organizational factors and quality of work life has not been sufficiently explored. Thus, the study was conducted to address the lack of literature on the mediating role of burnout on the relationship between organizational factors and quality of work life and it has not been sufficiently explored in the Philippines. The study determined the mediating role of burnout on the relationship between organizational factors and quality of work life of employees in selected sectarian educational institutions in Cavite. The study sought to determine the level of organizational factors, burnout, and quality of work life among the respondents; the relationship between organizational factors and quality of work life, and organizational factors and quality of work life, and organizational factors and quality of work life when age, gender, marital status, educational attainment, employment status, job type, and years of tenure are considered; and the mediating role of burnout on the relationship between organizational factors and quality of work life.

Methodology

Research Design

The study used quantitative research design specifically, descriptive correlational. Descriptive-correlational method describes the relationship between two variables and examine the relation between them. This study is descriptive as it described the level of organizational factors, burnout, and quality of work life of the employees. Correlational design was used to determine the relationship between organizational factors as independent variable, quality of work life as dependent variable, and burnout as mediating variable.

Population and Sampling

Through purposive sampling, 151 employees from two sectarian educational institutions in Cavite were selected. The respondents of the study were employees of sectarian educational institutions for at least one year and has the ability to answer questionnaire. Employees who were uncooperative and with unstable cognition were excluded in this study. Of the 151 respondents, 50 (33.11%) belong to 24-40 years old, 48 (31.79%) are between 41-52 years old, and 53 (35.10%) belong to 53-64 years old. There are 50 (33.11%) males and 101 (66.89%) are females. The largest part of the respondents is married (124) which accounts 82.12% of the population, while 23 (15.23%) are single, and 4 (2.65%) are widowed. With educational attainment, 29 (19.21%) respondents are doctoral degree holder, 72 (47.68%) are master's degree holder, 48 (31.79%) are college graduates, 2(1.32%) are others. Among the 151 employees who participated in the study 139 (92.05%) are regular employees and 12 (7.95%) are probationary. With the years of tenure, 53 (35.10%) employees are serving their institution for 1-10 years, 50 (33.11%) are between 11-20 years, and 48 (31.79%) are between 21-45 years.

Instrumentation

Adapted and modified questionnaires from different authors was used for this study and have distributed through online form. The researcher acquired permission from the authors of the questionnaires to adapt their questionnaires and informed them that the researcher modified some of the items to fit the study. The instrument was divided into four parts.

The first part of the instrument is the demographic profile of the respondents which include the age, sex, marital status, educational attainment, employment status, job type, and years of tenure.

The second part of the instrument is organizational factors with seven variables and composed of 66 items. This was adapted and modified from the study of Harder et al. (2015) and added other items from previous studies (Jomah, 2017; Sheikh, 2020; Vveinhardt & Gulbovaite, 2015; Zhang & Chen, 2017) to measure the employees' perceptions of leadership, task requirements and individual skills/abilities, work climate, systems, and individual needs and values in their organization. Five-Point Likert Scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree) was used as measure for each item. The questionnaire has undergone rigorous reviews for content validity and reliability. After the expert panel review and after

Journal of Health Sciences | ISSN 2599-5456

testing for reliability, some statements were modified which increased the likelihood of obtaining validity and reliable results. The questionnaire showed a good psychometric property of reliability (Harder et al., 2015).

The third part of the instrument is the Copenhagen Burnout Inventory (CBI), which consists of 19 items. The questionnaire was modified, and it evaluates 6 items for personal-related, 7 items for work-related, and 6 items for client-related burnout.

The last part of the instrument is adapted from the Work-Related Quality of Life (WRQoL) questionnaire by Easton and Van Laar (2014). The questionnaire is a 23-item psychometrically strong scale used to measure the perceived quality of life influenced by work among employees. It has six psychosocial sub-factors, which includes home-work interface (HWI) with 3 items, working conditions (WCS) with 3 items, job, and career satisfaction (JCS) with 6 items, control at work (CAW) with 3 items, stress at work (SAW) with 2 items, and general work balance (GWB) with 6 items. Five-Point Likert scale comprising Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree was used to measure each item.

Data Gathering Procedures

After securing the approval to conduct the study, the researcher sent out a letter of request to the president of the selected sectarian educational institutions which stated the intent of the researcher to conduct the study. The researcher encoded the questionnaire using an online survey software, SurveyMonkey. The link of the instrument was distributed individually to the respondent's email address or Facebook messenger. Included in the instrument are the necessary instructions before they answer the questionnaire and the consent form stating that participation is not mandatory, but their response is appreciated. Honesty in answering the questionnaire was emphasized to ensure accuracy of the results. The researcher gathered data for 1 month and a total of 183 employees responded to the study. However, 151 survey questionnaires were valid and 32 were considered invalid due to either incomplete answers or they were not included in the inclusion criteria. After all questionnaires were retrieved, the research maintained the highest confidentiality and did not compromise the privacy of the respondents. Gathered data were then tallied and analyzed with the help of the professional statistician.

Data Analysis

Data obtained were statistically tested, evaluated, summarized, and were put into graphs and tables using the Statistical Package for Social Sciences Software (SPSS). Descriptive statistics was used to determine the respondent's demographic profile. Descriptive statistics mean and standard deviation was used to determine the level of organizational factors, burnout, and quality of work life. In determining the significant relationship between the independent and dependent variables, Pearson's correlation coefficient, a bivariate linear correlation (Canturk et al., 2019) was utilized to test the relationships between organizational factors, burnout, and quality of work life of employees. The ANOVA (Analysis of Variance) and T-test was used to determine the difference in the quality of work life of the respondents in terms of their age, sex, marital status, educational level, years of service, and employment status. A correlation was tested, using Smart Partial Least Squares (PLS) an approach to Structural Equation Models (SEM) to allow analysis of the relationships simultaneously specifically to compare and contrast

in analyzing mediation effect of burnout in the relationship between organizational factors and quality of work life.

Ethical Considerations

This study was conducted in accordance with the human research ethics. The research was subjected to ethics review by the Ethics Review Board (ERB) of the selected sectarian educational institutions. The approval protocol for this study were 2020-ERB-AUP-044 and MIN: 2020-44. The ethical principles were carefully reviewed to maintain the dignity of the respondents. Key informants were briefed on the objective of the study and an informed consent was also given before administering any of the research protocols.

The identity of the participants was concealed to the researchers own keeping. Key informants were fully informed about the confidentiality of the result and they have the rights to withdraw their participation in the study at any stage. The information about the participants were coded with an assigned number and stored that only the researcher and adviser have access to it. They are guaranteed that the data gathered will be utilized only for research purposes and will not be shared or given to anyone unless required for publication.

Results and Discussions

Ν	Mean	SD	Scaled Response	Interpretation
151	3.83	.52	Agree	High
151	3.85	.72	Agree	High
151	3.69	.47	Agree	High
151	3.80	.63	Agree	High
			-	-
151	3.68	.71	Agree	High
151	3.95	.54	Agree	High
151	3.80	.46	Agree	High
	N 151 151 151 151 151 151	N Mean 151 3.83 151 3.85 151 3.69 151 3.80 151 3.68 151 3.95 151 3.80	N Mean SD 151 3.83 .52 151 3.85 .72 151 3.69 .47 151 3.80 .63 151 3.68 .71 151 3.95 .54 151 3.80 .46	N Mean SD Besponse 151 3.83 .52 Agree 151 3.85 .72 Agree 151 3.69 .47 Agree 151 3.69 .47 Agree 151 3.69 .47 Agree 151 3.80 .63 Agree 151 3.68 .71 Agree 151 3.95 .54 Agree 151 3.80 .46 Agree

Perceptions on Organizational Factors

Table 1 Level of Organizational Factors Among Respondents

Legend: 4.50-5.00 strongly agree (very high), 3.50-4.49 agree (high), 2.50-3.49 neutral (moderate), 1.50-2.49 disagree (low), 1.00-1.49 strongly disagree (very low)

Table 1 presents that employees in selected sectarian educational institutions have a high level of organizational factors, M = 3.80 (SD = .46). The highest among all the indicators of organizational factors is the respondents' individual needs and values perceptions (M = 3.95, SD = .54). The results revealed that majority of the respondents have high level of perception towards their organization. Organizational factors are things that would affect a person's job characteristics or environment (Ghavidel et al., 2019) and further stated that the role of

10

organizational factors in burnout is the inadequacy of equipment supply and human resources as well as ineffective managerial approaches in the organization which could lead to mental and emotional exhaustion, negative attitudes towards the profession, decreased and poor service quality, employee turnover, and early retirement. In another study conducted in the Philippines, Dalanon et al. (2018) indicated that organizational factors must be addressed, such as managers recognizing and comprehending the wants and pursuits of workers to inspire them to grasp ultimate functioning. He added that strategically managed employees in an organization make a distinction in how well the group functions and knowing the reason for success or failure of firms and their varying levels of performance is an essential skill.

The result implies that respondents have positive view on their job characteristics or environment. It seems that having a positive perception in the organization has direct association with job satisfaction and work engagement.

Level of Burnout

Table 2 shows that employees have low level of burnout, with an overall mean score of 2.30 (SD = .64). As indicated in table 2, it shows that personal burnout has the highest mean of 2.67 (SD = .29).

	N	Mean	SD	Scaled Response	Iterpretation
Personal Burnout	151	2.67	.52	Often	Moderate
Work-Related Burnout	151	2.35	.72	Often	Low
Client-Related Burnout	151	1.87	.47	Often	Low
Overall Burnout Level	151	2.30	.40	Often	Low

Table 2. Level of Burnout Among Respondents

Legend: 4.50-5.00 always (very high), 3.50-4.49 often (high), 2.50-3.49 sometimes (moderate), 1.50-2.49 rarely (low), 1.00-1.49 never (very low)

Burnout is defined as a state of physical, mental, and emotional fatigue which results from a high expectation and sustained stress. Also, burnout syndrome is an alarming issue in the modern work culture according to a local study done by George and Reyes (2017). Burnout level by the respondents in general is interpreted as low with a mean of 2.30. Although the dimension personal burnout level is interpreted as moderate which is similar to the research done by Labrague (2013) and Latif and Mat Nor (2016), the result may be advantageous to the respondents' personal wellbeing because moderate level of stress drives an individual to perform well and succeed.

Low level of stress plays a significant role in executive burnout which mediates and leads to high or low personal effectiveness that moderates experienced stress (Sharma, 2007). As discussed by Oi-ling (2003), the result implies that it is essential to nourish work values among employees and cultivate employees' commitment to their organizations. Moreover, lower level of burnout at work implies less anxious, use mature defense mechanisms and have a perception of better quality of life. Also, when burnout is diagnosed, the psychological interventions require training

11

through the adoption of mechanisms for overcoming everyday stress, which may affect the reduction of anxiety and the improvement of the quality of life. Professional assistance, including psychotherapy is required in severe cases. The result indicates that the respondents are nourished, less anxious and mature individuals.

Level of Quality of Work Life

<u>, , , , , , , , , , , , , , , , , </u>		0	1	12 /	
	Ν	Mean	SD	Scaled Response	Iterpretation
Home/Work Interface	151	3.71	.82	Agree	High
Working Condition	151	4.12	.69	Agree	High
Job & Career Satisfaction	151	3.98	.65	Agree	High
Control at Work	151	3.65	.78	Agree	High
Stress at Work	151	2.80	.89	Neutral	Moderate
General Work Balance	151	3.85	.70	Agree	High
Overall QoWL	151	3.67	.34	Agree	High

Table 3. Level of Quality of Work Life Among Respondents (QoWL)

Legend: 4.50-5.00 always (very high), 3.50-4.49 often (high), 2.50-3.49 sometimes (moderate), 1.50-2.49 rarely (low), 1.00-1.49 never (very low)

Table 3 shows a high level of quality of work life among employees, with an overall mean score of 3.67 (SD = .34). As shown in the table, working condition has the highest mean of 4.12 (SD = .69) and Continuance has the lowest mean 3.20 (SD = .66). Quality of work life is defined by Almarshad (2015) as the quality of interactions between employees, work environment, economic factors, and technology that includes employee experience, autonomous work groups, work rewarding environment, and organizational involvement. Additionally, Fontinha et al. (2018) defined quality of work life as part of overall quality of life that is influenced by work, the degree of availability of features for ensuring a humane working life for each employee of the organization (Ramawickrama et al., 2019). Vadivel and Velmurugan (2017) mentioned that an organization should improve the quality of work life of employees as it can achieve a heightened job satisfaction, commitment, and performance.

Based on the study of Akar (2018), with high quality of work life on affective commitment impacts organizational citizenship behaviors; therefore working conditions should be constantly improved. Same study done by Almalki et al., (2012) on the quality of work life among nurses indicates that a healthy work life is very important to improve work satisfaction, reduce turnover, and enhance productivity.

The result implies that the respondents' overall quality of life that influence work and the availability of features for each employee are being met. To achieve a satisfying quality of work life among employees, it is important to improve their working conditions.

Relationship of Organizational Factors and Burnout

Table 4. Relationship Between Organizational Factors and Burnout

12	Journal of Health Sciences ISSN 2599-545	6
Variable	Components	Burnout
Organizational Factors	Pearson Correlation (r)	258**
	p-value	.000
	Ν	151
	Verbal Interpretation	Significant

**Correlation is significant at the 0.01 level (2-tailed)

Table number 4 presents that there is a weak negative correlation (r = -.258) (p = <0.000) between organizational factors and burnout. The finding revealed that organizational factors have negative correlation to burnout which mean the higher the organization factors, the lower is the burnout of the respondents. The result of the study rejected the null hypothesis which indicates that there is no significant relationship between organizational factors and burnout is rejected. Strategically managed employees in an organization make a distinction in how well the group functions and knowing the reason for success or failure of firms and their varying levels of performance is an essential skill. Burnout is a result of mutual interaction between individual and work environment and is observed to be of great importance to both individual and organization in research (Bagci, 2015). A local study conducted in the Philippines by Dalanon et al. (2018) indicated that organizational factors must be addressed, such as managers to recognize and comprehend the wants and pursuits of workers to inspire them to grasp ultimate functioning.

The study implies relationship of organizational factors and burnout suggests human resources as the most valuable asset in the organization and that these needs to be nourished to increase effectiveness in the efficiency and productivity of the organization and that the respondents are valued, effective, productive and recognized by their organization.

Relationship of Burnout and Quality of Work Life

Table 5 shows that there is a moderate negative correlation (r = -.324) (p = <.000) between burnout and quality of work life. The findings reveal that burnout are negatively correlated to quality of work life which mean the higher the burnout, the lower is the quality of work life of the respondents. The null hypothesis which states that there is no significant relationship between burnout and quality of work life is rejected.

Variable	Components	Burnout
Burnout	Pearson Correlation (r)	324**
	p-value	.000
	Ν	151
	Verbal Interpretation	Significant

Table 5. Relationship Between Burnout and Quality of Work Life

**Correlation is significant at the 0.01 level (2-tailed)

Burnout syndrome is an alarming issue in the modern work culture according to a local study done by George and Reyes (2017). It has been proven that with higher levels of stress and fatigue among employees, there is subsequent lower quality of work life (Leitao et al.,

2019). Burnout showed a highly associated on poor quality of life, as well as its physical and psychological health. It also suggests that a highly strained and demanding work environment weaken the workers (Asante et al., 2019). A study also showed that there is negative relationship between burnout and quality of work life among workers for offshore oil platforms. It revealed that their quality of work life was reduced with heavier task, vaguer task, and increasing mental stress, yet it increased when there is more social support (Zhang et al., 2017).

The result implies that there is a negative relationship between burnout and quality of work life. It suggests that improving the work environment of employees reduces burnout and with lower levels of burnout, increases the quality of work life among employees.

Relationship of Organizational Factors and Quality of Work Life

1	8 4	
Variable	Components	Burnout
Burnout	Pearson Correlation (r)	.669**
	p-value	.000
	Ν	151
	Verbal Interpretation	Significant
**0 1		

Table 6. Relationship Between Organizational Factors and Quality of Work Life

**Correlation is significant at the 0.01 level (2-tailed)

Table number 6 presents that a moderate positive correlation (r = .669) (p = <0.000) exists between organizational factors and quality of work life. The finding shows that organizational factors is significantly correlated to quality of work life in a positive manner. It means that the better is the organizational factors, the higher is the quality of work life of the employees. Thus, the null hypothesis is rejected.

Employees aspire for quality of work life along with changes of work culture, traditional work concept while meeting the basic needs of people. A high quality manpower is considered as most important asset in the organization that summarizes quality of work life related to workplace, job satisfaction, development of employee skills, wages, health, safety, and the improvement of the physical conditions such as burnout that are unfavorable for employees (Duyan et al., 2013). An organization with employee satisfaction, optimal job performance, physical fitness, subjective wellbeing, corporate parlance, good working condition and general well-being are keys to positive outcomes at work resulting to happiness at work (Dahie et al., 2017; Sharma & Tolani, 2015). According to Yadav and Khanna (2014), to achieve a quality work life, it is necessary that there is collaboration between employees and the organization and this results to a better family life and work life.

The result implies that the components in the organization and its structural relations were suitable to the respondents which resulted to a high quality of work life experiences among employees.

Difference in the Quality of Work Life Considering Age

Table 7 shows that there is no significant difference in the quality of work life of the respondents when age is considered (p = .245). Highest quality of work life is seen in ages 53-64

Journal of Health Sciences | ISSN 2599-5456

years old (M = 3.71, SD = .36). Hence, the null hypothesis is accepted.

	00		~ ~ ~	v		0	0	
	Age	Ν	Mean	SD	df	F	p-value	Verbal Interpretation
	24-40	50	3.60	0.30	150	1.419	.245	Not Significant
	41-52	48	3.68	0.37				
	53-64	53	3.71	0.36				
1		~						

Table 7. Difference in the Quality of Work Life Considering Age

Legend: SD – Standard Deviation

The result is supported by Perez (2013) where quality of work life has no significant difference across age and length of service. Three other studies also reported that there is no significant difference between age of the respondents and their overall QoWL (Moradi et al., 2014; Jerome as cited in Yadav & Khanna, 2014). The result of the study also revealed that the age group 53-64 years old has the highest quality of work life. Geetha et al. (2018) have similar findings revealing that older people have higher degree of quality of work life that the younger once. A study in Egypt conducted by Shazly and Fakhry (as cited in Kelbiso et al., 2017) also revealed that advanced in age has significantly higher perception of QoWL. The result shows that the demographic profile of the respondents in terms of age did not have an effect in the quality of work life. The total number of respondents may have affected the difference in the QoWL considering age.

Difference in the Quality of Work Life Considering Gender

Table 8. Difference in the Quality of work Life Considering Gender							
Age	Ν	Mean	SD	df	F	p-value	Verbal Interpretation
Male	50	3.60	0.35	149	.336	.563	Not Significant
Female	101	3.70	0.34				

Table 8. Difference in the Quality of Work Life Considering Gender

Legend: SD – Standard Deviation

Table 8 shows that there is no significant difference in the quality of work life when gender is considered (p = .563). Hence, the null hypothesis is accepted. The result of the study is similar to the study of Geetha et al. (2018) and Moradi et al. (2014), which revealed that there was no statistically significant difference in the QoWL when gender was considered. The result also showed that female has higher quality of work life than males. Similar to the result of the study of Moradi et al. (2014) and Ayesha (as cited in Yadav & Khanna, 2014) that there is a high satisfaction in regarding QoWL dimensions among female compare to males. According to Khaghanizadeh (as cited in Moradi et al., 2014), the lower level of QoWL among males may be due to the fact that they are more involved with stressful activities and this may affect their perceived their overall QoWL.

The result of the study implies that gender did not have an effect in the quality of work life. The total number of respondents as well as the distribution of between males and females are not equal which may have affected the result of the study. However, the low level of QoWL among males may be because they are more exposed to laborious work.

Difference in the Quality of Work Life Considering Marital Status

		~ ~ ~ ~	5		0		
Age	Ν	Mean	SD	df	F	p-value	Verbal Interpretation
Married	124	3.59	0.35	150	2.575	.080	Not Significant
Single	23	3.52	0.31				
Widow	4	3.70	0.27				

Table 9. Difference in the Quality of Work Life Considering Marital Status

Legend: SD – Standard Deviation

Table 9 indicates that there is a no significant difference in the quality of work life of the respondents when marital status is considered (p = 0.080). Thus, the null hypothesis is accepted. The results showed that marital status had no effect on the quality of work of employees as supported in the studies of Kelbiso et al. (2018) and Moradi et al. (2014) which indicated that there is no significant relationship between QoWL and marital status.

The result implies that quality of work life of the respondents has no effect regardless of their marital status. The total number of respondents as well as the distribution in each group is not equal which may have affected the result of the study.

Difference in the Quality of Work Life Considering Educational Attainment

00		~ ~ ~ ~	, J		0		
Age	Ν	Mean	SD	df	F	p-value	Verbal Interpretation
Bachelor's	124	3.68	0.31	150	.400	.753	Not Significant
Master's	23	3.68	0.36				
Doctorate	4	3.63	0.37				
Others	2	3.45	0.18				

Table 10. Difference in the Quality of Work Life Considering Educational Attainment

Legend: SD – Standard Deviation

Table 10 shows that there is a no significant difference in the quality of work life of the respondents when educational attainment is considered (p = 0.753). Thus, the null hypothesis is accepted. Results showed that educational attainment did not have effect on the quality of work life of employees and so with their job performance. The result of the study is congruent with the study done by Jerome (as cited in Yadav & Khanna, 2014) that there is no significant relationship between the educational qualification of the respondents and their overall quality of life. In contrary with the study done by Moradi et al. (2014) which reported a significant relationship between nurses QoWL and educational level. They found out that nurses with lower education level has better QoWL than with nurses with higher educational attainment. It may be because nurses with higher education in their workplace especially if they did not meet their expectations.

The result implies that educational attainment exerts its influences on late-life cognitive function primarily by contributing to individual differences in cognitive skills (Lovden et al., 2020). In addition, working life and environment play a major role in life has been proven that QWL factors are essential for promoting a strong work culture, a good human resource climate, AUP Research Office JHS Vol. 3 No. 2 | December 2020

16	Journal of Health Sciences ISSN 2599-5456

motivates and encourages employees to perform and exert their duties at their maximum effort which in turn will provide a job satisfaction to employee and growth to an institution (Pandey & Jha, 2014).

The result of the present study implies that educational attainment did not affect the quality of work life among employees. The total number of respondents as well as the distribution in each group are not equal which may have affected the result of the study. However, increase in education may suggest a stability in their work that may help increase their quality of work life.

Difference in the Quality of Work Life Considering Employment Status

Tuble III. Dijjel	alle III. Difference in the guarity of norw Life Constanting Employment Status							
Age	Ν	Mean	SD	df	F	p-value	Verbal Interpretation	
Regular	139	3.68	0.34	149	.560	.456	Not Significant	
Probationary	12	3.46	0.34					

Table 11. Difference in the Quality of Work Life Considering Employment Status

Legend: SD – Standard Deviation

Table 11 shows that there is a no significant difference in the quality of work life of the respondents when employment status is considered (p = 0.456). Hence, the null hypothesis is accepted. The result implies that employees want employment stability and do not like to be the victims of whimsical personal policies and stay at the mercy of employers and therefore permanent employment provides security to the employees and improves their quality of work life (Swamy et al., 2015). Work systems either to enhance or to diminish quality of life and employment conditions have tremendous impacts that extend beyond the workplace and influence the broader well-being of individuals and families (Pandey & Jha, 2014). Yadav and Khanna (2014), suggest that a better quality of work life results to a better family life and work life.

The result of the study implies that employment status has no effect on the quality of work life among employees. The result of the study may be affected by the total number of respondents as well as the distribution in each group are not equal.

Difference in the Quality of Work Life Considering Job Type

Table 12. Dijjerence	able 12. Difference in the Quality of work Life Considering 500 Type								
Age	Ν	Mean	SD	df	F	p-value	Verbal Interpretation		
Teaching	75	3.63	0.38	149	3.350	.069	Not Significant		
Non-Teaching	76	3.69	0.30						

Table 12. Difference in the Quality of Work Life Considering Job Type

Legend: SD – Standard Deviation

Table 12 shows that there is no significant difference in the quality of work life of the respondents when job type is considered (p = 0.069). The null hypothesis is accepted. Results indicated that teaching and non-teaching employees performed their job well regardless of their position. Although permanent employment provides security to the employees and improves their QWL (Swamy et al., 2015), it is concluded that workers who feel that their organizations

invest in their careers, for example through continuous learning, the development of new skills or supporting professional growth, are more likely to feel that they contribute more than others to the organizations' productivity (Leitao et al., 2019).

The result of the study indicates that job type did not affect the quality of work life among employees. The result of the study may be affected by the total number of respondents. However, it may suggest that organizations which invest in their employees are more likely to contribute to a better quality of work life.

Difference in the Quality of Work Life Considering Years of Tenure

Tuble 13. Difference in the Quanty of more Life Considering Tears of Tenare							
Age	Ν	Mean	SD	df	F	p-value	Verbal Interpretation
1-10	53	3.59	0.32	150	1.874	.157	Not Significant
11-20	50	3.70	0.32				
21-45	48	3.71	0.39				

Table 13. Difference in the Quality of Work Life Considering Years of Tenure

Legend: SD – Standard Deviation

Table 13 shows that there is no significant difference in the quality of work life of the respondents when years of tenure is considered (p = 0.157). The null hypothesis is accepted. Quality of working life has been defined as the part of overall quality of life that is influenced by work (Fontinha et al., 2018). Result implies that the respondents' years of tenure does not affect their quality of work life and in line with Fontinah et al. (2018) study that a longer tenure in the organization negatively related to work performance. Meaning managers can still take appropriate actions to improve employees' QWL and subsequently reduce employees' turnover (Ogbuabor & Okononkwo, 2019).

The result of the study also showed that the longer years of experience has higher QoWL. It is in congruent with study of Geetha et al. (2018) which indicates that higher experienced group and employees who spent longer years with the same institution showed stronger quality of work life. Sharhraky (as cited in Moradi et al., 2014) suggests that employees with longer years of experience is more stable in their job and have lesser occupational stressors in their workplace, which may result to a better QoWL.

The result of the study indicates that years of tenure did not affect the quality of work life among employees. The result of the study may be affected by the total number of respondents. Although, literatures suggest that the organization can influence the development of quality of work life among employees and the longer years of service can result a better QoWL.

18 Mediating Effect



Figure 1. Modified Model Analysis Using Smart PLS

Figure 13 shows that result of the study on the mediation of burnout on the relationship of organizational factors and quality of work life. The modified model analysis result using SMART PLS shows burnout mediates the relationship between organizational factors and quality of work life. Further explanations are in Tables 14 and 15.

Path Coefficients	Coefficients	<i>t</i> -values	<i>p</i> -value
	β		
Burnout -> Quality of Work Life	-0.341	6.076	0.000
Organizational Factors -> Burnout	-0.357	4.735	0.000
Organizational Factors -> Quality of Work Life	0.612	11.247	0.000

Table 14. Path Coefficients

Table 14 shows the negative relationship between burnout to quality of work life (β = -0.341; t = 6.076; p = 0.000). It also reveals that there is negative relationship between organizational factors and burnout (β = -0.357; t = 4.735; p = 0.000). On the other hand, there is a positive significance between organizational factors and quality of work life (β = 0.612; t = 11.247; p = 0.000).

The state is meaning Lifeer of Durnour	Table	15.	Mediating	Effect	of Burnout
--	-------	-----	-----------	--------	------------

Independent Variable	Dependent Variable	Mediator	Туре	Estimate	p-value
Organizational Factors	Quality of Work Life	Burnout	Partial Medi- ation	0.122	0.000

Table 15 shows the mediating effect of burnout on the relationship between organizational factors and quality of work life. It shows that burnout partially mediates the relationship between organizational factors and quality of work life with estimate value of 0.122 (p-value=0.000).

Tables 14 and 15 reflect that burnout partially mediates the relationship between organizational factors and quality of work life. Organizational factors had a total effect of 0.86 quality of work life; the indirect effect was (0.341) * (0.357) = 0.122. The indirect effect is statistically significant (p = 0.000). Therefore, the null hypothesis is rejected.

The result of this study supported the "person–environment fit theory" which stresses that burnout is significantly affected by work environment factors (Bilal, 2016). Thus, the result supported Sinha (2012) on quality of work life being the effects of an individual's perception of, and attitudes towards, his or her work and the total working environment.

As proposed by Sinha (2012), for an organization to be successful and achieve its organizational objectives, employee satisfaction is imperative to be satisfied. In addition, since work occupies an important place in many people's lives, the physical, social, and psychological as well as spiritual well-being are likely to be affected. Hence, employees with a high level of psychological well-being are better, more committed, and more productive than employees with a low level of psychological well-being (Jeong & Choi, 2020; Obrenovic et al., 2020).

Although burnout may not be completely eliminated, it emphasized the need to acknowledge areas that triggers burnout and organizations to develop strategies to prevent them. The problem of burnout cannot be ignored as it has various detrimental consequences for all involved.

The study was done to determine the mediating role of burnout on the relationship between organizational factors and quality of work life of employees. The results revealed high levels of organizational factors and quality of work life and low level of burnout. There was a positive correlation between organizational factors and quality of work life while, there was negative correlation between organizational factors and burnout and between burnout and quality of work life. Furthermore, there was no significant difference in the quality of work life when age, gender, marital status, educational attainment, employment status, job type, and years of tenure were considered. Lastly, burnout partially mediates the relationship between organizational factors and quality of work life. The study demonstrated that a positive perception on organizational factors has better quality of work life and low level of burnout.

The result of the study proved that burnout is significantly affected by work environment factors and it could be lessened by improving the organizational factors. Thus, a low level of burnout could improve employee's quality of work life. Furthermore, a positive perception in the organization has a direct association with the employee's quality of work life. With the outcome of this study, institutions will be encouraged to improve their work environment as it reduced burnout and increases quality of work life among employees. Likewise, a better quality of work life of employees means that employees are highly satisfied with their work. Hence, the result of the study could guide both the institution and the employees in ensuring that they work together as team to avoid burnout and meet their goals.

A limitation of the study was related to the sample characteristics. Although there were variations in the population, the respondents consisted 151 only from two organizations which may have affected the result of the study. Another limitation was that there were moderating variables (gender, marital status, educational attainment, and employment status) with unequal distribution of respondents which is insufficient for comparison between them. A larger number of organizations would have provided this study more variety of occupations and organization size and location, which would have given a more complete picture concerning the causes of stress and interventions between sectors. Lastly, a replication of this research is recommended

Journal of Health Sciences | ISSN 2599-5456

with larger sample and with diverse population. Additionally, research can be explored in health care workers as they battle the pandemic.

References

- Almalki, M.J., FitzGerald, G., & Clark, M. (2012). The relationship between quality of work life and turnover intention of primary health care nurses in Saudi Arabia. *BMC Health Serv*, 12(314), 1-11. https://doi.org/10.1186/1472-6963-12-314
- Almarshad, S.O. (2015). A measurement scale for evaluating quality of work life: conceptualization and empirical validation. *Trends in Applied Sciences Research*, 10(3), 143-156. https://doi.org/10.3923/tasr.2015.143.156
- Akar, H. (2018). The relationship between quality of work life, school alienation, burnout, affective commitment and organizational citizenship: A study on teachers. *European Journal of Educational Research*, 7(2):169-180.
- Asante, J.O., Li, M.J., Liao, J. et al. (2019). The relationship between psychosocial risk factors, burnout and quality of life among primary healthcare workers in rural Guangdong province: a cross-sectional study. *BMC Health Serv Res 19*, (447). https://doi.org/10.1186/ s12913-019-4278-8
- Bagci, Z. (2015). Study of some demographic properties influencing levels of burnout of nurses in public hospitals by CHAID analysis. *Journal of the Faculty of Economics and Administrative Sciences*, 5(2), 479-494.
- Bilal (2017). Organizational structure as a determinant of job burnout. *Workplace Health & Safety*. https://doi.org/10.1177/2165079916662050.
- Canturk, M., Kocaoglu, N., & Hakki, M. (2019). Abdominal girt has a strong correlation with actual and ultrasound estimated epidural depth. *Turkish Journal of Medical Sciences*, (49), 1715-1720.
- Dahie, A.M., Aligees-Mohamed, A.A., & Khalif, H.B. (2017). Examining factors affecting the quality of work life of lecturers: Case study from University of Somalia in Mogadishu, Somalia. *Australian Journal of Science and Technology*, *1*(2).
- Dalanon, J., Diano, L.M., Belarmino, P., Hayama, R., Miyagi, M., & Matsuka, Y. (2018). A Philippine rural school's organizational climate, teachers' performance, and management competencies, *International Journal of Research-Granthaalayah*, 6(1). https://doi. org/10.5281/zeodo.1164141.
- Dapula, G.F. & Castano, M.C. (2017). Core self-evaluations, job satisfaction, transformational and servant leadership model in the Roman Catholic education system. *Asian Journal of University Education*.

- Duyan, E.C., Aytac, S., Akyildiz, N., & Van laar, D. (2013). Measuring work related quality of life and affective well-being in Turkey. *Mediterranean Journal of Social Sciences*, 5(1).
- Easton, S. & Van Laar, D.L. (2014). User manual for the work-related quality of life (WRQoL) Scale: a measure of quality of working life (2nd ed). University of Portsmouth: UK, ISBN: 978 1 86137 640 4 E-book.
- Fontinha, R, Van Laar, D., & Easton, S. (2018). Quality of working life of academics and researchers in the UK: the roles of contract type, tenure and university ranking. *Studies in Higher Education*, 43(4):786806, https://doi.org/10.1080/03075079.2016.1203890
- Geetha, R., Swamy, T.N.V.R.L., & Revathi, K. (2018). Impact of demographic profile on quality of work life of employees in cooperative and private sugar mills in Tamil Nadu. *International Journal of Mechanical Engineering and Technology*, 9(7), 787–793. http://www.iaeme.com/MasterAdmin/Journal_uploads/IJMET/VOLUME_9_ISSUE_7/ IJMET_09_07_083.pdf
- George, R. & Reyes, M.E. (2017). Burnout as a predictor of quality of life among selected Filipino nurses. *Indian Journal of Health and Wellbeing*, 8(7), 697-696.
- Ghavidel, F., Fallahi-Khoshknab, M., Molavynejad, S., & Zarea, K. (2019). The role of organizational factors in nurse burnout: experiences from Iranian nurses working in psychiatric wards, *Journal of Family Medicine and Primary Care, (8)*, 3893-9, https://doi. org/10.4103/jfmpc.jfmpc_615_19
- Green, A.E. (2014). The roles of individual and organizational factors in burnout among community-based mental health service providers. *National Institute of Health*, 11(1), 41-49.
- Harder, H., Gouldthorpe, J., & Goodwin, J. (2015). Exploring organizational factors related to extension employee burnout. *Journal of Extension*, 53(2).
- Jomah, N.B. (2017). Perceptions of employees in the effects of decision-making and leadership styles on relationships and perceived effectiveness in King Saud University Development Context. *International Education Studies*, 10(1).
- Kelbiso, L., Belay, A., & Woldie, M. (2017). Determinants of quality of work life among nurses working in Hawassa town public health facilities, South Ethiopia: Cross-sectional study. *Hindawi Nursing Research and Practice*. https://doi.org/10.1155/2017/5181676
- Jeong, K. & Choi (2020). Employees' weekend activities and psychological well-being via job stress: a moderated mediation role of recovery experience. *International Journal Environmental Research and Public Health*, (15), 1642, https://doi.org/10:3390/ ijerph17051642.

- Labrague, L. (2013). Stress, stressors, and stress responses of student nurses in government nursing school. *Health Science Journal*, 7(4), 424-435.
- Latif, R., & Mat Nor M. Z. (2016). Stressors and coping strategies during clinical practices among diploma nursing students. *Education in Medicine Journal*, 8(3), 21-33. https://doi.org/10.5959/eimj.v8i3.422
- Leitao, J., Pereira, D., & Goncalves, A. (2019). Quality of work fife and organizational performance: Workers' feelings of contributing, or not, to the organization's productivity. *International Journal of Environmental Research and Public Health*, 16(20), 3803. https://doi.org/10.3390/ijerph16203803
- Lovden, M., Fratiglioni, L., & Glymour, M.M. (2020). Education and cognitive functioning across the life span. *SAGE*, *21*(1), 6-41.
- Maslach, C. & Leiter, M. P. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. *World Psychiatry*, 15(2), 103-111. https://www.ncbi.nlm. nih.gov/pmc/articles/PMC4911781/pdf/WPS-15-103.pdf
- Moradi, T. Maghaminejad, F., & Azizi-Fini, I. (2014). Quality of working life of nurses and its related factors. Nurs Midwifery Stud, 3(2), e19450. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4228533/pdf/nms-03-19450.pdf
- Mosadeghrad, (2013). Quality of working life: an antecedent to employee turnover intention, *International Journal of Health Policy and Management, 1*(1), 43-50. https://doi.org/10.1517/ijpm.201307
- Obrenovic, B., Jianguo, D., Khudaukuilov, A., & Shafique Khan, M. (2020). Work-family conflict impact psychological safety and psychological well-being: a job performance model. *Frontiers in Psychology, (11)*, 475. https://doi.org/10.3389/fpsyg.2020.00475.
- Ochoa, P. (2018). Impact of burnout on organizational outcomes, the influence of legal demands: the case of Ecuadorian physicians. *Frontiers in Psychology*, *9*(662). https://doi.org/10.3389/fpsyg.2018.00662
- Oi-ling, S. (2003). Job stress and job performance among employees in Hong Kong: The role of Chinese work values and organizational commitment. *International Journal of Psychology*, *36*(60). 337-347.
- Ogbuabor, D.C. & Okononkwo, I.L. (2019). The influence of quality of work life on motivation and retention of local government tuberculosis control programme supervisors in Southeastern Nigeria. https://doi.org/10.1371/journal.pone.0220292

- Pandey, A. & Jha, B.K. (2014). Review and redefine: Quality of work life for higher education. Global Journal of Management and Business Research: An Administration Management, 14(11).
- Ramawickrama, J., Opatha, H.H., & Pushpakumari, M.D. (2019). Quality of work life and job performance: A study on station masters in Sri Lanka railways, *South Asian Journal of Management*, 26(3).
- Saleem, T.A. & Sumaya S. (2015). Selected organizational factors affecting performance of professional nurses in North West Bank Governmental Hospitals, *Journal of Education* and Practice, 6(7), 100-110.
- Sharma, G. & Tolani, B. (2015). Subjective well-being for employees in an organization. *Indian Journal of Health and Wellbeing*, 6(5), 529-522.
- Sharma, R.R. (2007). Indian model of executive burnout, Vikalkpa, 32(2).
- Sheikh, U.S. (2020). Perception of employees towards human resource development systems in healthcare: An exploratory analysis. *Journal of Organizational Behavior, 19*(1), 42-64.
- Sinha (2012). Factors affecting quality of work life: empirical evidence from Indian organizations, *Australian Journal of Business and Management Research*, 1(11), 31-40.
- Swamy, Nanjundeswaraswamy, & Rashmi (2015). Quality of work life: scale development and validation. *International Journal of Caring Sciences*, 8(2), 281-e300.
- Urban, B. (2017). Corporate entrepreneurship in South Africa: the role of organizational factors and entrepreneurial alertness in advancing innovativeness. *Journal of Developmental Entrepreneurship*, 22(3). https://doi.org/10.1142/S1084946717500157.
- Vadivel, S. & Velmurugan, R. (2017). Quality of work life of employees in private companies with reference to Coimbatore. *Int. J. Multidiscip.* Res. Dev., 4, 128–131.
- Vveinhardt, J., &Gulbovaite, E. (2015). Expert evaluation of diagnostic instrument for personal and organizational value congruence. *Journal of Business Ethics*, 136(3), 481-501. https://doi.org.10.1007/s10551-04-2527-7.
- Yadav, R. & Khanna, A. (2014). Literature review on quality of work life and their dimensions. IOSR Journal of Humanities and Social Science (IOSR-JHSS), 19(9), 71-80. http://www. iosrjournals.org/iosr-jhss/papers/Vol19-issue9/Version-5/L019957180.pdf
- Zhang, T. & Chen, A. (2017). Developing a psychometric instrument to measure physical education teachers' job demands and resources. *Measurement in Physical Education and Exercise Science*, 21(3), 142-153.

24

Journal of Health Sciences | ISSN 2599-5456

Zhang, Y., Liu, X. L., Wei, T. D., Lan Y. J. (2017). Relationship of job stress with job burnout and quality of work life in workers for offshore oil platforms. Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi, 35(3), 198-202. https://doi:10.3760/cma.j.is sn.1001-9391.2017.03.010.

Cardiovascular Disease Risk Factors and Health Status of Senior Citizens in Unisan, Quezon: Basis for a Lifestyle Modification Program

Bevvy Stefanie E. Tan and Mary Jane Botabara-Yap Adventist University of the Philippines

tanbevvy stefanie@gmail.com

Abstract

ardiovascular Diseases (CVD) are the number one cause of death globally, taking an estimated 17.9 million lives each year. The aging and elderly population are particularly susceptible to CVD. The Sustainable Development Goal 3 targets to ensure healthy lives and promotes wellbeing for all at all ages. This study investigated the CVD risk factors and health status of the elderlies who already have maintenance medications. This study was guided using precede-proceed model. Convenience sampling was used among 90 respondents, assessed using the CVD Risk Assessment form, and were interpreted using the World Health Organization/ International Society of Hypertension (WHO/ISH) prediction chart. Findings revealed that the respondents have a CVD risk level of 20-30%. moreover, 56.7% of the respondents are in stage 3 hypertension, 34.4% are overweight, and 34.4% have pre-diabetes. Results also showed that CVD risk is not significantly correlated with BMI (r = -.137; p-value = .197). CVD risk has significant relationship to blood pressure (r = .588; p-value = .000) and RBS (r = .516; p-value= .000). Female and male have no significant difference in terms of BP (F = 0.024, t = 0.27, p =0.787) BMI (F = 1.500, t = -1.85, p = 0.068) and RBS (F = 0.034, t = -0.19, p = $(1 - 1)^{-1}$ 0.852). There is no significant difference in age in terms of BMI, RBS, and blood pressure. Furthermore, there was no significant difference in health status in terms of educational attainment and smoking activity. The findings helped the researcher identify the appropriate program for the senior citizen.

Keywords: cardiovascular diseases (CVD), CVD risk assessment, senior citizen

Cardiovascular diseases (CVDs) are the number one cause of death globally with an estimated 17.9 million people dying from CVDs representing 31% of all global deaths (World Health Organization [WHO], 2016). People with cardiovascular disease or with high cardiovascular risks need early detection and management using counselling and medicines. Most CVDs can be prevented by addressing behavioral risk factors such as tobacco use, unhealthy diet, obesity, physical inactivity, and harmful use of alcohol. In the Philippines, 170,000 people die of CVDs every year (Sy et Al., 2012).While CVDs are more prevalent in the western countries, there are clear signs of converging trends around the world in response to rising standards of living and changes in lifestyle. In the Philippines, increases in tobacco smoking, alcohol consumption, raised blood pressure, and obesity are top risk factors for developing CVD. Therefore, the burden of CVD is growing faster than the ability to combat it due to the increasing rates of CVD risk factor. People age 65 and older are much more likely than younger people to suffer a heart attack, have a stroke, or develop coronary heart disease and heart failure. Heart disease is also a major cause of disability, limiting the activity, and eroding the quality of life of millions of older people. Aging can cause changes in the heart and blood vessels. For example, as people get older, their heart cannot beat as fast during physical activity or times of stress as it did when they were younger. However, the number of heartbeats per minute at rest does not change significantly with normal aging (National Institute of Aging [NIA],2019).

Changes that happen with age may increase a person's risk of heart disease. A major cause of heart disease is the buildup of fatty deposits in the walls of arteries over many years. The good news is there are things people can do to delay, lower, or possibly avoid or reverse their risk. High blood pressure and other risk factors, including advancing age, increase the risk of developing atherosclerosis. Because there are several modifiable risk factors for atherosclerosis, it is not necessarily a normal part of aging. Over time, the heart muscle can become weakened and/or damaged, resulting in heart failure. Heart damage can be caused by heart attacks, long-standing hypertension and diabetes, and chronic heavy alcohol use (NIA,2019).

Because of the CVD risks accompanying senior citizens lifestyles, this research was conducted. This research identified the appropriate Lifestyle Modification Program for the Senior Citizens specifically, it sought to answer the following questions:

- 1. What is the CVD risk of the respondents?
- 2. What is the health status of the respondents in terms of Body Mass Index (BMI), Blood Pressure (BP) and Random Blood Sugar (RBS)?
- 3. Is there a significant relationship between CVD Risk and Health Status?
- 4. Is there a significant difference in Health Status when age, gender, smoking activity and educational attainment are considered?

Methodology

Research Design

This study utilized a precede-proceed model, a comprehensive structure proposed by Lawrence W. Green for assessing health needs for designing, implementing, and evaluating health promotion and other public health programs to meet those needs. Precede provides the structure for planning a targeted and focused public health program. Proceed provides the structure for implementing and evaluating the public health program (Crosby & Noar, 2011). Population and Sampling Technique

The study was conducted among 90 clients of Unisan ages 60 years old and above in the province of Quezon. Convenience sampling was used, those who were available during the time of assessment became the respondents of the study.

Instrumentation

Interviews were conducted using the CVD/Non-communicable Assessment Risk Form from the Department of Health (DOH). Blood pressure was measured in a seated position with a sphygmomanometer, the measurement was repeated twice with five-minute interval and the average taken for accuracy. Data for weight and height were obtained with the respondents in light clothing. BMI was calculated as weight over height squared (kg/m2). Random blood sugar was obtained also using a glucometer. World Health Organization/International Society

Cardiovascular Disease Risk Factors and Health Status of Senior Citizens in Unisan, Quezon: Basis for a Lifestyle Modification Program of Hypertension (WHO/ISH) risk prediction chart was also utilized. This chart provides approximate estimate of CVD risk in people who do not have established coronary heart disease, stroke, or other atherosclerosis disease. They are useful as tools to help identify those at high CVD risk and to motivate patients particularly to change behavior.

Analysis of Data

The gathered data were analyzed utilizing the spearman method, Mann-Whitney U and ANOVA. Moreover, frequency and percentages were also used for the health status. The WHO/ ISH risk prediction chart was also used to determine the CVD risk level of the senior citizen.

Results and Discussions

Table 1. CVD Risk Factors of the Senior Citizens									
Variable	Mean	Std. Deviation	Verbal Interpretation						
CVD Risk	20.95%	1.58	20%-30% Risk level						
N=90									

a...

C 1 C .

Table 1 indicates the CVD risk factors of senior citizens. It indicates that the mean of CVD risk is 20.95% (SD = 1.58). This is verbally interpreted as 20%-30% risk level of CVD among senior citizens.

V	ariable	f	%
BMI	Underweight	5	5.6
	Normal	45	50.0
	Overweight	31	34.4
	Obese	9	10.0
	Total	90	100.0
Blood Pressure	Normal	33	36.7
	High blood stage	6	6.7
	Stage 2	51	56.7
	Total	90	100.0
RBS	Normal	48	53.3
	Pre-Diabetes	31	34.4
	Diabetic	11	12.2
	Total	90	100.0

Table 2. Health Status Among Respondents

Table 2 shows the health status of the respondents. Frequency table indicates three variables: BMI, blood pressure, and RBS. In terms of BMI, there are 5 (5.6%) underweight, 45 (50%) normal, 31 (34.4%) overweight, and 9 (10%) obese. With regards to blood pressure, 33 (36.7%) are normal, 6 (6.7%) are in high blood stage, and 51 (56.7%) are in stage 2 hypertensive stage. In terms of RBS, there are 48 (53.3%) normal, 31 (34.4%) pre-diabetic, and 11 (12.2%) AUP Research Office JHS Vol. 3 No. 2 | December 2020 28

with diabetes.

Results showed that the employees have a 20%-30% CVD risk. Individuals in this category are at the borderline risk of fatal or non-fatal vascular events due to some factors based on the WHO/ISH prediction chart. According to the WHO (2016), total CVD risk depends on the individual's particular risk factor profile, sex, and age; it will be higher for older men with several risk factors than for younger women with few risk factors. Findings also showed that 56.7% of the respondents are in Stage 2 Hypertension, 34.4% are overweight, and 34.4% are in pre-diabetes stage. Many people are unaware of their risk status; opportunistic and other forms of screening by health care providers are therefore a potentially useful means of detecting risk factors, such as raised blood pressure, abnormal blood lipids, and blood glucose (WHO, 2016). Studying CVD risk factors among the workers will lead to recommendations that can motivate employers and policy makers to put CVD prevention among their priorities.

Table 3. Correlation Between CVD Risk Factors and Health St	tatus
---	-------

Variables	B	MI	Blood I	Pressure	R	BS
CVD Risk	r	<i>p</i> -value	r	<i>p</i> -value	r	<i>p</i> -value
	-0.137	0.197	.588**	0.000	.516**	0.000

N=90

**. Correlation is significant at the 0.01 level (2-tailed). Reject H0

Table 3 indicates the correlation between CVD risk factors and health status. Using Pearson correlation, it shows that CVD risk factor is not significantly related to BMI (r = -.137; p-value = .197). Nonetheless, results indicate that CVD risk has a significant positive correlation with blood pressure (r = .588; p-value = .000) and RBS (r = 516; p-value = .000). This implies that when the level of blood pressure increases, CVD risk also increases and vice versa. Also, when RBS level increases, CVD risk also increases and vice versa.

Results of the study also showed that CVD risk is significantly correlated with BP and RBS. CVD risk has a significant relationship with blood pressure. Large cohort studies have demonstrated that high BP is an important risk factor for heart failure (Fuchs & Whelton, 2019). In addition, longitudinal data obtained from the Framingham heart study have indicated that BP values between 130-139/83-89 mmHg are associated with a more than two fold increase in relative risk from CVD as compared with those with BP levels below 120/80 mmHg (Kannel, 2013).

On the other hand, there is no significant difference when it comes to their BMI. According to the WHO (2016), overweight and obesity are defined as abnormal or excessive fat that accumulate and present a risk to health. Obesity was found to be a major risk factor for the development of type-2 diabetes, asthma, hypertension, stroke, coronary artery disease, cancer and cancer-related mortality, liver and gallbladder diseases, sleep apnea, osteoarthritis, and gynecological complications. Obesity is associated with elevated blood pressure, blood lipids, and blood glucose; changes in body weight coincide with changes in these risk factors for disease. CVD mortality and morbidity has been shown to elevate in individuals who are overweight, particularly with central deposition of adipose tissues (Akil & Ahmad, 2012). A study affirmed that overweight status, in addition to obesity, is associated with significantly increased long-term risk for CVD morbidity in the context of similar or shorter total longevity Cardiovascular Disease Risk Factors and Health Status of Senior Citizens in Unisan, Quezon: Basis for a Lifestyle Modification Program and a greater proportion of life lived with morbidity compared with normal BMI (Khan et al.,

29

2018). The associations for usual non fasting glucose were weaker than those for usual fasting glucose (Rodgers, 2019).

Variables	Factors (Gender)	Mean	Standard Deviation	F	df	t	Sig. (2-tailed)
BMI	Female	23.67	4.89	1.500	88	-1.85	. 0.068
	Male	25.39	3.90				
RBS	Female	1.57	0.70	0.034	88	-0.19	0.852
	Male	1.60	0.71				
Blood	Female	113.17	13.18	0.024	88	0.27	0.787
Pressure	Male	112.35	14.53				

Table 4. Difference of Gender in Health Status

N: Male = 35; *Female* = 55

Table 4 shows the difference in health status in terms of gender. Using independent t-test, results showed that there is no significant difference in BMI in terms of gender (F (88) = 1.500, t = -1.85, p = 0.068). It also showed no significant difference in RBS (F (88) = 0.034, t = -0.19, p = 0.852) and blood pressure (F (88) = 0.024, t = 0.27, p = 0.787). This means that there is no gender differences in the level of BMI, RBS, and blood pressure among the respondents. Findings also revealed that there is no significant difference of gender in terms of BMI, RBS, and BP. In the recent years, the interest in studying the impact of sex steroids and gender on the regulation of blood pressure and CVD have been growing. Women are protected from most cardiovascular events compared with men until after menopause. Men are also thought to be at risk of CVD and other chronic disease. Studies also showed that it is the reduction of androgen levels that frequently accompanies chronic disease and may exacerbate cardiovascular disease in men (Maranon & Reckelhoff, 2015). Research elucidate that the immune system plays a complex role in hypertension. The greater anti-inflammatory immune profile in females during hypertension may act as a compensatory mechanism to limit increases in BP compared to males who exhibit a more pro-inflammatory profile (Gillis & Sullivan, 2016). Therefore, sex specific approaches are recommended for effective blood pressure management (Hayon et al., 2017).

	Variable	f	%
Smoking	never smoked	37	41.1
Activity	current smoker	25	27.8
	passive smoker	28	31.1
	Total	90	100.0

 Table 5. Frequency Distribution of Smoking Activity

Table 5 shows the frequency distribution of smoking activity. It indicates that there are 37 (41.1%) nonsmoker or never smoked, 25 (27.8%) current smoker, and 28 (31.1%) passive smokers.

AUP Research Office	JHS Vol. 3 No. 2 December 2020

30	Journal of Health Sciences ISSN 2599-5456						
Table 6. Difference of Smoking Activity to Health Status of Respondents							
Variable	Factor	Ν	Ā	SD	F	df	p-value
BMI	never smoked	37	2.51	0.65	0.128	2, 87	.880
	current smoker	25	2.52	0.92			
	passive smoker	28	2.43	0.74			
RBS	never smoked	37	1.62	0.72	0.069	2, 87	.934
	current smoker	25	1.56	0.71			
	passive smoker	28	1.57	0.69			
Blood	never smoked	37	114.02	14.32	0.460	2, 87	.633
Pressure	current smoker	25	112.92	13.98			
	passive smoker	28	110.67	13.69			

Table 6 indicates the difference of smoking activity to Health Status of respondents. Results showed that there is no significant difference of smoking activity in terms of BMI (F (2, 87) = .128, p = .880), RBS (F (2, 87) = .069, p = .934), and blood pressure (F (2, 87) = .460, p = .633). This implies that whatever the smoking activity, there is a possibility of having the same BMI, RBS, and BP. Other contributing factors may be explored.

Smoking is a major cause of CVD and causes approximately one of every four deaths from CVD, according to the 2014 Surgeon General's Report on smoking and health. CVD is the single largest cause of death in the United States, killing more than 800,000 people a year. More than 16 million Americans have heart disease. Almost 8 million have had a heart attack and 7 million have had a stroke. Even people who smoke fewer than five cigarettes a day may show signs of early CVD. The risk of CVD increases with the number of cigarettes smoked per day, and when smoking continues for many years. Smoking cigarettes with lower levels of tar or nicotine does not reduce the risk for cardiovascular disease. Exposure to secondhand smoke causes heart disease in nonsmokers. More than 33,000 nonsmokers die every year in the United States from coronary heart disease caused by exposure to secondhand smoke. Exposure to secondhand smoke can also cause heart attacks and strokes in nonsmokers (Center for Disease Control [CDC], 2014).

Variable	Factor	N	X	SD	F	df	p-value
BMI	Elementary	39	2.31	0.77	3.357	2, 87	.139
	High School	39	2.72	0.72			
	College	12	2.33	0.65			
RBS	Elementary	39	1.67	0.77	0.464	2,87	.630
	High School	39	1.51	0.64			
	College	12	1.58	0.67			
Blood	Elementary	39	117.09	16.38	3.677	2,87	.129
Pressure	High School	39	109.08	11.18			
	College	12	110.00	9.63			

Table 7. Difference of Educational Attainment to Health Status of Respondents

Table 7 indicates the difference of educational attainment to health status of respondents. Results showed that there is no significant difference with educational attainment in terms of BMI (F (2, 87) = 3.357, p = .139), RBS (F (2, 87) = .464, p = .630), and blood pressure (F (2, 87) = 3.677, p = .129). This implies that whatever the educational attainment, there is a possibility of having the same BMI, RBS, and BP. Other contributing factors may be explored. Findings revealed that there is no significant difference in health status when educational attainment is considered. The relationship between education and health is never a simple one. According to Center on Society and Health (2015), poor health not only results from lower educational attainment, it can also cause educational setbacks and interfere with schooling. Another study revealed that it does not matter if you are a college or high school graduate, as long as the person is employed, because employment increases health status, it improves an individual's physical and mental well-being, while job loss can have a detrimental effect (Goodman, 2015).

Variable	Factor	N	Ī	SD	F	df	p-value
BMI	old adults (55-64)	26	2.85	0.73	3.24	2, 86	.053
	young-old (65-74)	36	2.42	0.77			
	middle-old(75-84)	25	2.24	0.66			
	oldest-old (85 and above)	3	2.33	0.58			
RBS	old adults (55-64)	26	1.62	0.64	0.37	2,86	.78
	young-old (65-74)	36	1.53	0.74			
	middle-old(75-84)	25	1.68	0.75			
	oldest-old (85 and above)	3	1.33	0.58			
Blood	old adults (55-64)	26	116.51	18.26	1.40	2,86	.25
Pressure	young-old (65-74)	36	110.24	10.67			
	middle-old(75-84)	25	113.16	13.02			
	oldest-old (85 and above)	3	104.44	7.70			

 Table 8. Difference of Age to Health Status of Respondents

Table 8 indicates the difference of age to health status of respondents. Results show that there is no significant difference in BMI in terms of age (F (2, 86) = 3.24, p = .053), and a significant difference in RBS (F (2, 86) = .37, p = .78), and BP (F (2, 86) = 1.40, p = .25). This implies that whatever the age, there is a possibility of having the same BMI, RBS, and BP. In the present study, association of age with systolic and diastolic blood pressures was stronger than that of age with BMI. Blood pressure was higher in the elderly strata of the sample with or without a corresponding elevation in BMI suggesting the involvement of some other contributory factors (Mungreiphy et al., 2011). A study found that age positively correlates with blood pressure significantly. This is a common finding and is attributed to arterial stiffness consequent upon structural alterations in the arterial wall. With ageing, the arteries lose elasticity because of medial degeneration and sclerosis (Okeahialam et al., 2015). In terms of blood sugar, a study revealed that they observed a very clear and significant increase in plasma glucose levels with age. This finding applies to fasting; 2-hour post-prandial, as well as random plasma glucose levels, with 2-hour plasma glucose showing the strongest relationship (Ko et al., 2010). Aging is

32

Journal of Health Sciences | ISSN 2599-5456

by far the strongest known risk factor of diabetes mellitus and CVD (Chia et al., 2018). In conclusion, the result of the study showed that CVD risk is associated with many factors. Although the CVD risk of the senior citizen is in moderate category, there are still modifiable factors and health needs that should be addressed like blood pressure, BMI, and blood sugar level. By using the preceed-proceed model, the researcher determined and analyzed the needs of the target population. Lifestyle behaviors and policies were identified as well. This study helped the researcher formulate a Lifestyle Modification Program entitled "Gabay sa Malusog na Pamumuhay": A Lifestyle Modification Program for Senior Citizens. In the light of the findings and conclusion, the researcher recommends the following: (a) continuous surveillance for CVD risk factors are to be strengthened, and guidelines for CVD detection and prevention are needed; (b) make blood pressure cuffs available in the barangay so they can monitor their blood pressure with the help of the Barangay Health Worker; (c) the Sangguniang Barangay should provide environmental supports for physical activity such as safe places where they could exercise, walking trails, and maps of measured walking/jogging routes; (d) offer them dancing or Zumba Activities or maybe Chacha sessions where they could exercise and socialized at the same time; (e) make most of the food healthy by starting a home garden or community vegetable garden wherein healthy food items are available and affordable and most importantly is to build a support group or club so that they can be motivated and continuity of the program will be assured. Therefore, interventions and lifestyle modifications at the community are still encouraged and recommended.

References

- Akil, L. & Ahmad, H. (2012). Relationships between obesity and cardiovascular diseases in four southern states and colorado. *J Health Care Poor Underserved*, 22(4), 61–72. https://doi. org/10.1353/hpu.2011.0166
- Center on Society and Health (2015). *Why education matters to health: Exploring the causes.* https://societyhealth.vcu.edu/work/the-projects/why-education-matters-to-health-exploring-the-causes.html
- Chia, C., Egan, J., & Ferrucci, L. (2018). Age-related changes in glucose metabolism,hyperglycemia, and cardiovascular risk. *Circulation Research*, *123*, 886–904. https://doi.org/10.1161/CIRCRESAHA.118.312806
- Crosby, R. & Noar, S.(2011). Health promotion and disease prevention. *Journal of Public Health Dentistry*, 71(1), S7-15. https://www.ruralhealthinfo.org/toolkits/health-promotion/2/ program-models/precede-proceed
- Center for Disease Control and Prevention Office on Smoking and Health (2014). *Smoking and cardiovascular disease*. https://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/pdfs/fs_smoking_CVD_508.pdf
- Fuchs, F. & Whelton, P. (2019). High blood pressure and cardiovascular disease. Hypertension 2020, 75, 285–2. https://doi.org/10.1161/HYPERTENSIONAHA.119.14240

Cardiovascular Disease Risk Factors and Health Status of Senior Citizens in Unisan, Quezon: Basis for a Lifestyle Modification Program 33

Gillis, E. & Sullivan, J. (2016). Sex differences in hypertension. *Hypertension*, 68(6), 1322–1327. https://doi.org/10.1161/HYPERTENSIONAHA.116.06602

- Goodman, N. (2015). The impact of employment on the health status and health care costs of working-age people with disabilities. http://www.leadcenter.org/system/files/resource/ downloadable_version/impact_of_emplo yment_health_status_health_care_costs_0. pdf
- Hayon, M., Hyeon, C., Dae, R. (2017). Sex differences in hypertension prevalence and control: Analysis of the 2010-2014 Korea National Health and Nutrition Examination Survey. https://www.ncbi.nlm.nih.gov/books/NBK9634/
- Kannel, W. (2013). Hypertension: Reflections on risks and prognostication. *Med Clin North Am*, *93*(3), 541. https://doi.org/10.1016/j.mcna.2009.02.006
- Khan, S., Ning, H., & Wilkins, J. (2018). Association of body mass index with lifetime risk of cardiovascular disease and compression of morbidity. *JAMA Cardiol*, 3(4), 280-287. https://doi.org/10.1001/jamacardio.2018.0022
- Ko, G., Wai, H., & Tang, G. (2010). *Effects of age on plasma glucose levels in nondiabetic Hong Kong Chinese*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2080461/
- Maranon, R. & Reckelhoff, J. (2015). Sex and gender differences in control of blood pressure. *Clin Sci, 125*(7), 311–318. https://doi.org/10.1042/CS20130140
- Mungreiphy, N., Kapoor, S., & Sinha, R. (2011). Association between BMI, blood pressure, and age: Study among tangkul naga tribal males of Northest India. https://doi. org/10.1155/2011/748147
- National Institute on Aging (2019). *Heart health and aging*. https://www.nia.nih.gov/health/ heart-health-and-aging#:~:text=Adults%20age%2065%20and%20older,risk%20of%20 developing%20cardiovascular%20disease.
- Okeahialam, B., Ogbonna, C., Joseph, D., Chuhwak, E., & Isiguzoro, I. (2015). Relationship of blood pressure with some cardiovascular disease risk factors in a rural population of Plateau State, North Central Nigeria. *Nigerian Medical Journal*, 56(3), 208–212. https:// doi.org/10.4103/0300-1652.160400
- Rodgers, A. (2019). Blood glucose and risk of cardiovascular disease in the Asia Pacific Region. *Diabetes care*, 27(12), 2836-2842. https://doi.org/10.2337/diacare.27.12.2836
- Sy, R., Morales, D., Dans, A. (2012). Prevalence of atherosclerosis-related risk factors and diseases in the Philippines. *Journal of Epidemiology*, 22(5), 440–447. https://doi. org/10.2188/jea.JE20110095

Journal of Health Sciences | ISSN 2599-5456

World Health Organization. (2016). *Prevention of cardiovascular disease*. https://www.who.int/ cardiovascular_diseases/guidelines/Full%20text.pdf

"Floating on Cloud 9": Factors Influencing the Use of E-Cigarettes

Garee Austen G. Recto and Mary Jane Gayadan Adventist University of the Philippines 2032740@aup.edu.ph 2052456@aup.edu.ph

Abstract

lectronic cigarette is popular in this modern era and is rapidly increasing worldwide despite limited research on its safeness. This increasing prevalence of e-cigarette use raises a concern that it may lead to health problems. Thus, the purpose of this study is to identify the factors associated with the continuing use of e-cigarettes among users (N = 34). A quantitative research design was employed for this study. Drawing on the Theory of Planned Behavior, this research focused on attitudes, subjective norms, and perceived behavioral control, as well as the relationship of marketing to the use of e-cigarette considering age, educational attainment, and employment status. The result showed that marketing (0.03) and subjective norms (0.01) have significant relationship on how frequent e-cigarette is used. On the other hand, marketing (0.01) has a *significant relationship* on the duration of use while users' attitude (0.02) while perceived behavior control (0.05)has a significant relationship on the amount of use. Moreover, users' age and their perceived behavioral control (0.01) have a relationship on the use of e-cigarette. Hence, providing restriction on e-cigarette advertising; and educating individuals and the community they belong will help the public health in addressing the increased prevalence of e-cigarette.

Keywords: cardiovascular diseases (CVD), CVD risk assessment, senior citizen

Electronic cigarette (e-cigarette) is now popular in this modern era and is rapidly increasing worldwide despite its limited research on safeness. It is a new way of smoking using a metallic tube which consist of an inhaler that contains a replaceable cartridge that holds a liquid with nicotine, water, and other liquids (Newton, 2017). It creates a tiny light on the tip even glows like a real cigarette and produces a vapor that stimulates the act of smoking (Department of Health [DOH], 2019).

A study found that awareness on e-cigarettes grows to 80 percent and more than double among U.S adult e-cigarette users (Schneider, 2017). Even though conventional cigarette is banned to advertise from television, marketing e-cigarette is growing. Overall, e-cigarette advertising expenditures across media channels tripled from \$6.4 million in 2011 to \$18.3 million in 2012. Expenditures were highest in magazines and TV and lowest in newspapers and on the Internet (Kim et al., 2014). Advertisement often emphasized e-cigarette as a safe alternative to conventional cigarette and as an effective method to quit smoking but study were conducted and have produced mixed result (McRobbie et al., 2014; World Health Organization [WHO], 2016). Studies in the US, Canada, and the UK indicate that e-cigarette use among non-smoker adolescents substantially increases the risk of initiating cigarette use, raising concerns that e-cigarettes may promote cigarette smoking among youth who would not have otherwise

become smokers (Barrington-Trimis et al., 2016; Conner et al., 2017; Leventhal et al., 2015; Primack et al., 2015; Wills et al., 2017).

The prevalence of e-cigarette use in the U.S. was highest among persons aged 18 to 24 years, translating to approximately 2.8 million users in this age range. More than half the current e-cigarette users (51.2%) were younger than 35 years (Mirbolouk et al., 2018). This increasing prevalence of e-cigarette use raises a concern that it may lead to health problems. In October 2019, 1,080 lung injury cases associated with using e-cigarette, or vaping, products from 48 states and 1 U.S. territory was reported wherein approximately 80% of patients are under 35 years old, 16% of patients are under 18 years old and 21% of patients are 18 to 20 years old (CDC, 2019).

In the Philippines, 2015 Global Adult Tobacco Survey recorded that the overall prevalence of ever users and current users of e-cigarettes was 2.8 percent and 0.8 percent, respectively (DOH, 2019). The product is now being marketed to youth and racial/ethnic groups, with colorful and stylish packaging and flavors that mask the harsh and toxic properties of tobacco smoke (Carpenter et al., 2005). The DOH and Food and Drug Administration warn the public that e-cigarette is harmful and not risk free (DOH, 2019).

It is important to understand the why and how of smoking e-cigarette because users can be at risk to lifelong nicotine addiction through e-cigarette. Although studies were conducted exploring on e-cigarette awareness, perceived effect and factors influencing individuals to use e-cigarette is limited in the Philippine context.

Statement of the Problem

This study assessed the factors influencing the use of e-cigarette. It will specifically answer the following questions:

- 1. Is there a relationship between marketing, attitude, subjective norms and perceived behavioral control on the use of e-cigarette in terms of frequency, length, and amount of use?
- 2. Is there a relationship between advertisement, attitude, subjective norms and perceived behavioral control on the intention to use e-cigarettes considering age, educational attainment, and occupation?

Methodology

Research Design

A quantitative research design was employed for this study. The research focused on the factors affecting the use of e-cigarette. The study had several dependent and independent variables. The frequency, length, and amount of e-cigarette use were identified as dependent variables. Marketing, attitude, subjective norms, and perceived behavioral control on e-cigarettes were identified as independent variables. The age, educational attainment, and employment status were identified as mediating variables.

Population and Sampling Techniques

The respondents for the study were e-cigarette user in Laguna and Cavite. The

AUP Research Office	JHS Vol. 3 No. 2 December 2020				
loating on Cloud 9	": Factors	Influencing	the I	Jse of E-	Cigarette
--------------------	------------	-------------	-------	-----------	-----------
fouring on croud)	. 1 401015	minuemening	une e	500 OI L	orguiette

researchers utilized the purposive sampling technique, where the respondents (n = 34) were chosen according to the need of the research study. Thus, only those 18 years old and above were considered in the study.

Data Gathering Procedure

Cross sectional data was gathered through paper survey method distributed to the targeted individuals who use e-cigarette. Data collection was carried out in the 3rd week of November 2019 in Cavite and Laguna. Prior to the filling out of the survey, the researchers' names and the purpose of survey were explained to the respondents individually. All the respondents voluntarily participated in the study.

Instrumentation

A self-administered questionnaire was used to gather data for the study. The questionnaires consisted of 6 sections, namely: (a) demographic profile, (b) behavior-related questions, (c) marketing e-cigarette, (d) e-cigarette-related attitude, (e) e-cigarette-related subjective norms, and (f) e-cigarette-related perceived behavioral control.

The validity of the questionnaire was ensured by consulting the advisor of this study, three other health education experts in College of Health, and a statistician from a faith-based university.

Ethical Consideration

Prior to the implementation, approval for this study was obtained from the Research Committee of the researchers' institution. Furthermore, consent of the e-cigarette shop owners and respodents were obtained prior to the conduct of the study. They were fully informed about the purpose of the study and the procedures that were involved as well as the confidentiality of the study.

Data Analysis

The data of the study was statistically analyzed with the Statistical Package for Social Science (SPSS) computer software program. Descriptive statistic of frequencies, percentages, and central tendency measures such as mean and standard deviations were used to describe the demographic profile as well as the behavior (frequency, length, and amount of use) on e-cigarette. Pearson's correlation analysis was conducted to examine the relationship marketing, attitude, subjective norms, and perceived behavioral control on the behavior of using e-cigarette and the relationship considering the mediating variables.

Journal of Health Sciences | ISSN 2599-5456

Result and Discussion

E-cigarette internet vendors are actively engaged in various promotional activities to increase the appeal of their products online and the absence of FDA regulations specific to the Internet, the e-cigarette e-commerce marketplace is likely to grow (Mackey et al.,). This is found significant in the study; vast majority of the responents had heard about e-cigarettes from social or internet media sources.

Table 1 presents the descriptive analysis of accessible source of awareness among users. This study found that social and internet media (58.8%) had a higher significance among the sources of awareness, which is accessible among e-cigarette users, followed by shared information from a person (32.4%), and television (08.8%). This means that the trend in marketing e-cigarette product is now through online platform, it is less regulated and accessible by the consumer.

Source of Awareness	Ν	Frequency	Percentage
Shared Information from a person	34	11	32.4
Television	34	3	08.8
Social and Internet Media	34	20	58.8

Table 1. Descriptive Analysis of Accessible Source of Awareness Among Users

Table 2 presents the relationship between marketing, attitude, subjective norms, and perceived behavioral control on the use of e-cigarette considering the frequency. The study found that the use of e-cigarette in terms of frequency is statistically significant to marketing (p = 0.03) and subjective norms (p = 0.01) while it is not statistically significant to attitude (0.06) and perceived behavioral control (p = 0.63).

Table 2. Relationship Between Marketing, Attitude, Subjective Norms and Perceived Behaviora
Control on the of Using E-Cigarette Considering the Frequency

Factors	Pearson	p-value	Verbal Interpretation	
Marketing	-0.367	0.03	Significant	
Attitude	-0.329	0.06	Not Significant	
Subjective Norms	-0.451	0.01	Significant	
Perceived Behavioral Control	-0.085	0.63	Not Significant	

Table 3 presents the relationship between Marketing, Attitude, Subjective Norms and Perceived Behavioral Control on the use of e-cigarette considering the duration. The study found that the use of e-cigarette in terms of duration have a statistically significant relationship with marketing (p = 0.01) while it has no statistically significant relationship to attitude (p = 0.33), subjective norms (p = 0.08), and perceived behavioral control (p = 0.84).

"Floating on Cloud 9": Factors Influencing the Use of E-Cigarettes

Factors	Pearson	p-value	Verbal
			Interpretation
Marketing	0.422	0.01	Significant
Attitude	0.174	0.33	Not Significant
Subjective Norms	0.308	0.08	Not Significant
Perceived Behavioral Control	0.037	0.84	Not Significant

 Table 3. Relationship Between Marketing, Attitude, Subjective Norms, and Perceived Behavioral

 Control on the Use of E-Cigarette Considering the Duration

This study showed that marketing has a significant relationship on the frequency and long-term use of e-cigarette. This only means that the frequency and the duration of use has to do with how e-cigarette is being presented (safe to use than tobacco, easy to use, and it tastes good), how much will it cost (affordable, low maintenance cost, and discounted), how it is promoted (online marketing and product design) and the way the market place is situated (accessibility, availability, and comfortability). According to a study, one factor associated in e-cigarette use is the unique design and marketing features of it such as flavor and USB rechargeability that makes it more acceptable and appealing to young adults regardless of their smoking status (Vardavas et al., 2015).

There is a study that e-cigarette use was associated to higher exposure to secondhand smoke, smoking by any family member, friends who smoke, and witnessed smoking at school (Joung et al., 2016). In addition, it was reported that cigarette smoker was attracted to e-cigarette due to several reasons, including freedom to use them in some place were cigarette is banned and enjoyment of the "smoking experience" (Hales, 2019). In relation to the study, the result of this research also found the frequency of use has a significant relationship on the subjective norms. This only means that a positive environment, supportive family, and friends has a significant relationship on the frequency of using e-cigarette.

Table 4 presented the relationship between marketing, attitude, subjective norms, and perceived behavioral control on the use of e-cigarette considering the amount. This study found that the use of e-cigarette in terms of amount has a statistical relationship to attitude (p = 0.02) and perceived behavior (p = 0.05) while it has no statistically significant relationship to marketing (0.09) and subjective norms (p = 0.31).

Factors	Pearson	p-value	Verbal
			Interpretation
Marketing	0.296	0.09	Not Significant
Attitude	0.401	0.02	Significant
Subjective Norms	0.178	0.31	Not Significant
Perceived Behavioral Control	0.335	0.05	Significant

 Table 4. Relationship Between Marketing, Attitude, Subjective Norms and Perceived Behavioral

 Control on the Use of E-Cigarette Considering the Amount

Various studies discussed about users' perception on e-cigarette, mentioning that e-cigarettes are less unhealthy than cigarettes (Buczek et al., 2018), young adults perceived e-cigarettes (and aerosol) as less harmful, less addictive, and less popular than cigarettes (Jiang et al., 2019), e-cigarettes were healthier than traditional tobacco, which were also taken as common reasons for using e-cigarettes or a product that is healthier than cigarettes to quit smoking (Xu et al., 2016). These perceptions that e-cigarettes are less harmful than cigarettes, which in turn, were associated with higher recent e-cigarette use (Pokhrel et al., 2015).

This study showed that individual attitude (how it is being market as healthier and safer than tobacco, effective in losing weight, and relieving stress) has a significant relationship on the amount of nicotine use. According to a study, the amount of nicotine delivered seems to be a key factor that determines the e-cigarette pattern of use (Goniewicz et al., 2013). Moreover, the result of this study also shows that perceived behavioral control of a person also affects the amount of nicotine used in e-cigarette because it is easily purchased, stores are within their reach, it is not prohibited in the community, easy to use, and not expensive.

Behavioral Control on the Intention to Use E-Cigarettes Considering Age					
Factors	Pearson	p-value	Verbal		
			Interpretation		
Marketing	-0.010	0.95	Not Significant		
Attitude	-0.042	0.82	Not Significant		
Subjective Norms	-0.134	0.45	Not Significant		

-0.435

Table 5. Relationship Between Advertisement, Attitude, Subjective Norms, and Perceived toution to Use E C:- $D 1 \cdot 1 C$.1 T α

Table 5 shows that age has statistically relationship to perceived behavioral control (p =(0.01) while it has no statistically significant relationship to marketing (0.95), attitude (p = 0.82) and subjective norms (p = 0.45).

0.01

0.67

0.79

0.09

Significant

Not Significant

Not Significant

Not Significant

Behavioral	Control on the In	tention to Use E-Cig	arettes Consid	lering Educational Attainme
Factors		Pearson	p-value	Verbal
				Interpretation
Marketing		0.209	0.24	Not Significant

-0.076

-0.046

-0.296

Table 6. Relationship between Advertisement, Attitude, Subjective Norms, and Perceived nt

Table 6 shows that educational attainment has no statistically significant relationship to marketing (0.24), attitude (p = 0.67), and subjective norms (p = 0.79), and perceived behavioral control (p = 0.09).

40

Attitude

Subjective Norms

Perceived Behavioral Control

Perceived Behavioral Control

"Floating on Cloud 9": Factors Influencing the Use of E-Cigarettes

Factors	Pearson	p-value	Verbal
			Interpretation
Marketing	-0.123	0.49	Not Significant
Attitude	-0.227	0.20	Not Significant
Subjective Norms	-1.158	0.37	Not Significant
Perceived Behavioral Control	-0.245	0.16	Not Significant

 Table 7. Relationship Between Advertisement, Attitude, Subjective Norms, and Perceived

 Behavioral Control on the Intention to Use E-Cigarettes Considering Occupation

Table 7 shows that occupation has no statistically significant relationship to marketing (0.49), attitude (p = 0.20), and subjective norms (p = 0.37), and perceived behavioral control (p = 0.16).

Age, gender, education, ethnicity, and cigarette smoking are independently associated with awareness of e-cigarette (Yong et al., 2019), older age, male gender, conventional smokers, peer influence, daily smoking, and heavier smoking are the most common characteristics of adolescent e-cigarette users (Perikleous et al., 2018). Yet in this study, educational attainment and employment status has no relationship on the use of e-cigarette but considering age, it has a significant relationship on the behavioral control affecting the use of e-cigarette. This only means that age is a moderating factor on how easy or difficult to purchase e-cigarette, to look for e-cigarette stores, to use e-cigarette in the pubic place, the maintenance of e-cigarette and to save money to buy for e-cigarette.

Even though limited study was conducted in the Philippines on the factors affecting the use of e-cigarette, findings on this study showed that factors such as marketing, attitude, subjective norms and perceived behavioral control has a relationship on the use of e-cigarettes. Therefore, providing restriction on e-cigarette advertising, educating individuals and the community "they" belong will help the public health in addressing the increased prevalence of e-cigarette.

In addition, although this study showed the relationship of different factors affecting the use of e-cigarette. The study has its own limitation. The survey samples were limited only to 18 years old and above considering that parents of user's below 18 years old are not aware that their children are using e-cigarette. Moreover, the researcher is only limited only to analyzing the relationship of the variables not on the differences due to the number of sample size (N = 34) and considering the time to conduct the research is only 1 month. Thus, these quantitative findings should be tested in future studies with more sample size.

References

- Barrington-Trimis, J. L., Urman, R., Berhane, K., Unger, J. B., Cruz, T. B., Pentz, M. A., & McConnell, R. (2016). E-cigarettes and future cigarette use. *Pediatrics*, 138(1), e20160379.
- Buczek, E., Harrington, K., Hendricks, P., & Schmalbach, C. (2018). *Electronic cigarette awareness, use, and perceptions among cancer patients*. https://doi.org/10.1177/2473974X18774543
- Carpenter, C. M., Wayne, G. F., Pauly, J. L., Koh, H. K., & Connolly, G. N. (2005). New cigarette brands with flavors that appeal to youth: Tobacco marketing strategies. Health Affairs, 24(6), 1601-1610.
- Center for Disease Control and Prevention (2019). *Outbreak of lung injury associated with e-cigarette use, or vaping.* https://www.cdc.gov/tobacco /basic_information /e-cigarettes/ severe-lung-disease.html
- Conner, M., Grogan, S., Simms-Ellis, R., Flett, K., Sykes-Muskett, B., Cowap, L., & West, R. (2018). Do electronic cigarettes increase cigarette smoking in UK adolescents? Evidence from a 12-month prospective study. *Tobacco Control*, 27(4), 365-372.
- Department of Health (2019). *Electronic cigarette*. https://www.doh.gov.ph/node/64.
- Department of Health (2019). *DOH and FDA warns public of e-cigarette use*. https://www.doh. gov.ph/press-release/DOH-and-FDA-warns-public-of-e-cigarette-use
- Goniewicz, M. L., Lingas, E. O., & Hajek, P. (2013). Patterns of electronic cigarette use and user beliefs about their safety and benefits: An Internet survey. *Drug and Alcohol Review*, 32(2), 133-140.
- Hales, D. (2019). An invitation to health: Your life, your future (18th ed.). Cengage learning.
- Jiang, N., Cleland, C., Wang, M., Kwong, A., Lai, V., & Lam ,T. (2019). Perceptions and use of e-cigarettes among young adults in Hong Kong. https://bmcpublichealth.biomedcentral. com/articles/10.1186/s12889-019-7464-z
- Joung, M., Han, M., Park, J., & Ryu, S. (2016). Association between family and friend smoking status and adolescent smoking behavior and e-cigarette use in Korea. *International Journal of Environmental Research and Public Health*, *13*(12), 1183.
- Kim, A. E., Arnold, K. Y., & Makarenko, O. (2014). E-cigarette advertising expenditures in the US, 2011–2012. *American Journal of Preventive Medicine*, *46*(4), 409-412.

"Floating on Cloud 9": Factors Influencing the Use of E-Cigarettes

- Leventhal, A. M., Strong, D. R., Kirkpatrick, M. G., Unger, J. B., Sussman, S., Riggs, N. R., & Audrain-McGovern, J. (2015). Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *Jama, 314*(7), 700-707
- Mackey, T. K., Miner, A., & Cuomo, R. E. (2015). Exploring the e-cigarette e-commerce marketplace: identifying Internet e-cigarette marketing characteristics and regulatory gaps. *Drug and Alcohol Dependence, 156*, 97-103.
- McRobbie, H., Bullen, C., Hartmann-Boyce, J., & Hajek, P. (2014). Electronic cigarettes for smoking cessation and reduction. *Cochrane Database of Systematic Reviews*, (12).
- Mirbolouk, M., Charkhchi, P., Kianoush, S., Uddin, S. I., Orimoloye, O. A., Jaber, R., ... & Maziak, W. (2018). Prevalence and distribution of e-cigarette use among US adults: Behavioral risk factor surveillance system, 2016. *Annals of Internal Medicine*, 169(7), 429-438.
- Newton, D. E. (2017). Substance abuse: A reference handbook (2nd ed.). Cengage.
- Perikleous, E., Steiropoulos, P., Paraskakis, E., Constantinidis, T., & Nena, E. (2018). *E-cigarette* use among adolescents: An overview of the literature and future perspectives. https://doi.org/10.3389/fpubh.2018.00086
- Primack, B. A., Soneji, S., Stoolmiller, M., Fine, M. J., & Sargent, J. D. (2015). Progression to traditional cigarette smoking after electronic cigarette use among US adolescents and young adults. *JAMA Pediatrics*, 169(11), 1018-1023.
- Pokhrel, P., Fagan, P., Kehl, L., & Herzog, T. A. (2015). Receptivity to e-cigarette marketing, harm perceptions, and e-cigarette use. *American journal of Health Behavior*, 39(1), 121-131.
- Schneider, M. J. (2017). Introduction to public health (5th ed.). Jones & Bartlett Learning.
- Wills, T. A., Knight, R., Sargent, J. D., Gibbons, F. X., Pagano, I., & Williams, R. J. (2017). Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii. *Tobacco Control*, 26(1), 34-39.
- World Health Organization (2016). Electronic nicotine delivery systems and electronic nonnicotine delivery systems (ENDS/ENNDS).
- Vardavas, C. I., Filippidis, F. T., & Agaku, I. T. (2015). Determinants and prevalence of e-cigarette use throughout the European Union: A secondary analysis of 26 566 youth and adults from 27 Countries. *Tobacco Control*, 24(5), 442-448

- Xu, Y., Guo, Y., Liu, K., Liu, Z., & Wang, X. (2016). E-cigarette awareness, use, and harm perception among adults: a meta-analysis of observational studies. https://doi. org/10.1371/journal.pone.0165938
- Yong K, Chien, H., Hock, K. (2019). Sociodemographic differences in awareness of e-cigarette in Malaysia. https://doi.org/10.1016/j.jons.2019.04.001

Effectiveness of Mentawan Leaves (Poikilospermum suaveolens) as Mosquito Larvicide

Azielyn F. Faderogaya, Kurt G. Gatus and Pamela O. Nicol Adventist University of the Philippines

kggatus@aup.edu.ph

Abstract

The increase in dengue outbreaks and other mosquito-borne infections has become a growing health and economic problem in many parts of the globe. A necessary key to control its spread is the breaking down of the links in the chain of infection. One of the links in this chain is the mosquito vector. In this light, an extract of mentawan (Poikilospermum suaveolens) leaves was tested for its effectiveness as a larvicide against Aedes aegypti mosquito larvae. To determine the effectiveness of the mentawan leaf extract, third instar larvae of Aedes aegypti were exposed to serial dilutions of the extract after which the larval mortality rates were determined after 48 hours. The lethal concentration to kill 50% (LC50) and 90% (LC90) of larvae were then computed as 31240 ppm and 68129 ppm, respectively. The results showed that although the mentawan leaf extract possesses larvicidal activity against Aedes aegypti mosquito larvae, it is only effective when used in very high concentrations. The amount of the extract needed for effective killing was high for practical use. Further studies including larvae from other mosquito vector species such as Culex sp. and Anopheles sp. may be needed. Different extractions methods such as methanolic extraction and oil-based extraction methods may be used and the preparation of pellets to provide higher concentration of the active agents may also be explored.

Keywords: mentawan leaves, Aedes aegypti, terpenoids

Dengue has caused outbreaks in many parts of the globe. Aedes aegypti is a species of mosquito that transmits the disease along with Chikungunya and Zika virus. A very effective way of controlling and preventing the spread of dengue is the killing in the larval stages of the mosquito. Chemical-based insecticides are used to prevent and control the spread of the disease. Although chemical-based insecticides are used, it has hazardous effect in the health of the population. Several breakthroughs using plant-based insecticides were discovered in exchange of the use of chemical insecticides. Plant-based products can be an alternative to the hazardous effects of chemical-based insecticides that are commonly used to fog off

mosquitoes.

Poikilospermum suaveolens is dubbed as one of the miracle vines that emerge in deep seated forests used for medicinal purposes. It is called mentawan in Indonesia and hanapol in the Philippines. Researches point several plantbased insecticides that can kill adult mosquito and mosquito larvae such as Annona squamosa leaves, olive oil, eucalyptus oil, and aloe vera. There has been no conductive study regarding the larvicidal activity of mentawan leaves.

Determining the effectivity of mentawan leaves as mosquito larvicide will add to the plant-based insecticide products. Also, mentawan leaves are commercially available to be used. Identifying the toxicity of Journal of Health Sciences | ISSN 2599-5456

mentawan leaves is beneficial if it can be harmful or harmless to the environment while it kills mosquito larvae. Also, lethal concentrations of 50% and 90% are used to determine the rate of killing of mentawan leaves. Moreover, the duration of effect in killing mosquito larvae is studied to know how long it takes for mentawan leaves to kill mosquito larvae. Guidelines for laboratory and field testing of mosquito larvicides by the World Health Organization is the method used in testing the larvicidal activity of mentawan leaves against Aedes aegypti mosquito larvae. Aedes aegypti 3rd instar larvae and early 4th instar larvae were used in the study. The effectivity of mentawan leaves must be determined to stop the spread of the disease in the larval stage of the Aedes aegypti mosquito.

Mosquitoes, flies, ticks, and bugs do not only cause inconvenience at home, school, and when traveling. The Philippine Council for Health Research and Development (2016) states that mosquitoes have serious implications on the health of countless Filipino families and communities. In the study conducted by Berg et al. (2012), vector-borne diseases cause a major burden in the Philippines. Main diseases are malaria, dengue, lymphatic filariasis, schistosomiasis, and Japanese encephalitis.

Roque et al. (2014) states that dengue is a growing health concern in the Philippines. Dengue is a viral disease whose clinical spectrum ranges from unapparent to severe forms and fatal outcomes. Although dengue death is 99 % avoidable, every year around 20,000 deaths are estimated to occur in more than 100 countries. In the study conducted by Carabali et al. (2015), dengue is caused by the transmission to humans of one of the four dengue virus serotypes (DENV1, DENV2, DENV3 and DENV4) through the bite of Aedes mosquitoes.

They are originally from the African continent, which have adapted in urban tropical and subtropical environments. Besides representing a threat in disease transmission, large populations of mosquitoes are a nuisance, resulting in losses for tourism and limitations to work and leisure activities. Edillo et al. (2015) states that environmental risk factors and inconsistent preventive practices, in addition to urbanization, increasing population, inadequate public health infrastructure, poor solid waste management, and lack of an effective mosquito surveillance system contribute to the growing dengue challenge.

Because of the problems and threats which they represent for society, the mosquito populations should be monitored, and very often the use of control measures is necessary in the urban and rural environments. According to Monnerat (2012), the fight against mosquito larvae in their breeding sites, when the physical elimination of these sites is not viable, may be carried out with the periodic application of larvicides. The larvicides are divided into three groups: chemicals – organophosphates and pyrethroids, bioregulators – synthetic analogs of insect hormones and biologicals – entomopathogenic bacteria. Mdoe et al. (2014) specifies that targeting vector mosquitoes at the larval stage is the best alternative since larvae are relatively immobile and confined within a given geographical area, cannot change behavior to escape the effects of insecticides and thus became more vulnerable as compared to adult mosquitoes.

To minimize the dependency on chemical-based insecticides, more efforts are required toward development of alternative methods for controlling vector mosquitoes. In this regard, development of bio insecticide, has received much attention as they are considered more efficient, safe to environment and biodegradable compared to synthetic insecticides. Singhi et al. (2015) denotes that herbal origin insecticide comprises of number of secondary metabolites which act on both behavioral and physiological processes, therefore, ruling out the chances of resistance. According to Subeki (2008), alternative repellents such as eucalyptus oil, along with

46

camphor oil and clove oil, showed relatively high larvicidal effect.

Mdoe et al. (2014) states that plants constitute a rich source of active and effective compounds that are biodegradable and have traditionally been used to control mosquitoes. The complex and variable mixtures of bioactive compounds with different modes of action, offered by plants, may lessen the chance of resistance in mosquito populations. Searching for plant-based pesticides is of paramount importance in vector control and in overcoming prevailing vector resistance challenges. Guiterrez (2014) pointed that potential larvicidal activity is evaluated through determination of LC50 and LC90. Mosquito larval bioassay is used to determine the mortality of the mosquito larvae of Aedes aegypti.

Mentawan

According to StuartXchange (2015), Poikilospermum suaveolens, also known as hanopol in Tagalog and mentawan in Indonesia, is a stout and woody climber. Leaves are oblong-ovate or subobovate, 15 to 25 centimeters long, 8 to 15 centimeters wide, tapering to a point at the apex, rounded or heart-shaped at the base, smooth or hairy on both surfaces, dotted and streaked with cystoliths. It is common in forests at low and medium altitudes from northern Luzon to Mindanao. It grows along rivers and streams, and in brushwood and open forests. According to the National Parks Flora and Fauna (2019), it is well distributed in India, southeast China, Myanmar, Vietnam, Laos, Cambodia, the Philippines, south of Thailand, the Nicobar Islands, Sumatra, Peninsular Malaysia, Singapore, Borneo, Java, Sulawesi, and the Moluccas. It is commonly used for blisters or ulcers in mouth and tongue wherein the roots are boiled and rubbed in the infusion of the wound (International Tropical Timber Organization, 2020). In the study of Cheng (2007), a phytochemical analysis of mentawan leaves showed high levels of terpenoids (Appendix C) which have been known to play a role in plant-insect interactions.

Terpenoids

In the study conducted by Cheng (2007), terpenoids, which constitute the most abundant and structurally diverse group of plant secondary metabolites, play an important role in plantinsect, plant-pathogen, and plant-plant interactions. Terpenoids are commonly present in higher plants and more than 23000 individual structures have been identified. Terpenoids are normally produced in vegetative tissues, flowers, and, occasionally, roots.

According to Aharoni (2005), terpenoids are important for plant survival and also possesses biological properties that are beneficial to humans. The isoprenoid biosynthetic pathway generates both primary and secondary metabolites. Among the primary metabolites produced by this pathway are the phytohormones gibberellic acid (GAs), abscisic acid (ABA) and cytokinins; the carotenoids, chlorophylls and plastoquinones involved in photosynthesis; the ubiquinones required for respiration; and the sterols that influence membrane structure.

Many of the terpenoids are commercially interesting because of their use as flavors and fragrances in foods and cosmetics. In addition, terpenoids can have medicinal properties and ecological significance. Compounds such as the bitter triterpenoid cucurbitacins and the pungent diterpenoid polygodial have been shown to be involved in insect resistance.

Journal of Health Sciences | ISSN 2599-5456

Methodology

Preparation of Crude Extract

Twenty-seven kilograms of mentawan leaves were collected inside the campus of the Adventist University of the Philippines. Two areas were the subject of interest in acquiring mentawan leaves: the backyard of Balila residence and the area of Galicia residence in the vicinity of the motorpool.

Mentawan leaves were wiped with clean cloth to remove dirt and stems were cut. Twenty-four trays were loaded with mentawan leaves and an industrial heat pump at the Nutrition and Dietetics Department of AUP was used to facilitate the dehydration process of the leaves. The leaves were dehydrated for 6-8 hours and 4.5 kilograms of dried mentawan leaves were generated after the dehydration step. Figure 1 shows the leaves after cleaning and before the dehydration procedure.



Figure 1. Cleaned Mentawan Leaves Before Drying

The dried mentawan leaves were transported to the Department of Science and Technology, Taguig City for grinding and extraction procedures. After the mentawan leaves were ground into powder by an industrial grinder, a proportion of 1 kilogram of grinded mentawan leaves to 4 liters of ethanol was used for the soaking procedure. Figures 2 and 3 shows the grinder used for the dried leaves and the soaking of ground leaves in methanol, respectively.

48



Figure 2. Industrial Grinder for Grinding Mentawan Leaves



Figure 3. Grinded Mentawan Leaves Soaked in Ethanol

The ground leaves in ethanol were then filtered in a glass funnel with filter paper and collected in a large beaker. After the filtration step, the filtrate was loaded in a rotary evaporator to evaporate excess ethanol. The remaining solution was then placed on top of a water bath to produce a pasty mixture which results to the final product of crude ethanolic extract of mentawan leaves. Figures 4, Figure 5, and Figure 6 shows the respective setups.



Figure 4. Filtration of Soaked Mentawan Leaves



Figure 5. Pasty Mixture of Mentawan Extract in Water Bath



Figure 6. Filtered Mentawan Extract in Rotatory Evaporator

Test for Larvicidal Activity

Test Mosquitoes. The Aedes aegypti 3rd instar larvae used in the larvicidal study was reared in the Insectary of Standards and Testing Division, Industrial Technology Development Institute of the Department of Science and Technology at laboratory conditions of $25 \pm 2^{\circ}$ C temperature and $65 \pm 10\%$ relative humidity. Figure 7 shows the homogeneous batches of third instars to early fourth instars larvae that were used in the test.



Figure 7. Closer Look of Larvae Set-up

Materials for Testing. Pipettors, 1mL and 10mL capacity, and disposable tips were utilized for measuring aliquots of dilute solutions. Disposable Pasteur pipettes, 5mL and 10mL capacity were used to transfer third instar and early fourth instar larvae to 12oz disposable plastic cups or 250mL beakers containing the appropriate volume of solution concentration. A graduated cylinder of 100mL capacity and flask of 50mL capacity were used for measuring liquid volumes. Moreover, data recording forms were used during the test.

Serial Dilutions. A 10% or 100000 ppm (27.8g/ 278mL water with 5% ethanol of sample in 10mL + 268mL water) stock solution was prepared. The stock solution was serially diluted in water as per concentration used in the assay.

Bioassay. In the preliminary test, the 3rd instar and early 4th instar mosquito larvae were exposed to a range of test concentrations from 500 ppm to 5000 ppm and a control using dechlorinated tap water with 5% ethanol to determine the effective doses. After determining the mortality of larvae in this range of concentrations, another batch of larvae was exposed to concentrations from 5000 ppm to 30000 ppm. Final test for lethal doses were re-evaluated at concentration range indicated in Table 1. The appropriate volume of extract from the stock solution used in each concentration is added to 25mL dechlorinated tap volume starting with the lowest concentration as tabulated in Table 1.

52	Journal of Health Sciences ISSN 2599-54	156
Table 1. Final Test Concentration	ons of Crude Extract of Ment	tawan Leaves
Final Test Concentrations	Amount of plant extract	
(ppm)	solution added to 25mL	
	water (mL)	
15000	3.75	
30000	7.5	
45000	11.25	
60000	15	

Batches of 20 third instar and early fourth instar larvae were transferred by means of Pasteur pipette to 12oz plastic cups containing the appropriate volume of solution concentrations under test. Five replicates were set up at each concentration. Equal numbers of controls were set up simultaneously. For negative control, dechlorinated tap water with 5% ethanol was used. For positive control, Abate 1SG mosquito larvicide was used. The test containers were held at $25 \pm$ 2° C and relative humidity of $65 \pm 10\%$.

After 48 hours exposure, larval mortality was recorded. Moribund larvae were counted and added to dead larvae for calculating percentage mortality. Dead larvae are those that cannot be induced to move when they are probed with a needle in the siphon or the cervical region. Moribund larvae are that incapable of rising to the surface or not showing the characteristic diving reaction when the water is disturbed.

If the control mortality is between 5% and 20%, the mortalities of treated groups should be corrected by Abbott's formula:

> \underline{X} (100), where X = percentage survival in untreated control and % Mortality Y= percentage survival in the treated sample

Data Analysis

Data from all replicates were pooled for analysis. Standard deviation of the means of percent mortality was calculated. A test series is valid if the relative standard deviation (or coefficient of variation) is less than 25%. The LC50 and LC90 of larval population were calculated using linear regression probit analysis.

In the linear regression analysis, all the concentrations used in the assay were converted to log concentrations and all the observed mean percentage larval mortality at each concentration were transformed into probit to be able to obtain the linear regression line equation and to estimate the lethal doses at 50% and 90% larval kill.

Results and Discussion

The larvicidal activity of crude extract of mentawan leaves against Aedes aegypti mosquito third instar larvae (Table 1) were observed at concentrations ranging from 15000 ppm to 60000 ppm yielding percentage larval death from $15 \pm 5\%$ to $92 \pm 4.47\%$ after 48 hours exposure period. The LC50 and LC90 were estimated at 31240 ppm and 68129 ppm, respectively, with linear regression equation of Y = 3.78x - 11.99. Figure 8 presents the comparison of toxicity levels of the different extract concentrations.



Figure 8. Linear regression line equation of % larval kill response in probit to different log concentration of crude extract of mentawan leaves.

The larval mortality in the positive control, Abate 1SG Mosquito larvicide, was observed at a concentration range from 0.15 ppm to 1.2 ppm. The larval mortality rate was observed at $12.5 \pm 9.57\%$ to $93.75 \pm 6.29\%$ within 24 hours of exposure period. The LC50 and LC90 are 0.52 ppm and 1.22 ppm, respectively, with linear regression equation of Y = 3.46x + 5.98. Figure 9 presents the comparison of toxicity levels of the different concentrations of the control larvicide Abate 1SG.



Figure 9. Linear regression line equation of % larval kill response in probit to different log concentration of Abate 1SG Mosquito larvicide (positive control).

ournal of Health Sciences IS	SSN 2599-5456
--------------------------------	---------------

No larval death was observed in the negative control using dechlorinated tap water with 5% ethanol during 24 hours of exposure period. Mentawan leaves have compounds classified as terpenoids that have been shown to have the potential to kill mosquitos and mosquito larvae. The tests have revealed that a crude extract of mentawan leaves have in fact some larvicidal activity against Aedes aegypti.

However, the amount of extract needed to demonstrate detectable larvicidal effects range from 15000 ppm to 60000 ppm. An LC50 of 31240 ppm and LC90 of 68129 ppm may be too high to make the crude extract useful for practical applications. To achieve just 50% killing of larvae, the crude extract must be used in amounts equivalent to approximately 31.24% of the volume of water to be treated. Compared to these results, the study conducted by Govindarajulu (2015) in determining the larvicidal activity of the leaves of Annona reticulata, commonly known as "atis" or custard apple, showed dosages between 50 ppm to 250 ppm to demonstrate larvae mortality. Different kinds of extracts were prepared from the plant; aqueous, ethanolic and methanolic extracts. The methanolic extract proved to be most potent with the percentage mortality rate of the dosage increased starting from a 24-hour exposure to a 48-hour exposure of the dosage to the 3rd instar larvae. Compared to the custard apple leaf extract, the mentawan leaf extract was produced using ethanol instead of methanol as solvent. Whether improved larvicidal activity may be obtained from a methanolic extract of mentawan leaves was not determined in this study.

The result obtained in this study was contrary to the custard apple's result. Although mentawan leaves have previously tested to have high levels of terpenoids, it did not translate to effective larval killing at lower concentrations. There may be several potential explanations for the unexpected result. It may be possible that varying types of terpenoids found among different plant species have differing potencies where some are more effective than others in killing mosquito larvae. Another possibility could be an unexpected component degradation or volatilization of the active compounds during the processing and storage of the extract. To develop mentawan leaves as an effective and practical mosquito larvicide, the production of pellets with high concentrations of the effective compound may be a better alternative.

A crude ethanolic extract prepared from mentawan leaves (Poikilospermum suaveolens) have the ability to kill Aedes aegypti mosquito larvae. However, the amount of the extract needed for effective killing was too high for practical use.

Because only the species Aedes aegypti was tested against the mentawan leaf extract, further studies including larvae from other mosquito vector species such as Culex sp. and Anopheles sp. may be needed. Different extraction methods such as methanolic extraction and oil-based extraction methods may be used and the preparation of pellets to provide a higher concentration of the active agents may also be explored.

54

- References
- Aharoni, A., Jongsma, M.A., & Bouwmeester, H.J., (2005). Volatile science? Metabolic engineering of terpenoids in plants. *Trends in Plant Science*, 10(12), 594-602. https:// www.sciencedirect.com/ science/article/pii/S1360138505002566.
- Berg, H.V., Velayudhan, R., Ebol, Antonietta., Catbagan Jr., B.H.G., Turingan, R., Tuso, M., & Hii, J., (2012). Operational efficiency and sustainability of vector control of malaria and dengue: descriptive case studies from the Philippines. *Malaria Journal*, *11*, *269*. http:// www.ncbi.nlm.nih.gov/pmc/articles/PMC3425236/pdf/1475-2875-11-269.pdf.
- Carabali, M., Hernandez, L.M., Arauz, M.J., Villar, L.A., & Ridde, V., (2015). Why are people with dengue dying? A scoping review of determinants for dengue mortality. *BMC Infectious Diseases*, 15, 301. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4520151/ pdf/12879_2015_Article_1058.pdf
- Cheng, A.X., Yong-Gen, L., Ying-Bo, M., & Shan, L. (2007). Plant terpenoids: Biosynthesis and ecological function. *Journal of Integrative Plant Biology*, 49(2), 179–186. https://www. researchgate.net/publication/227601151.
- Edillo, F.E., Halasa, Y.A., Largo, F.M., Erasmo, N.V., Amoin, N.B., Alera, M.P., Yoon, I., Alcantara, A.C., & Shepard, D.S. (2015). Economic cost and burden of dengue in the Philippines. *The American Journal of Tropical Medicine and Hygiene*, 92(2), 360–366. http://www.ncbi.nlm.nih.gov/pubmed/25510723
- Govindarajulu, B., Srimathi, A., Bhuvana, R., & Karthikeyan, J. (2015). Mosquito larvicidal efficacy of the leaf extracts of Annona reticulata against Aedes aegypti. *International Journal of Current Microbiology and Applied Sciences*, 4(8), 132-140.
- Gutierrez, P., Antepuesto, M., Aubrey, N., Eugenio, B., & Santos, M. (2014). Larvicidal activity of selected plant extracts against the dengue vector Aedes aegypti mosquito. *International Journal of Biological Sciences*, *3*(4) 23-32.
- Mdoe, F.P., Cheng, S., Lyaruu, L., Nkwengulila, G., Chang, Shang-Tzen, C., & Kweka, E. (2014). Larvicidal efficacy of Cryptomeria japonica leaf essential oils against Anopheles gambiae. *Parasites & Vectors*, 7, 426 http://www.parasitesandvectors.com/ content/7/1/426.
- Monnerat (2012). Evaluation of different larvicides for the control of Aedes aegypti (Linnaeus) (Diptera: Culicidae) under simulated field conditions. BioAssay, 7, 3. http://www. bioassay.org.br
- Roque, V.G., Brett, J., Dizon, R., & L'Azou, M. (2014). Epidemiology of dengue disease in the philippines (2000–2011): A systematic literature review. *PLoS Neglected Tropical Diseases*, 8(11), e3027. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4222740/

- Singhi, M., Purohit, A., & Chattopadhyay, S. (2015). Effectiveness and feasibility of methanol extracted latex of Caloptropis procera as larvicide against dengue vectors of western Rajasthan, India. *Journal of Vector Borne*, 52(2), 142-146. http://search.proquest.com/ docviesacoountid=38643
- Subeki, S. (2008). Potency of the Indonesian medicinal plants as antimalarial drugs. *Jurnal Teknologi dan Industri Hasil Pertanian, 13*(1), 27. http://jurnal.fp.unila.ac.id/index.php/JTHP/article/view/80

Effects of Short-Term Lifestyle Intervention Program on the Anthropometrics, Biomarkers, Caloric Intake, and Physical Activity of Health workers: A Pilot Study

Maria Cecilia B. Torres and Milagros T. Leano Philippine Society of Sports Nutrition University of the Philippines, College of Chemistry 2052909@aup.edu.ph & mitleano@hotmail.com

Abstract

ifestyle Intervention Program can significantly improve in health knowledge, nutrition, and physical activity behavior. Health lecture is a primary intervention necessary to achieve a meaningful degree of prevention and protection. The current program is patterned after the Community Health Intervention Program (CHIP) by Dr. Hans Dhiel. The program rediscovers the patient's health in preventing, arresting, and reversing the disease. The current study aimed to determine the effects of a short-term lifestyle intervention program on the anthropometrics, biomarkers, caloric intake, and physical activity of health workers at risk of non-communicable disease. A prospective cohort research was conducted on 31 samples in Karuhatan, Valenzuela City. The information required for the study were collected using a self-constructed questionnaire and an adopted Finnish Type 2 Diabetes Risk Test. Data gathered were analyzed using MedCalc Version 19.5.3. Statistical tools used to answer the research questions include percentage, mean, paired t-test, one-way ANOVA, and multiple regression. There was no significant change in mean weight and BMI. However, the following biomarkers had significant change: waist circumference, waist to hips circumference, total body fat, fasting blood sugar, diastolic blood pressure, physical activity in all intensity types, energy, and fats intake. The study results provide local evidence of the potential effectiveness and feasibility of the 4- week intervention program. Further studies with extended time, increased intervals in health lectures and group exercises are recommended.

Keywords: *short-term lifestyle intervention, primary intervention, preventive health care, nutrition lecture, exercise*

Unhealthy diets and a lack of physical activity may lead to hypertension, elevate blood glucose, blood lipids, and obesity. (World Health Organization [WHO], 2018). These are called metabolic risk factors that can lead to cardiovascular disease; the leading non-communicable diseases (NCDs) cause premature deaths. Physical inactivity levels are rising in many countries with major implications for the prevalence of non-communicable diseases (NCDs) and the general health of the population worldwide (WHO, 2010). Globally, 1 in 4 adults is not active enough, and more than 80% of the world's adolescent population is insufficiently physically active (WHO, 2018). Furthermore, the Research Institute (2012) recommend that the public should practice healthy eating habits by consuming sufficient fruits and vegetables, healthy meat, and limiting high caloric food. It also suggests that being physically active prevents lifestyle-related non-communicable diseases. Today, non-communicable diseases (NCDs) are responsible for 7 out of 10 deaths 58

Journal of Health Sciences | ISSN 2599-5456

worldwide, with 85% of premature NCD deaths occurring in low- and middle-income countries (Center for Disease Control and Prevention [CDC], 2020]. The World Health Organization (2020) unit leads to the development of global policy and guidelines to advance physical activity promotion to people of all ages and abilities across multiple settings to reduce physical inactivity globally by 15% by 2030. The non-communicable diseases risk factors can be avoidable through a healthy lifestyle. (United Nations Children's Fund [UNICEF], 2020). The WHO (2010) recommends having at least 150 minutes of moderate-intensity physical activity throughout the week. For example, Jesmin et al. (2020) found out that even walking for ten weeks can significantly improve low HDL-C levels. Also, the Mayo Clinic (2019) recommends that as simple as daily brisk walking can help to live a healthier life. The faster, farther, and more frequently a person's walk, the greater the benefits. Moreover, a 4-week diet with exercise intervention has beneficial effects on weight loss and clinical parameters. (Tok et al., 2020).

Merriam-Webster (n.d.) defines short-term as occurring over or involving a relatively short period of time. The Comprehensive Health Intervention Program (2020), has seen significant improvement in health with a minimum of 4 weeks at minimal cost. There are limited studies on short-term lifestyle intervention programs, and to the best of our knowledge, there are no local studies yet that have been published. Having said the need for further investigation plus the emerging health problems of NCDs, a 4-week community-based lifestyle intervention program was developed in this study. The following specific research questions were addressed:

- 1: What are the effects of a short-term lifestyle intervention program on the anthropometrics, biomarkers, caloric intake, and physical activity of health workers at risk of non-communicable disease?
- 2: Is there a significant difference in the caloric intake of the respondents when grouped according to physical activity?
- 3: Does blood pressure and body fat percentage had an effect on food intake?
- 4: Does blood pressure and body fat percentage had an effect on physical activity?

Theoretical Framework

The current program was inspired by a behavior change framework designed by Gianz, Rimer and Lewis in 2002, that has been and is still widely used throughout the world. The health belief model is the reference for various health interventions in order to reduce or eliminate the risk. (Green et al., 2020).

Methodology

Research Design

The study is a prospective cohort research design to assess the effects of the short-term lifestyle intervention program on the respondents' anthropometrics, biomarkers, caloric intake, physical activity, determine any significant difference in the caloric intake based on respondents' physical activity. The current study was patterned after the CHIP (Complete Health Intervention Program, 2020) developed by Dr. Hans Dhiel in 1998. However, modifications were performed in reference to the respondents' convenience and availability of resources.

The respondents were drawn through a simple random sampling comprising 59 Barangay Health Workers (BHW) from Karuhatan, Valenzuela City. The mean age of the respondents was 46, and females in general (n = 31). The civil status are as follows; single (n = 7), married (n = 22) and separated (n = 2).

Instrumentation

A self - constructed survey questionnaire and the adopted Finnish Diabetes Risk Score (FINDRISC, 2019) was used for the data collection.

Health worker's demographic information. Health workers were asked to provide information about their age, gender, religion, marital status, educational background, and contact details.

Diabetes risk category. The pointing system used in the adopted Finnish Diabetes Disease Risk are as follows: (a) slightly elevated risk -7 to 11 points (1 in 25), (b) moderate risk -12 to 14 points (1 in 6), (c) high risk -15 to 20 points (1 in 3) and (d) very high risk -21 points or over (1 in 2).

Anthropometric measurement. A research assistant measured the following anthropometrics; height and weight, waist and hips circumference, body fat percentage, and blood pressure. The World Health Organization WHO (2020) was the reference used to assess the Body Mass Index BMI. Measured in kg/m2, the classification are as follows: <18.5 =underweight, 18.5 to 24.9 = normal, 25 to 29.9 = overweight and > 30 = obese. Meanwhile, the World Health Organization WHO (2011) reference was used to categorize the waist circumference: < 80 centimeters = ideal, and > 80 centimeters = not ideal. The Tanita UM073 was the body impedance analyzer used to assess the body fat percentage. The total body fat classification was based on the respondents' age and height. (Tanita, 2020). The blood pressure was measured using an aneroid sphygmomanometer and was classified according to the Philippines Heart Association Clinical Practice Guidelines (2014). Measured in mmHg, the classification of systolic blood pressure are as follows: < 120 = ideal, 120 to 139 = prehypertensive, and > 140 = hypertensive. On the other hand, the classification for the diastolic blood pressure are as follows: < 80 = ideal, 80 to 89 = pre-hypertensive, and > 90 = hypertensive.

Biomarker screening. The same laboratory took the fasting blood sugar of the respondents. The respondents' fasting blood sugar were classified according to the guidelines of the American Diabetes Association (2016). Measured in mg/dL, the classification of fasting blood sugar are as follows: < 100 mg/dL = ideal range, 100 - 125 mg/dL = pre-diabetes, and > 125 mg/dL = person with diabetes.Food intake. Using the self-constructed diary, the respondents recorded their food intake from baseline to 4th week. Measured in calories, the detailed food intake has been categorized according to macronutrient content (carbohydrates, protein, and fat).

Physical activity. Using the self-constructed diary, the respondents recorded their physical activity for the baseline data (3-days) to 4th week. The physical activity was classified according to the intensity and mean weight, these were the values used to compute for the energy cost. (The Compendium of Physical Activities Tracking Guide, 2011). The intensity levels of activities (duration in minutes) are categorized into the following: LPA - low impact physical activities, MPA - moderate impact physical activities, and VPA -vigorous physical activities.

Data Gathering Procedure

The respondents were initially assessed through anthropometrics (weight, waist circumference, waist-to-hips circumference, and body fat percentage), biomarker screening (blood pressure and fasting blood sugar). The respondents submitted baseline data (3-day food and physical activity recall) before the intervention. These were the references used to compare the effects of the short-term lifestyle intervention program to the health workers. The respondents attended a one-hour live lecture on nutrition and another one-hour for group exercise. The activity was conducted once a week for four weeks. During the program, the respondents recorded their daily food intake and physical activity in a program designed diary. After the intervention, the respondents had a post-screening. Finally, pre- and post-data were evaluated.

Analysis of Data

The data were analyzed using MedCalc Version 19.5.3. The differences from all continuous variables (weight, BMI, waist circumference, hips circumference, waist to hips circumference, body fat percentage, systolic blood pressure, diastolic blood pressure, fasting blood sugar) were measured and compared from baseline (3-day recall) to post-intervention using the paired t-test. The Analysis of Variance was the treatment used to compare the weekly food intake and physical activities from baseline to post-intervention. The Post – hoc Analysis was applied to support the results from the ANOVA further. Also, to identify in which week does the variable statistically improved. Multiple Regression was used to predict the relationship between the following independent variables: fasting blood sugar, blood pressure (systolic and diastolic), percent body fat, and with the independent variables: food intake (energy, carbohydrates, protein, and fats) with physical activity (LPA, MPA, and VPA).

Ethical Considerations

The accredited ethics committee provided ethical clearance for the study and requested the Philippine Women's University Health Department to seek permission in conducting the study. Informed consent was obtained from the respondents. Both the administration and collection of questionnaires were anonymous, and information was kept in strict confidentiality.

Results and Discussion

Disease Risk Assessments

The respondents' risk of developing Type 2 Diabetes Mellitus results are as follows: (1) slightly elevated risk – 55 %, (2) moderate risk – 22%, (3) high risk – 12%, and (4) very high risk – 11%. Table 1 shows that there were no significant reductions in the following categories: mean body weight, BMI, and hips circumference. Meanwhile, the waist circumference had a significant decrease of 3.98 centimeters (p < 0.0001) that resulted in a significant reduction of the waist to hip ratio of 3.22%. Lastly, the same was also seen on body fat percentage, with a parameter reduction of 2.68% (p < .0184).

Anthronometric	Baseline	Post						
Data		Intervention	% Diff	Change	t-value	p-value	VI	
2	Mea	an ± SD						
Weight (lbs. & kgs)	134.9 (61.3) ± 20.86	$\frac{134.1(60.9) \pm}{20.32}$	0.59	0.8	1.96	0.06	NS	
BMI (kg/m²)	$\begin{array}{c} 26.5 \pm \\ 4.09 \end{array}$	26.3 ± 3.98	0.75	0.2	-1.45	0.16	NS	
Waist circumfer- ence (cm)	88.7 ± 8.2	86 ± 7.39	3.04	2.7	-5.48	**0.0001	S	
Hips circumference (cm)	95.3 ± 6.61	95.5 ± 6.93	-0.2	-0.2	0.26	0.79	NS	
Waist to hip ratio	$\begin{array}{c} 0.93 \pm \\ 0.06 \end{array}$	0.9 ± 0.06	3.22	0.03	-4.3	**0.0002	S	
Body Fat %	37.3 ±	36.3 ± 5.6	2.68	1	-2.51	*0.0184	S	

Effects of Short-Term Lifestyle Intervention Program on the Anthropometrics, Biomarkers, Caloric Intake, and Physical Activity of Health workers	61
Table 1. Baseline and Post Intervention Anthropometric Measurements Mean Changes	

Note. BMI = Body Mass Index (World Health Organization), Waist to hips circumference (The Food and Nutrition Research Institute – Department of Science and Technology). Body Fat Percentage (Tanita- gender for age). *p <0.05, ** p < 0.01, S = Significant, NS = Not Significant. Paired t-test was used to compare all the anthropometric measurements from baseline to post-intervention.

The fasting blood sugar results showed that the normal fasting blood glucose respondents had no significant change from 87 to 92 mg/dL (p > 0.423). The pre-diabetes respondents had a significant decrease on their FBS from 109 to 97 mg/dL of about 10.18 % (p < 0.0002). The respondents' classified with more than 125 mg/ dL of fasting blood glucose results had a significant decrease of 60 mg/dL (p < .008). On the other hand, the pre-hypertensive respondents had a significant decrease of 3.75% from 80 to 77 mmHg (p < 0.0379). The hypertensive group had a significant decrease of 13.83% (p < 0.0004). Table 2 shows the comparison mean food intake wherein the energy and fats had a significant decrease (p < 0.05).

Food Intake	Baseline	Week 1	Week 2	Week 3	Week 4	p-value	VI
Energy	$1843 \pm$	$1460 \pm$	$1407 \pm$	$1479 \pm$	$1559 \pm$	*.001	S
	566.16	241.44	281.12	343.83	459.36		
Carbohydrates	$244 \pm$	$181 \pm$	$196 \pm$	$177 \pm$	$217 \pm$	0.504	NS
	222.69	115.31	111.02	117.99	200.62		
Protein	$81 \pm$	$75 \pm$	71 ±	$57 \pm$	$73 \pm$	0.064	NS
	29.20	35.15	36.03	22.48	27.41		
Fats	$55 \pm$	$46 \pm$	39 ± 9.88	$44 \pm$	$44 \pm$	*.001	S
	13.47	15.05		17.63	15.98		

Note. *p <0.05, S = Significant, NS = Not Significant., VI-Verbal Interpretation

Post-hoc Analysis of Macronutrients Intake

There was a significant decrease in values from baseline to 1st week, and the mean observation remains stable until 3rd week. There was a post-hoc analysis for the mean calories and fat intake because there was a significant reduction in mean calories from baseline to 4th week. However, the carbohydrates and protein mean intake was not significant, resulting in no post-hoc analysis.

Multiple Regression Analysis

Table 3 shows the relationship of food intake with the biomarkers (systolic and diastolic blood pressure, fasting blood sugar, and body fat percentage). Univariately, energy is significantly related to FBS with a coefficient of 0.052 (p < 0.018). Food intake was also observed not significant with SBP, DBP, and BF (p > 0.676). Therefore, a unit decreases in energy leads to a decrease in FBS by 0.052.

Table 3. Relationship of the Mean Food Intake with Blood Pressure, Fasting Blood Sugar andPercent Body Fat

Food	SBP		DBP		FBS		BF	
Intake	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Energy	0.006721	0.2854	0.002281	0.4708	0.05199	*.0180	0.000569	0.8185
Carbohy- drates	0.006396	0.6667	0.00375	0.618	-0.04645	0.3499	-0.0006734	0.2614
Protein	0.04894	0.6384	0.07956	0.1398	0.09871	0.775	0.01708	0.6809
Fats	0.1484	0.4208	0.04579	0.6221	0.7055	0.2528	0.04071	0.5786
R-square	0.1		0.1338		0.3061		0.1021	
P-value	0.6399		0.4866		0.0676		0.6303	
Interpretation	Not Significant		Not Significant		Not Significant		Not Significant	

Note. * S = Significant Variables, BPS = Blood Pressure (Systolic),

BPD = Blood Pressure (Diastolic), FBS = Fasting Blood Sugar, BF = Percent Body fat

Table 4 shows the relationship of the mean physical activity (LPA, MPA, &VPA) with the biomarkers (blood pressure, fasting blood sugar, and body fat percentage). The three intensity levels of activities significantly increased from baseline to 4th week (p < 0.05). Meanwhile, results depicted that the biomarkers are significantly dependent on the intensity levels. However, the intensity levels were not significantly related to biomarkers.

62

Effects of Short-Term Lifestyle Intervention Program on the Anthropometrics, Biomarkers, Caloric Intake, and Physical Activity of Health workers	63
Table 4. Relationship of the Mean Physical Activity with Blood Pressure, Fasting Blood Sugar,	
Rody Fat Percentage	

Food	SBP		DBP		FBS		BF	
Intake	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
LPA	0.01848	0.3403	0.005289	0.5998	0.007215	0.9206	-0.0008051	0.9186
MPA	-0.237	0.3785	-0.004072	0.9768	-0.9113	0.3695	-0.007416	0.946
VPA	-0.1481	0.602	0.06654	0.6542	0.7506	0.4843	0.04452	0.702
R-square	0.058	0.05876 0.03014		14	0.06422		0.006947	
P-value	0.6862		0.8615		0.6536		0.9822	
Interpretation	Not Significant		Not Significant		Not Significant		Not Significant	

Note. S =**Significant Variables, LPA*= *Low Impact Physical Activity, MPA* = *Moderate Impact Physical Activity,* VPA =Vigorous Physical Activity.

After the lifestyle intervention program was applied, there was no significant reduction in weight, which correlates to no change in BMI. However, the significant decrease in waist circumference had a correlation effect that improved the waist to hip reduction and total body fat percentage. The mean average results for the waist circumference, waist - to hips ratio and body fat percentage, fasting blood sugar, and diastolic blood pressure have significant changes. (Berendsen et al., 2020, Devaraj et al., 2020, Kim et al., 2020, Salmon et al., 2020, & Seo et al., 2019). The current study was in contrast with the study results conducted by Ndgwa et al. (2020) wherein no significant reductions were observed, though implemented in 8 months.

There was an improvement in food preference, wherein the calories and fat intake were reduced. (Mamun et al., 2020; Schyns et al., 2020). Aside from that, there was an increase in the modality and intensity of activities. (Leung et al., 2020). Even after the intervention, the food intake and physical activity had also improved. (Mackenzie et al., 2019).

There are several limitations observed in the current study. First, some respondents' intake of medication can be a confounder of lowering the blood pressure and fasting blood sugar. Also, the respondents were all female, which means that results may vary to male respondents. Next is that a control group can be included to determine more outcomes. (Dellis et al., 2020; Ho et al., 2020; Kim et al., 2020; Latina et al., 2020; Yadav et al., 2019). Finally, being a relatively small cohort will not provide remarkable results. Although there are statistically significant results, these are not considered clinically significant. Additionally, the significant results also show a trend of improvement.

There are several recommendations for this current study. First, additional tests such as visceral fat, muscle mass percentage, and further biochemical screening are suggested to determine other favorable effects. Furthermore, the inclusion of psychological well-being tests can also be considered. (Hardman et al., 2020; Jiskoot et al., 2020; Sakane et al., 2020). Finally, the program is advised to be extended so that confident results can be achieved. (Amer et al., 2020; Palau et al., 2020; Silva et al., 2020; Taheri et al., 2020; Takaeuchi et al., 2020; Wekker et al., 2019).

Conducting the study was an ideal kick start for the respondents to pursue a healthy lifestyle. As previously mentioned, the current pilot study has been found beneficial to the respondents, specifically the improvement in caloric intake and the physical activity. The intervention can be developed through a more intense, continuous, and more systematized program. Early prevention is cost-effective instead of treatment. Conducting an intervention AUP Research Office

program on persons with pre-existing non-communicable disease may not result in favorable effects. (Huppertz et al., 2020; Pandey et al., 2020).

Lifestyle intervention program may help the health care professionals and other health agencies to delay the onset of non-communicable diseases. The current program can provide valuable information in policymaking since the country has limited programs for primary intervention and management of non-communicable diseases.

References

- Amer, O. E., Sabico, S., Alfawaz, H. A., Aljohani, N., Hussain, S. D., Alnaami, A. M., & Al-Daghri, N. M. (2020). Reversal of prediabetes in Saudi adults: Results from an 18-month lifestyle intervention. *Nutrients*, 12(3), 804. https://doi.org/10.3390/nu12030804
- American Diabetes Association (2016). Standards of medical care in diabetes 2016: Summary of Revisions. *Diabetes Care, S4-S*5. https://doi.org/10.2337/dc16-S003
- Berendsen, B. A., Hendriks, M. R., Rutten, G. M., Kremers, S. P., Savelberg, H. H., & Schaper, N. C. (2020). The added value of frequent physical activity group sessions in a combined lifestyle intervention: A cluster randomised trial in primary care. *Preventive Medicine Reports, 20, 101-204*. https://doi.org/10.1016/j.pmedr.2020.101204
- Canadian Task Force on Preventive Health Care (2019). *Diabetes, Type 2—Clinician FINDRISC*. https://canadiantaskforce.ca/tools-resources/type-2-diabetes-2/type-2-diabetes-clinician-findrisc/
- Center for Disease Control and Prevention. (2020, May 26). Global non-communicable diseases. *Global Health Protection and Security*. https://www.cdc.gov/globalhealth/ healthprotection/ncd/index.html
- Compendium of Physical Activities (2011). 2011 Adult compendium of physical activities.http:// prevention.sph.sc.edu/tools/docs/documents_compendium.pdf
- Complete Health Intervention Program (2020). *A lifestyle medicine solution*. https://chiphealth.com/
- Dellis, D., Tsilingiris, D., Eleftheriadou, I., Tentolouris, A., Sfikakis Jr, P. P., Dellis, G., & Tentolouris, N. (2020, April). Carbohydrate restriction in the morning increases weight loss effect of a hypocaloric Mediterranean type diet: A randomized, parallel group dietary intervention in overweight and obese subjects. *Nutrition*, 71, 110578. https://doi. org/10.1016/j.nut.2019.110578

Devaraj, S., Rockette-Wagner, B., Arena, V., Miller, R. G., Napoleone, J., Conroy, M., &

Effects of Short-Term Lifestyle Intervention Program on the Anthropometrics, Biomarkers, Caloric Intake, and Physical Activity of Health workers 65

- Kriska, A. M. (2020, March 2). The impact of a yearlong diabetes prevention program-based lifestyle intervention on cardiovascular health metrics. *Circulation*, 141. https://doi. org/10.1161/circ.141.suppl_1.P438
- Food and Nutrition Research Institute (2012). Nutritional guidelines for Filipinos: A prescription to good nutrition. *Department of Science and Technology*. http://www.fnri.dost.gov.ph
- Green, E.C., Murphy, E.M., & Gryboski, K. (2020). The health belief model. *The Wiley Encyclopedia of Health Psychology*. https://doi.org/10.1002/9781119057840.ch68
- Hardman, R. J., Meyer, D., Kennedy, G., Macpherson, H., Scholey, A. B., & Pipingas, A. (2020, April 18). Findings of a pilot study investigating the effects of Mediterranean diet and aerobic exercise on cognition in cognitively healthy older people living independently within aged-care facilities: The lifestyle intervention in independent living aged care (LIILAC) Study. *Current Developments in Nutrition, 4*(5). https://doi.org/10.1093/cdn/ nzaa077
- Ho, M., Chau, P. H., Yu, E. Y. T., Ying, M. T. C., & Lam, C. L. K. (2020). Protocol: Communitybased weight loss programme targeting overweight Chinese adults with pre-diabetes: Study protocol of a randomised controlled trial. *BMJ Open*, 10(4). https://dx.doi. org/10.1136%2Fbmjopen-2019-035196
- Huppertz, N., Beetham, K. S., Howden, E. J., Leicht, A. S., Isbel, N. M., & Coombes, J. S. (2020, March). A 12-month lifestyle intervention does not improve cardiac autonomic function in patients with chronic kidney disease. *Autonomic Neuroscience*, 224, 102642. https://doi.org/10.1016/j.autneu.2020.102642
- Jesmin, S., Sohael, F., Rahman, M. A., Maqbool, A., Islam, M. M., Shima, T., & Takeda, F. (2020, March 13). Short-term lifestyle intervention program through daily walking improves circulatory low HDL level in rural Bangladeshi women. *The Journal of Physical Fitness and Sports Medicine*, 9(4), 181-190. https://doi.org/10.7600/jpfsm.9.181
- Jiskoot, G., Dietz de Loos, A., Beerthuizen, A., Timman, R., Busschbach, J., & Laven, J. (2020, June 1). Long-term effects of a three-component lifestyle intervention on emotional well-being in women with polycystic ovary syndrome (PCOS): A secondary analysis of a randomized controlled trial. *Plos One*, 15(6), e0233876.https://doi.org/10.1371/journal. pone.0233876
- Kim, S. R., Nho, J. H., Kim, J. Y., & Hur, J. (2020). Effects of a lifestyle intervention based on type D personality in overweight and obese middle-aged women: A feasibility study. *Worldviews on Evidence-Based Nursing*. https://doi.org/10.1111/wvn.12457
- Latina, J., Fernandez-Jimenez, R., Bansilal, S., Sartori, S., Vedanthan, R., Lewis, M., & Farkouh, M. (2020). Grenada heart project–community health action to encourage healthy behaviors (GHP-CHANGE): A randomized control peer group–based

Journal of Health Sciences | ISSN 2599-5456

lifestyle intervention. *American Heart Journal, 220*, 20-28. https://doi.org/10.1016/j. ahj.2019.08.022

- Leung, A. W., Chan, R. S., Sea, M. M., & Woo, J. (2020). Psychological factors of long-term dietary and physical activity adherence among Chinese adults with overweight and obesity in a community-based lifestyle modification program: A mixed-method study. *Nutrients, 12*(5), 1379. https://doi.org/10.3390/nu12051379
- Mackenzie, R. M., Ells, L. J., Simpson, S. A., & Logue, J. (2019, November 22). Core outcome set for behavioral weight management interventions for adults with overweight and obesity: Standardized reporting of lifestyle weight management interventions to aid evaluation (STAR-LITE). *Obesity Reviews*, 21(2). https://doi.org/10.1111/obr.12961
- Mamun, A., Kitzman, H., & Dodgen, L. (2020, September 4). Reducing metabolic syndrome through a community-based lifestyle intervention in African American women. *Nutrition, Metabolism and Cardiovascular Diseases*. https://doi.org/10.1016/j.numecd.2020.06.005
- Mayo Clinic. (2019). Walking: Trim your waistline, improve your health. *Fitness*. https://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/walking/art-20046261

Merriam-Webster (n.d). Short-term. https://www.merriam-webster.com/dictionary/short-term

- Ndwiga, D. W., MacMillan, F., McBride, K. A., Thompson, R., Reath, J., Alofivae-Doorbinia, O., & Simmons, D. (2020). Outcomes of a church-based lifestyle intervention among Australian Samoans in Sydney–Le Taeao Afua diabetes prevention program. *Diabetes Research and Clinical Practice*, 160, 108000. https://doi.org/10.1016/j. diabres.2020.108000
- Palau-Rodriguez, M., Garcia-Aloy, M., Miñarro, A., Bernal-Lopez, M. R., Brunius, C., Gómez-Huelgas, R., & Andres-Lacueva, C. (2020). Effects of a long-term lifestyle intervention on metabolically healthy women with obesity: Metabolite profiles according to weight loss response. *Clinical Nutrition*, 39(1), 215-224. https://doi.org/10.1016/j. clnu.2019.01.018
- Pandey, A., Patel, K. V., Bahnson, J. L., Gaussoin, S. A., Martin, C. K., Balasubramanyam, A., & Berry, J. D. (2020, March 5). Association of intensive lifestyle intervention, fitness, and body mass index with risk of heart failure in overweight or obese adults with type 2 diabetes mellitus: An analysis from the look AHEAD trial. *Circulation*, 141(16), 1295-1306. https://doi.org/10.1161/CIRCULATIONAHA.119.044865
- Philippine Heart Association Inc. (2014). 2014 PHA Clinical practice guidelines for the diagnosis and management of patients with coronary artery disease. *Philippine College of Cardiology*. https://www.philheart.org/images/guidelines/cad2014.pdf

66

Effects of Short-Term Lifestyle Intervention Program on the Anthropometrics, Biomarkers, Caloric Intake, and Physical Activity of Health workers 67

- Sakane, N., Kotani, K., Suganuma, A., Takahashi, K., Sato, J., Suzuki, S., & Kuzuya, H. (2020).
 Effects of obesity, metabolic syndrome, and non-alcoholic or alcoholic elevated liver enzymes on incidence of diabetes following lifestyle intervention: A sub analysis of the J-DOIT1. *Journal of Occupational Health*, 62(1), e12109. https://doi.org/10.1002/1348-9585.12109
- Salmon, M., Wright, B., Kridl, T., Faircloth, G., Salmon, R., & Gordon, N. (2020). 273 OR: Comparative effectiveness of lifestyle intervention on fasting plasma glucose in normal weight vs. overweight/obese adults with prediabetes. https://doi.org/10.2337/db20-273-OR
- Seo, Y.G., Lim, H., Kim, Y., Ju, Y.S., Lee, H.J., Jang, H.B., Park, S.I., & Park, K.H. (2019, January 10). The effect of a multidisciplinary lifestyle intervention on obesity status, body composition, physical fitness, and cardiometabolic risk markers in children and adolescents with obesity. *Nutrients. 11*(1), 137. https://doi.org/10.3390/nu11010137
- Silva, A. M., Nunes, C. L., Matias, C. N., Jesus, F., Francisco, R., Cardoso, M., & Martins, P. (2020, January 19). Champ4life study protocol: A one-year randomized controlled trial of a lifestyle intervention for inactive former elite athletes with overweight/obesity. *Nutrients*, 12(2), 286. https://doi.org/10.3390/nu12020286
- Schyns, G., van den Akker, K., Roefs, A., Houben, K., & Jansen, A. (2020, June). Exposure therapy vs lifestyle intervention to reduce food cue reactivity and binge eating in obesity: A pilot study. *Journal of Behavior Therapy and Experimental Psychiatry*, 67, 101453. https://doi.org/10.1016/j.jbtep.2019.01.005
- Taheri, S., Zaghloul, H., Chagoury, O., Elhadad, S., Ahmed, S. H., El Khatib, N., & Al-Hamaq, A. (2020, June 6). Effect of intensive lifestyle intervention on bodyweight and glycaemia in early type 2 diabetes (DIADEM-I): an open-label, parallel-group, randomised controlled trial. *The Lancet Diabetes & Endocrinology*, 8(6), 477-489.https://doi. org/10.1016/S2213-8587(20)30117-0
- Takeuchi, Y., Kashiwabara, K., Hosoi, H., Imai, H., & Matsuyama, Y. (2020, December). Longitudinal effects of a nationwide lifestyle intervention program on cardiometabolic outcomes in Japan: An observational cohort study. *Preventive Medicine*, 106301. https:// doi.org/10.1016/j.ypmed.2020.106301
- Tanita. (2020). *Body fat percentage. Know your measurements*. https://www.tanita.com/en/ understanding-your-measurements/
- Tok, Ö., Kisioglu, S. V., Ersoz, H. Ö., Kahveci, B., & Goktas, Z. (2020). A 4-week diet with exercise intervention had a better effect on blood glucose levels compared to diet only intervention in obese individuals with insulin resistance. *The Journal of Sports Medicine* and Physical Fitness. https://doi.org/10.23736/S0022-4707.20.11188-5

68

- United Nations Children's Fund UNICEF. (2020). Behaviours that lead to disease often emerge during childhood and adolescence. *Non-Communicable Diseases*. https://www.unicef. org/health/non-communicable-diseases
- Wekker, V., Huvinen, E., Van Dammen, L., Rono, K., Painter, R. C., Zwinderman, A. H.,
 & Hoek, A. (2019). Long-term effects of a preconception lifestyle intervention on cardiometabolic health of overweight and obese women. *European Journal of Public Health*, 29(2), 308-314. https://doi.org/10.1093/eurpub/cky222
- World Health Organization (2020). *More physical activity*. https://www.who.int/teams/health-promotion/physical-activity
- World Health Organization (2018, June 1). *Who is at risk of such diseases? Non-communicable diseases.* https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
- World Health Organization (2018, February 18). *Physical activity*. https://www.who.int/news-room/fact-sheets/detail/physical-activity
- World Health Organization. (2011, May 16). *Waist circumference and waist-hip ratio: report of a WHO expert consultation*. https://www.who.int/publications/i/item/9789241501491
- World Health Organization (2010, November 30). *Global recommendations on physical activity for health*. https://www.who.int/publications/i/item/9789241599979
- Yadav, R., Yadav, R. K., Khadgawat, R., Pandey, R. M., Upadhyay, A. D., & Mehta, N. (2019, January 7). Randomized controlled trial of a 12-week yoga-based (including diet) lifestyle vs. dietary intervention on cardio-metabolic risk factors and continuous risk score in Indian adults with metabolic syndrome. *Behavioral Medicine*, 46(1), 9-20. https://doi.org/10.1080/08964289.2018.1538098

Coping With Coal: Exploring the Experience of Communities Near a Coal-Fired Power Plant- Basis for a Module on Community Capacity Building Program

Mary Jane Botabara-Yap, Marife Villamiel, Zenaida D. Willison and Mechelle Palma Adventist University of the Philippines mjbbotabara@aup.edu.ph

Abstract

oal is the largest source of energy on earth and is used to supply electricity in many countries. Unfortunately, as much as it helps light up some communities, coal-fired power plants are also the world's biggest industrial polluter. Due to the heavy combustion of coal, there is an equally heavy emission of toxic chemicals which contribute to some dangerous diseases. The goal of this study was to gain deeper understanding on the impact of the presence of coal-fired power plant to the environment and health of the people living in the community. It utilized phenomenological study design using in-depth interview through snowball sampling among 10 participants aged 40 years old and above. Data was analysed through Colaizzi method and was guided by health belief model which claims that change can occur if self-efficacy is built in. Results showed that: (1) the health and environment were better before the coal; (2) the perception on the presence of coal was both positive and negative and (3) all the participants agreed that there is a need for sustainable programs to take care of the health and environment of the communities. Result of this study showed great public health implication in enhancing the community capacity of the community residents living near a coalfired power plant.

Keywords: *coal-fired power plant, environmental health, phenomenological study, environmental pollutants, community capacity*

Coal fired power plants are type of power plants that make use of combustion of coal to generate electricity (Energy Education Encyclopedia, 2019). Since the invention of electricity, life has been enhanced. Through electrical technology, lifestyle became comfortable, and it seems unimaginable to live without it. Coal plays a vital role in electricity generation; it is most widely used and a major source of fuel in power plants because it is readily available in most developing and developed countries. Although coals are beneficial, these are also a source of health and environmental problems.

The global consumption of coal is on the rise; with both consumption (1.4%) and production (4.3%) increasing at their fastest rates for the last five years (BP Statistical Review of World Energy, 2019). In Asia, coal is seen as an affordable and abundant resource and there is a growing demand in Pakistan and Southeast Asian nations like Indonesia, Vietnam, Philippines, and Malaysia (Wood, 2019) despite increasing international 70

Journal of Health Sciences | ISSN 2599-5456

awareness of the risks of global warming due to greenhouse emissions.

In the Philippines, coal continues to provide more than a third of installed capacity of power plants which accounts for 35.3% (Lagare,2019). In the Quezon province, the existing power plant in the town of Pagbilao are two units of 367.5 MW each; together, they produce an approximately six billion kWh of electricity per year. The electricity generated by the two units is fed to the Luzon grid through a 230kV transmission line (Varcas,2019). Moreover, another power plant company is building a 1200 MW coal powerplant in the nearby town of Atimonan which is said to be the first in the country to utilize High Efficiency Low Emission (HELE) technology also known as ultra-supercritical power plant. For this, permits were in hand and resettlement of 50 of 70 families living in the project site had been finished. The company is hopeful to complete the construction by the fourth quarter of 2025. The construction of these power-plants is being developed to build additional capacity to sustain and fulfill the country's economic and development need (Varcas, 2019).

However, the truth remains: coal is the most polluting source of energy which emits twice as much as carbon dioxide as natural gas (US Energy Information Administration, 2020). Globally, 800,000 people die prematurely each year due to direct or indirect effects of air pollution, and million suffer from illnesses due to many harmful pollutants it emits into the air such as sulphur dioxide (SO2), nitrogen oxide (NOx), particulate matter (PM) and other various trace metals including mercury (Endcoal Team, 2017). These pollutants contribute to those communities living near the mines more prone to reduced life expectancies and increased rates of lung cancer, heart, and kidney disease (Burt et al., 2013). Moreover, NOx and SO2 released from coal contribute to global warming and acid rain which can spread over a wide area killing fish and plants. It is also the largest single source of mercury emissions which affects aquatic life and contaminates fish because of neurotoxin.

In the Philippines, a Harvard University study estimated that 2,400 Filipinos are dying from coal-related air pollution every year and at least 12% of workers employed in coal-fired power plants have contracted lung diseases suspected due to inhalation of dust during mining operations (Health Care Without Harm Inc. Asia [HCWHA], 2016).

As there is a plan to start a coal-fired power plant in the town of Atimonan, Quezon, this qualitative study determined the impact of the coal-fired power plant in the lives of the community people living around the area over the last 20 years.

The goal of this study is to enhance the capacity of the community in taking care of their health and environment as they live close to a coal-fired power plant. The purpose of this study was three-fold: first, it investigated the environmental and health conditions of the community prior to the construction of the coal; second, it explored the current environmental and health scenario among the residents in the community; finally, it generated new strategies on how to protect the community in case a new coal-fired power plant will be established elsewhere.

The following are the research questions:

- 1. What was the environmental and health condition of the community before and after building the coal-powered power plant in the community?
- 2. How do the respondents perceive the presence of coal-powered power plant in the community?
- 3. What are the strategies that can help protect the community against coal-fired power plant?

Methodology

This is a phenomenological study which explored the experiences of the residents staying in three different communities near the coal-fired power plant in the province of Quezon, Philippines. It utilized health belief model as a theoretical framework which posits that optimal behavior change can be achieved if messages are designed to target the respondents' perception of the severity and threat of the condition, weighing in of the benefits and barriers of change, and the enhancement of self-efficacy to move towards behavior change. It was the goal of this study to enhance the capacity of the community to watch out for each other's health and welfare.

Snowball sampling was used in choosing the respondents from three communities situated within the vicinity where the coal-fired powerplant was located. Respondents were chosen based on the inclusion criteria where they must have lived as an adult (above 18 years old) prior to the construction of the coal-fired power plant in 1994 and must willingly consent to the in-depth and recorded interview which was conducted from November 19 until December 20, 2019. The main purpose and objectives of the study were thoroughly explained and was reassured that they have an option to leave the interview room and not answer the questions should it make them uncomfortable. Confidentiality of data collection was also emphasized. The interview was conducted through a focused-group discussion and one-on-one approaches. Data collection was deemed completed once saturation was reached, yielding a total of 10 interviews. Of these, eight respondents were females and two were males with ages between 50 to 75 years old.

Using Colaizzi method the data were transcribed and coded according to the research questions posed by the study. Their verbatim statements were then translated into English for presentation in this paper. The findings were validated through literature review, observation on the participants during the interview, a walk-through in the community as well as examining the epidemiological data found in the community health center and rural health units, respectively. The research study was conducted in full conformance with Ethical Review Board (ERB) of the Adventist University of the Philippines, the principles of the Declaration of Helsinki, good clinical practice, and the laws and regulations of the Philippines. The identities of the participants were kept confidential and only the study team had access to the interview data. The audio recordings were deleted upon completion of the analysis.

Results and Discussion

Through re-reading the verbatim transcripts of the participants, significant statements and phrases were extracted and formulated meanings were coded and arranged into themes.

Environmental and Health Condition of the Community Before and After Building the Coal-Powered Power Plant in the Community

When asked about the condition of the community before the coal-powered power plant was built, the emerging themes that came out were "*clean, cool air,*" "*the sea is teeming with fish,*" and "*few sicknesses in the community.*" With these responses, it can be deduced that before the building of the coal-powered power plant, the residents live in a positive environment.

72

Journal of Health Sciences | ISSN 2599-5456

"I was born here; I was here before the plant started. Before that, the climate was not that hot and there was no dust, now the environment is dusty- from the coal ash, especially when the southwest wind comes here. Also, the heat is regular, very hot; we haven't been getting rain for a long time. In those days, before the coal came, the community here rarely gets sick, and there were a few of us here in the 1990s, not like today, there are so many people already; those who work from other places, they come here and stay, they got married here and decide to stay."

"I was born here, our mother was a legitimate native here, when the plant was built, I was pregnant with my son and already had nine children. This was a very nice community. The sea breeze was cool. The place is quiet and not many people were getting sick. In those days, we get our main food from the sea. We sell it and get money; loads of fish. But now, we were told not to catch fish in the sea as it has become contaminated. Our fishermen have to go quite far just to catch a few. Its very sad. Some of the men decided to work in the city as their catch cannot sustain the family anymore. Also, the heat is very bad and the ashes blown by the wind causes us allergies and asthma."

"We have been living here for a long time before the coal plant. When the power plant came, we noticed that the fishes were dying. Once you could see that the sea is teeming with fish, but now it is empty; so, the women here have to work because there is almost no fish left, there is nothing to sell. Right now, because the fish are affected, we have no livelihood. The power plant does not offer a job, they promised they will but nothing happened so far. Young people can no longer study because their parents are poor and fish is our livelihood."

The mining of coal and the disposal of its residues result in waste materials that are harmful to humans, animals, and the ecosystem (Munawer, 2018). The various gases produced by the coal combustion, such as sulphur dioxide (SO2), nitrogen oxide (NOx), Carbon Dioxide (CO), hydrocarbons, and other elements such as mercury, arsenic, cadmium, etc., are released into the atmosphere, causing air pollution, sea animal poisoning, and compromised water systems in the community thus, resulting to disease and death (Union of Concerned Scientists USA [UCSUSA], 2017). However, modern coal combustion system should not result in the emission of serious smoke pollution problem, provided it is well regulated and the process of "gastification" are well established to prevent ash-related problems (Ozer et al., 2017).

When asked regarding their personal experience about the changes in the community's health conditions comparing before and after the coal plant was established, the common themes that came out were "people dying of heart attack and cancer," "more cases of Asthma and common colds," "reduced lifespan."

"My father was 70 years old when he died of lung cancer; my husband, was 40 years old when he died, five years ago. He used to work at the plant, had breast cancer but later died of pneumonia. When he was diagnosed with cancer, he was treated early. When the plant was constructed, he was working there in the 1990s. There was another one who works at the plant, also died due to lung disease. I knew many people who were working there and who died - some of heart attack, others of cancer. The usual ailments here are
Coping With Coal: Exploring the Experience of Communities Near a Coal-Fired Power Plant- Basis for a Module on Community Capacity Building Program 73 cough and cold, asthma and rashes. Before the plant was constructed, we did not know of anyone with breast cancer or skin disease. "

"There are many children here with asthma, before there were not so much here; they said that asthma is in the genes but I don't know why in our family we don't have asthma but my grandson has (asthma)."

"My older brother was 60 years old when he had a heart attack, my elder sister had cervical cancer and died at 61 years old. My husband was only 56 years old when he died, he died of lung cancer. They all died here, lived here. There are many widows here, husbands died of lung disease, lung cancer. Mostly are men, having lung cancer.... maybe because of diving? Most of the disease here is also kidney disease, my nephew is waiting for a kidney transplant..."

"Many of them have lung disease, there are many cases here of those who lose their voice first go through the hoarseness and then die. Many are dying younger. There are those who do not smoke but those who are hoarse and then die (enumerated names of persons who died). My husband had a chest pain and then suddenly his voice became hoarse, when we brought him to the Doctor, it was too late, he passed away. Apparently, it was cancer."

The above responses corresponded with the epidemiological data from the community health centers and rural health units, respectively. It was noted in the data examination that the most common causes of morbidity were upper respiratory infections such as cough and colds, asthma and skin allergies, while the number one cause of death is cardiovascular disease. Data has shown that residents living within the vicinity of coal-fired power plants are most vulnerable to the burdens of negative health conditions (Burt et al., 2013). In the evaluation report from 40 different studies, it was shown that the effects of exposure to particulate matters (sulfur dioxide, nitrogen oxide), causes injury to the airways and lungs which leads to toxicity and inflammation and eventual cell deaths. Respiratory symptoms, asthma, chronic obstructive pulmonary disease (COPD), and lung cancer are very common conditions seen among residents in communities exposed in particulate matter (US Environmental Protection Agency, 2009). Further, it was noted that there was a decreased life expectancy among communities who are exposed to coal (Gohlke et al., 2011).

Community's Perception on the Presence of Coal-Powered Power Plant

The second research question dealt with the community's perception on the presence of coal-powered power plant. The responses were divided as some feel that the presence of power plant enhanced their economic standing and that the infrastructure in the community has improved. They now have a good road leading to town, people now have an easy access in mobility and that the community has more money due to taxation. 74

Journal of Health Sciences | ISSN 2599-5456

"In the community, the benefit is that the barangay regularly receives the Real Property Tax, the barangay gets a share, 25%. The community tax would have been great if the incumbent program had been good, if there was a specific direction on how to spend the money. Sometimes the municipality gives and it is big when it comes. Just lately the tax came to the community amounting to 75 million; it has to be spent within three years, until now it has not been spent. A building is being built for the health center, a lying-in center, but it is not yet completed."

"Since the plant came, our roads are better and the mobility of the residents going to town center, has improved. Our men were also given jobs in the plant."

Some participants also acknowledged the positive effects the plant had in their lives but wished that it was more sustainable. As the plant has been with them for more than 20 years, they felt that some of the projects and programs that the management promised them are not visible anymore.

"Before there was an environmental program; we learned about waste segregation, everyone was taught because we did that for two years but then they did not continue and of course we did not have enough capacity to continue. The community also has a program but it is not enough. There was also an education program before where the plant management took some of our children as scholars but then it did not continue."

"There are always checkups here, but just check-up, we can't see the real problem because we are not passed through laboratory examinations, as long as the doctor checks, they wouldn't know what your real illness is. They do it once a year through the medical mission"

"Many people were helped, a lot of progress but it seems to be broken; like the trees they have removed, so our air filtration is affected; they have taken the beautiful trees that should be the source of housing. What's more, are they going to re-plant again if they have destroyed all the plants there? Our community is being stripped off of plants, slowly."

It was reported that most of the communities living within a vicinity of coal-fired power plants tend to verge on a lower income group (Wilson et al., 2016). Initially, residents may feel an uplifting of their socio-economic status as more amenities are offered to them, especially in the beginning of the plant operation however, continuous living in close proximity to a coal-fired power plant always result in negative health and environmental consequences (Wilson et al., 2016). This comes back to the question of economic benefits versus environmental and health costs, in which it was noted in a partial study that there is sizable local health cost as compared to a meagre local economic benefit of a coal-fired power plant in a community, and that it is best to construct it away from a more populous, urban cities (Barrows et al., 2018).

In the final objective of this study, the researchers determined the best strategies to protect the community against the effects of coal-fired power plant. The common themes that came out from the interview were "sustainability of programs" and "community capacity".

"The community must have a regular, continuous dialogue before, during and after the plant is constructed. I am not fully against the plant, but our rights to health and clean environment must also be protected. A once-a-year activity to make us happy, like gift-giving during Christmas or once-a-year medical mission, although they are acknowledged, but it is not enough. At the end of the day, our health is suffering, our fishes are dying, we suffer from bad smell coming from the emission. I think we deserve better."

"I think there has to be a good representative from the community to act as a spokesperson, who is apolitical. A Memorandum of Agreement must spell out the continuity of the health and environmental programs to be done on a regular basis. The community must enhance their capacity to speak up and look out for each other's welfare. The community must have a full representation, especially in checking the quality of air, water, of the sea and of our health."

"The programs to monitor our health and environment must be sustainable and well carried out."

The opposing forces in this issue is clear: on one hand, advancing energy efficiency is required to make the people's lives more comfortable, and to serve the growing capitalistic needs of the country; on the other hand, the lives of the people living within the vicinity of a coal-fired power plant are at risk. They were promised good things in the beginning but seem to end up taking the crumbs of what was left. The finding imply that lives will be better off if emissions of poisonous gasses are strictly mitigated, or better still, to close the plant; however, while the communities have little capacity to call for its closure, there is a need to safeguard their lives against these pollutants and measures must be set in place to reduce the exposure. It is then highly recommended that communities should educate themselves, to engage in organizing and advocacy efforts to enforce accountability and social responsibility in energy production. Further, they must be educated that they are free to voice out their opinions, to make informed, individual choices and can engage in an advocacy for the development of stringent regulations and improved corporate social responsibility.

As a result of this study, a module that involves enhancing community capacity through community organizing, with the aim to ease the negative effects of coal to the environment and health of the people residing within the vicinity of a coal-fired power plant was created and is ready for implementation.

References

- Barrows, G., Garg, T., & Jha, A. (2018). *The economic benefits versus environmental costs of India's coal-fired power plants*. http://conference.iza.org/conference_files/environ_2018/ barrows_g26483.pdf
- BP Statistical Review of World Energy (2019). *Statistical review of world energy*. https://www. bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html
- Burt, E., Orris, P., & Buchanan, S. (2013); Scientific evidence of health effects from coal use in energy generation. *Health Care Research Collaborative*. https://noharm-uscanada.org/ sites/default/files/documents-files/828/Health_Effects_Coal_Use_Energy_Generation.pdf
- Endcoal Team (2017). Choose health. https://endcoal.org/health/
- Energy Education Encyclopedia (2019). *Coal fired power plant*. https://energyeducation.ca/ encyclopedia/Coal_fired_power_plant
- Gohlke, J., Thomas, R., Woodward, A., Campbell-Lendrum, D., Pruss-Ustun, A., & Hales, S. (2011). Estimating the global public health implications of electricity and coal consumption. *Environ Health Perspect*, *119*(6), 821.
- Greenpeace Philippines (2016). New greenpeace report estimates coal plant emissions could kill 2400 Filipinos per year. http://www.greeenpeace.org
- Health Care Without Harm Inc. Asia (2016). The human cost of coal. https://noharm-global.org
- Lagare, J. (2019). Meralco pushes for high efficiency, low emission plant. *The Manila Times*. https://www.manilatimes.net
- Munawer, M. (2018). Human health and environmental impacts of coal combustion and post-combustion wastes. *Journal of Sustainable Mining*, 7(2), 87-96. https://www.sciencedirect.com/science/article/pii/S2300396017300551
- Ozer, M., Basha, O., Stiegel, G., & Morsi, B. (2017). Effect of coal nature on the gasification process. *Woodhead Publishing*. https://doi.org/10.1016/B978-0-08-100167-7.00007-X
- Union of Concerned Scientists USA (2017). *Coal and air pollution*. https://www.ucsusa.org/ resources/coal-and-air-pollution
- US Energy Information Administration (2020). How much carbon dioxide is produced when different fuels are burned? https://www.eia.gov/tools/faqs/faq.php?id=73&t=11
- U.S. Environmental Protection Agency (2009). *Integrated science assessment for particulate matter*. EPA/600/R-08/139F.

Coping With Coal: Exploring the Experience of Communities Near a Coal-Fired Power Plant- Basis for a Module on Community Capacity Building Program 77

- Varcas, M. (2019). *Meralco willing to undergo competitive selection process to allow Atimoan construction to start*. https://www.bworldonline.com/meralcowilling-to-undergo-co-eselection-process-to-allow-atimonan-construction-to-start/
- Wilson, A., Patterson, J., Wasserman, K., Starbuck, A., & Sartor, A. (2016). Coal blooded: putting profits before people, executive summary. *National Association for the Advancement of Colored People*. https://www.naacp.org/wp-content/uploads/2016/04/ Coal_Blooded_Executive_Summary_Update.pdf
- Wood, J.; (2019); *These countries are driving global demand for coal*. World Economic Forum. https://weforum.org/agenda/2019/02/these-countries-are-driving-global-demandforcoal

Effects of Acute, Strenuous Exercise on Platelet Count and Bleeding Time Among Women

Princess Red Rose G. Rodriguez, Davielle Mae C. Gobi and Sarah Nicole Aurea P. Merino

Adventist University of the Philippines prrgrodriguez@aup.edu.ph

Abstract

E xercise may have a lot of health benefits but sudden and vigorous exercise transiently increases the risk of primary cardiac arrest. This study focused on the effects of strenuous exercise in platelet count and bleeding time among women as platelets also play an important role in the pathogenesis and progression of cardiovascular diseases. With the objective to determine and compare the platelet count and bleeding time (BT) of fifteen sedentary and ten physically active women in two intervals, blood extraction and examination were done before and immediately after one and a half kilometer-run. The bleeding time was not significantly affected by the activity; however there was a significant difference in the change of platelet count of sedentary women with statistically higher count than physically active women rendering similar result with a previous study on men. Further studies that include the platelet function such as adhesiveness, secretion and aggregability that can help in the augmentation and advancement of information linking platelets to exercise and CVD is recommended.

Keywords: clotting time, bleeding time, platelet count

Platelets, technically called thrombocytes, are the smallest cells in the blood whose main function is in hemostasis which is a complex physiologic process that maintains normal blood flow and would seal the wound in cases of vessel injury to stop bleeding by producing a clot or thrombus which would eventually be dissolved as the wound heals. Dysfunction in the hemostasis system, which could cause hemorrhage or thrombosis, can be life-threatening (Keohane et al., 2016). Hemostasis is a three-step process: primary hemostasis which includes vasoconstriction and platelet activation, secondary hemostasis in which the coagulation factors are activated, and the tertiary is fibrinolysis which is the process of dissolving the clot as the new tissue regenerates to prevent blood clot to healthy blood vessels (Gale, 2011). During damage to the blood vessels

platelets are activated and would rapidly respond to the site to adhere to the damaged wall and aggregate with other platelets to form platelet plug to initially seal the wound and stop the bleeding; the event would also cause the platelets to secrete proteins and other molecules to initiate thrombin formation through the coagulation pathway (Keohane et al., 2016) until the process of hemostasis is complete which would result to restoration of new tissue (LaPelusa & Dave, 2020). The normal platelet count is 150 to 400 X 109/L with average platelet counts slightly higher in women than in men. Platelets may seem to be insignificant because of its size (2-4µm) but they play a vital role in hemostasis (Keohane et al., 2016) and in modulating inflammatory reactions and immune responses (Garai et al., 2017), therefore abnormalities and deviations from its role could result to lethal

consequences.

Studies comparing different exercise intensities regarding their effects on platelets and the risk for developing cardiovascular diseases were arising this past decade. Regular physical activity or exercise has been known to have many benefits on the individual and one of those is it reduces the risk for cardiovascular diseases (Benefits of Physical Activity, 2020), while sudden vigorous exercise can lead to cardiovascular complications. Physically inactive people are at 50-fold increased risk of sudden death and at 100-fold increase risk in developing myocardial infarction. The cardiovascular complications following acute strenuous exercise can be accounted for the transient but significant increase in the platelet count and the activation of its functions (El-Sayed et al., 2004). It has been established that platelet activation is closely related to the secretion of growth factors and inflammatory mediators therefore leading to the development of cardiovascular diseases (Heber & Volf, 2015). The elevated platelet count is due to the release of platelets from the spleen, bone marrow, and lungs. During strenuous exercise oxygen consumption is boosted, which would result in the generation of free radicals and oxidative stress, which are associated to membrane damage, lipid peroxidation, and platelet hyper-aggregation and would subsequently result in the coagulation pathway activation and its activation is associated to accelerated clot or thrombus formation (El-Sayed et al., 2004).

In a study on the effect of exercise to the platelet aggregability and other cardiovascular parameters, the data showed that the platelet aggregability was significantly increased following acute, severe exercise in healthy subjects while the platelet aggregability in those who had regular, moderate exercise showed a significant decrease (Pagar et al., 2012). Regular exercise and physical conditioning may reduce the risk of major vascular thrombotic events and protect individuals against cardiovascular diseases. Because platelets play a key role in thrombus formation, the protective effect of exercise against cardiovascular diseases may be partially due to alterations of platelet function. Results from previous study of men suggest that platelet adhesiveness and aggregability are suppressed by moderate intensities of acute exercise and exercise training (Wang et al., 1994). However, similar studies in which women subjects were used have not been carried out, perhaps because of inconsistent results regarding the platelet function during different phases of the menstrual cycle (Wang et al, 1997). Cardiovascular disease mortality may be lower in women than in men (Bots et al., 2017), the women still must take preventive measures to reduce the risk of the said disease. The objectives of this study are to measure the pre- and post- exercise platelet count and bleeding time of the physically active and sedentary women, to compare the effects of the intervention to the variables and to determine to which group has significant findings. The result of this study will be beneficial to women especially to those with antecedent factors for developing cardiovascular diseases.

Methodology

Research Design

This study used a quasi-experimental design (Harris et al., 2006). Quasi-experimental design was deemed appropriate for the study because this study aimed to demonstrate causality between the intervention and the outcome without using randomization of the sample.

Population and Sampling Technique

Twenty-five healthy females within the age bracket of 18-30 years old were chosen through snowball sampling technique. The participants were divided into two groups: a group of ten physically active participants and another group of fifteen sedentary women. Women that have habitual sustained exercise of at least three times a week comprises the physically active. While sedentary group do not engage in any strenuous exercise except for day-to-day walking. The participants allowed in the study were not taking drugs, vitamins (B9, C, D, E, K), birth control pills, and alcohol and were free from any kinds of diseases such as diabetes and bleeding, as well as menstruation.

Materials

Venipuncture was done for the platelet count and finger prick for the bleeding time. Blood samples were extracted from the participants before undergoing strenuous exercise. Immediately after both groups underwent acute strenuous exercise session in the form of running for one and a half kilometers within the maximum time of seven minutes, blood was extracted again. Blood samples were dispensed in EDTA tubes to measure platelet count and bleeding time was done by fingerprick using a lancet to make a small-standardized wound and the duration of bleeding was recorded.

Analysis of Data

Test results of the pre- and post- test were analyzed using using Levene's test and T- test. Levene's test was used for equality of variances and t-test for equality of means.

Ethical Considerations

Ethical considerations were observed to ensure confidentiality and anonymity in handling the data. Furthermore, before joining the study, the participants were given written informed consent.

Results and Discussion

With previous study done on men being the subjects, the same result is also obtained in this study conducted on women as subjects. The tables below show the data gathered in the preand post- acute, strenuous exercise.

		Ν	MEAN	SD	t	p-value
PLATELET	BEFORE	15	351.6	82.95248	-7.198	0.00
	AFTER	15	420.9333	102.10741		
BLEEDING TIME	BEFORE	15	2.3507	0.63455	1.398	0.184
	AFTER	15	2.0573	0.58848		

Table 1. Comparison the Variables Before and After Exercise of the Sedentary Women

80

Effects of Acute, Strenuous Exercise on Platelet Count and Bleeding Time Among Women

As seen in the table above, there's a statistical evidence that the platelet count of the sedentary women was significantly affected by the strenuous exercise owing to the increased count, while the bleeding time was not affected by the intervention given.

		Ν	MEAN	SD	t	p-value
PLATELET	BEFORE	10	319.8	47.11405	-3.009	0.014
	AFTER	10	348.5	52.27757		
CLOTTING TIME	BEFORE	10	5.66	1.30396	1.593	0.146
	AFTER	10	5.133	1.13797		
BLEEDING TIME	BEFORE	10	2.378	0.77189	1.781	0.109
	AFTER	10	2.017	0.40083		

Table 2. Comparison the Variables Before and After Exercise of the Physically Active Women

Table 2 is similar with the results of the sedentary women in which the bleeding time was not affected by the strenuous exercise. The change in platelet count was significant but unlike with the sedentary women, strenuous exercise only yielded to a minimal change in the platelet count of the physically active women.

Table 3. Comparison of the Change in Each Variable of Sedentary and Physically Active Women

	GROUP	Ν	MEAN	SD	df	t	p-value
CHANGE IN	SEDENTARY	15	-69.3333	37.30505	23	-2.869	0.009
PLATELET	PHY ACT	10	-28.7	30.16271			
CHANGE IN	SEDENTARY	15	0.2933	0.81283	23	-0.221	0.827
BT	PHY ACT	10	0.361	0.64115			

Base on the above results, there is a significant difference between the change in platelet count of sedentary women and physically active women. More precisely, the change in platelet count of sedentary women is statistically higher than the change in platelet count of physically active women.

Significant increase in the platelet count is more pronounced in sedentary women than in the physically active women. With both studies, evidence of gender differences as not a major factor in platelet activation can be comprehended. Platelet count in all participants increased after the acute, strenuous exercise while the results seen on the bleeding time of the participants did not pose any consistent data trend. Although decreased individual bleeding time may be observed. In this study only the platelet count changed significantly which may indicate that the strenuous exercise may affect more the production of platelets and not on its function.

General studies show that acute exercise results in transient increase in platelet count. This increase is caused by hemoconcentration and by platelets released from the liver, lungs and importantly the spleen. Interestingly, platelets stored in the spleen have been reported to be significantly larger than normal circulating platelets. Evidently, platelet count is directly and indirectly affected by physical activity or inactivity. In this regard, several mechanisms and cell or tissue types are supposed to contribute to the observed effects. Acute exercise results in increased levels of catecholamines as well as increased shear and oxidative stress, all of which

81

are known to activate platelets (Heber & Volf, 2015). This is especially relevant as artery flow and shear rate increase in parallel to exercise intensity.

On the other hand, a study done by Wang and colleagues (1997) was the first report to clearly demonstrate that the intensity of acute exercise is an important factor affecting blood platelet function citing that moderate exercise tends to desensitize platelets, whereas strenuous exercise can potentiate either in healthy subjects or in patients with stable angina and that exercise effect is more pronounced in the sedentary than in the physically active. Kestin et al. (1993) found that strenuous exercise could activate platelets, as assayed by the presence of activation-associated surface antigen on platelets. Their findings were consistent with part of this study's results that there is more pronounced sudden platelet rise after the acute, strenuous exercise in the sedentary women than those women who are physically active.

On one hand, the enhanced platelet count or platelet activity in severe exercise may accelerate the formation of hemostatic platelet plugging and lead to shortened bleeding time. This may cause thrombosis in the coronary microcirculation and thus augment the risk of primary cardiac arrest. On the other hand, a study on moderate exercise explained that moderate exercise may reduce the risk of thrombotic events because it decreases platelet adhesiveness and aggregability. Therefore, it is of special interest that the effects of exercise on platelet function show obvious similarities to outcomes from epidemiologic studies on the impact of exercise transiently increases the risk for myocardial infarction. This obvious parallelism poses the intriguing question if the assessment of platelet function in response to acute and habitual exercise might help to predict the beneficial effects of physical activity on the development of CVD. Although this is speculative at the moment, clearly more research is required on this highly relevant topic as well as on the mechanisms that are involved in the modulation of platelet function by habitual exercise.

References

- Benefits of Physical Activity (2020). *Centers for disease control and prevention*. https://www.cdc.gov/physicalactivity/basics/pa-health/index.htm
- Bots, S. H., Peters, S. A. E., & Woodward, M. (2017). Sex differences in coronary heart disease and stroke mortality: a global assessment of the effect of ageing between 1980 and 2010. *BMJ Global Health*, 2(2), e000298. https://doi.org/10.1136/bmjgh-2017-000298
- El-Sayed, M.S., Ali, Z. E., & Ahmadizad, S. (2004) Exercise and training effects on blood haemostasis in health and disease: An update. *Sports Med*, 2004(3), 181-200.
- Gale, A. J. (2010). Continuing education course #2: Current understanding of hemostasis. *Toxicologic Pathology*, 39(1), 273–280. https://doi.org/10.1177/0192623310389474
- Garai, B., Chatterjee, S., Mondal, S., & Mondal, T. (2017). Effect of exercise on platelet variables: An overview. *International Journal of Physical Education, Sports and Health*, 4(3), 506-510.

- Harris, A. D., McGregor, J. C., Perencevich, E. N., Furuno, J. P., Zhu, J., Peterson, D. E., & Finkelstein, J. (2006). The use and interpretation of quasi-experimental studies in medical informatics. *Journal of the American Medical Informatics Association : JAMIA*, 13(1), 16–23. https://doi.org/10.1197/jamia.M1749
- Heber, S. & Volf, I. (2015). Effects of physical (in)activity on platelet function. *BioMed Research International, 2015*, 1–11. https://doi.org/10.1155/2015/165078
- Keohane, E. M., Smith, L. J., & Walenga, J. M. (2016). *Rodak's hematology: Clinical principles and applications (5th ed.).* Elsevier.
- Kestin, A. S., Ellis, P. A., Barnard, M. R., Errichetti, A., Rosner, B. A., & Michelson, A.D. (1993). Effect of strenuous exercise on platelet activation state and reactivity. *Circulation*, 88(1),1502-1511.
- LaPelusa, A., Dave, H. D, (2020). Physiology, hemostasis. *National Center for Biotechnology Information*. https://www.ncbi.nlm.nih.gov/books/NBK545263/
- Pagar, A. B., Raut, S. E., & Hawaldar, V. B. (2012). The effect of exercise on platelet aggregability and other cardiovascular parameters. *International Journal of Basic Medical Science*, 2(6), 273-277
- Wang, J. S, Jen, C. J., Kung, H. C, Lin, L. J, Hsiue T. R, & Chen, H. I. (1994). Different effects of strenuous exercise and moderate exercise on platelet function in men. *Circulation*, 90(6), 2877-2885.
- Wang, J. S., Jen, C. J., & Chen, H. I. (1997). Effects of chronic exercise and deconditioning on platelet function in women. *J Appl Physiol*, 83(6), 2080-5. https://doi:10.1152/ jappl.1997.83.6.2080

The Influence of Resilience Towards Professional Burnout Among Registered Nurses

Fiskvik Boahemaa Antwi, Simon Akwasi Osei, Arlidette Myrizel O. Reyes, Reynito D. Reyes, Karen Ablola, Karen Wu, Dina D. Galang and Beryl Ben C. Mergal Adventist University of the Philippines arliereyes1234@gmail.com

Abstract

idely acknowledged, healthcare is demanding due to the increasing workload and shortages of nursing staff. Compared to other health care professionals, nurses have high burnout rates thus posing major concerns leading to adverse effects on clinical outcomes. This descriptivecorrelational study investigated the influence of resilience towards professional burnout among registered nurses. One-hundred and fifty qualified nurses answered a constructed survey questionnaire. The statistical treatment used was the mean, standard deviation, t-test, Pearson Correlation, and ANOVA. The reliability of the instrument was resilience of 0.888 and professional burnout of 0.840. The study revealed high resilience among nurses and an average level of professional burnout in the workplace. Analysis of the sub-variables of professional burnout revealed nurses experience an average level of emotional exhaustion, personal achievement, and scored a low level in depersonalization. There was a negative relationship between resilience and professional burnout and there was no significant difference in professional burnout in terms of sex and age. High level burnout was noted among nurses aged 35-41 years and above, those working in the accident and emergency unit, and those with clinical experience of 10 years or more. The study recommends nursing administrators to conduct continuous professional education enhancing resilience among nurses and to create a work environment according to the nurse-patient ratio, appropriate working hours and workload. Further research is recommended using a qualitative research design to further understand the effect of burnout among nursing staff wellbeing.

Keywords: resilience, professional burnout, registered nurses, emotional exhaustion

It has been widely acknowledged that healthcare is demanding due to the increasing workload and shortages of nursing staff. According to Tay et al. (2014), the incidence of burnout ranged from 30% to 80% according to international researches. In 2013, a study on nurses' turnover was released by the National Health Service (NHS) in England due to burnout. The Royal College of Nursing reported in a 2013 study, out of 10,000 nurses, 62% considered resigning due to burnout. Sixty-one percent cited hectic schedules as a deterrent to excellent quality treatment, and 83 percent claimed that 5,000 nurses who left the profession in three years are due to the increasing workload.

Across the world research studies resulted as follows: A cross-sectional research done in 10 European countries sampled 23,159 surgical and medical staff resulted to elevated nursing burnout rates in separate countries: 40% in Ireland, 42% in England, 24% in Norway 22%, in Finland, 25% in Belgium, 30% in Germany, 40% in Poland, and 29%

84

The Influence of Resilience Towards Professional Burnout Among Registered Nurses

in Spain (Ezenwaji et al., 2019). Waddill-Goad (2019) research noted CBC Radio Canada's report had 40% of nurses in Canada who engaged in burnout research stated that 25% would not allow families or loved ones to work in the hospital due to the workload and highly demanding environment. A 2013 study conducted by the Michigan Center for Nursing resulted 42% of nurses wanted to leave after one to ten more years in their profession while a survey of 16 Asian countries in Asia found that nurses had a high burnout rate from 34.6% to 61.5% (See et al., 2018).

Rushton et al. (2015) investigated the relationship between nurses' moral distress, resilience, and burnout among 114 patients in the high-intensity unit. Statistical analysis was used to establish correlations between measurements of scale and to identify independent variables correlated with burnout. The results showed resilience and burnout have a significant relationship and that further studies with an increase population size be done.

Since there were limited studies here in the Philippines, this research investigated the relationship between resilience and burnout among nurses. Specifically, it answered the following questions:

- 1. What is the level of resilience among the respondents?
- 2. What is the level of burnout among the respondents in terms of
- a. Emotional exhaustion
- b. Depersonalization
- c. Personal Achievement
- 3. Is there a significant relationship between resilience and burnout among the respondents?
- 4. Is there any significant difference in professional burnout when considering sex, age, clinical area, and clinical experience

Resilience

Hsieh et al. (2015) defined resilience as the ability to adjust positively and effectively to difficult circumstances or adversity, and can occur in individuals or families while Thomas and Asselin (2018) examined it primarily in comparison to people and conceived as an ability or characteristic, a set of features or intrinsic force, or a complex and dynamic process involving internal and external protective factors between people and their setting.

Internal resilience-promoting factors are correlated with individual personal, intrapersonal characteristics including faith or belief optimism, self-confidence, compassion, awareness, hope, self-efficacy, coping, self-care, power, versatility, sense of purpose, adaptability and (Thomas & Revell, 2016). Factors fostering societal or environmental resilience relate to defensive mechanisms specific to the person and include social networks and services, organizational support and resources, and role models and have been allocated to enhance resilience and have formed resilience-building approaches aimed at maintaining and enhancing internal and external assets to help resolve and adapt to challenges.

Smith and Yang (2017) argued that high levels of nursing resilience were associated with increased overall well-being, improved the professional quality of life, working relationships, psychological health, and increased job satisfaction while Delgado et al. (2017) examined the relationship between resilience and emotional labor utilizing an integrative literature review design. They claimed that nursing emotional work involves handling clients, and colleagues' emotional demands. Building resilience is an important strategy to mitigate the burnout resulting from ongoing exposure to these demands; however, there is a limited understanding of resilience

in the sense of emotional nursing work thus they utilized studies published from 2005 to 2015 from CINAHL, PsycINFO, Medline, and Scopus electronic databases resulting no significant relationship between resilience and emotional labor thereby suggesting more resilience interventions be explored.

Ren et al. (2018) explored resilience among nurses in China. A cross-sectional survey design was used among 1356 nurses from 11 general hospitals in Guangzhou, China. Results showed a low level of nurse resilience and that they could not effectively cope with job challenges and recover from adversity. Strengthening self-efficacy, choosing active coping, decreasing job stress, and enhancing educational training can effectively improve their resilience. Koen et al. (2011) investigated the prevalence of nursing resilience through a cross-sectional study utilizing 312 nurses working in public and private hospitals in South Africa resulted to three levels of resilience: 10% of participants manifested low resilience, 47% moderate resilience and 43% high resilience. Nurses in private health care had significantly (small practical effect) higher levels of resilience than nurses in public health care.

Burnout

Burnout syndrome is a serious consequence of prolonged work-related exposure to stressors and was first developed in the early 1970s to describe the physical and mental decline phase of professionals working in areas such as health care, teaching, social work or emergency legal services (Lee et al., 2014). It was consequently characterized as a prolonged reaction to chronic work stress concerning three dimensions: emotional exhaustion, depersonalization, and low performance and professional failure emotions otherwise recognized as lack of personal accomplishment (Hayes et al., 2013) and according to Chang and Chan (2013), the incidence of nursing burnout associated with occupational stress is high and reported that factors such as age, years of experience, management structure, lack of competent staff, diverse and demanding patients, and inadequate clinical supervision are associated to burnout. Others include increased workload, stress, underappreciated work, and underpaid work, poor management, conflict with staff, recognition of responsibility, lack of support, conflict with physicians, and work and family conflict.

Research in various countries resulted as follows: Li et al. (2014) found that the strongest predictors of physical health problems among nurses in Japan are excess workload and the number of people residing at home, while the best predictors of mental health problems were the probability of leaving the current nursing situation and lack of workplace assistance while Lasebikan and Oyetunde (2012) investigated the prevalence and factors associated with nursing burnout in Nigeria that the GHQ-12 determined the presence of psychiatric morbidity and resulted a high level of burnout was identified among 9.1% of the respondents in terms of emotional exhaustion, 29.2% in terms of depersonalization and 40.0% in terms of reduced personal accomplishment. Lahana et al. (2017) sampled 180 public health center nurses in Greece and studied burnout dimensions of emotional exhaustion and depersonalization were at high levels while personal accomplishment was at low levels. Female nurses had a higher personal accomplishment score than men. Marital status, daily routine, and relationships with supervisors were significantly related to emotional exhaustion and depersonalization. In different sectors theses reseach were as follows: Katyal (2013) compared the burnout

level among nurses in Government and private hospitals. The results showed government hospital nurses had a high level of burnout, significantly higher emotional exhaustion, and depersonalization compared to those working in private hospitals; however, they did not differ significantly with respect to personal accomplishment. Cishahayo et al. (2017) determined the level of nursing burnout in the ICU and Emergency Department. By utilizing a quantitative research approach and a descriptive cross-sectional research design, 60 nurses were sampled and found a high level of burnout among 61.7% of the respondents, high workload and turnover, high emotional exhaustion (48.3%), high depersonalization (25%) and low personal accomplishment (50%).

In establishing the relationship between resilience and burnout, a descriptive study by Kutluturkan et al. (2016) was conducted among 140 oncology nurses. A relationship existed between emotional exhaustion and perception of future; depersonalization was related to self-perception and structured style and; and personal accomplishment was related to the perception of future, structured style, and self-perception. There was a significant relationship between resilience and burnout while Xie et al. (2011) investigated the relationship between resilience and burnout among 1,061 nurses in hospitals in China and resulted a high level of burnout and a moderate level of resilience, negative correlation on resilience towards burnout, negative relationship between burnout symptoms and resilience has been demonstrated, and this informs the role of resilience in influencing burnout.

Methodology

Research Design

This quantitative study used descriptive-correlational design to examine the resilience and professional burnout among registered nurses in the Philippines. The statistical treatment used were: the mean of the absolute values of the numerical differences between statistical data to determine values correlating to the sample population; standard deviation, t-test, Pearson Correlation, ANOVA, and Statistical Package for Social Sciences (SPSS) version 22 to analyze the data. Question one and two were answered by using mean and standard deviation. Question three was answered by correlation using Pearson Correlation Coefficients to determine the relationship based on their strength and direction of resilience and professional burnout. Question four was answered by using ANOVA and T-Test to assess the differences between registered nurses' burnout when considering sex, clinical area, and clinical experience.

Population and Sampling Techniques

The study was conducted in a selected hospital in the Philippines and utilized sampling technique to sample 150 nurses. The inclusion criteria for the respondents will: a) a graduate of BSN program and an RN, b) must be in the job order, nurse I, or nurse II position. The exclusion criteria for the respondents are a) nurse supervisors and nurse administrators, b) nursing attendants.

88	Journal of Health Sciences ISSN 2599-5456				
Table 1. Demographic	Profile of the Responder	1t			
Demogra	phic Variable	Frequency	Percent		
Age	21-27 Years	47	31.3		
	28-34 Years	68	45.3		
	35-41 Years	35	23.3		
Sex	Females	104	69.3		
	Males	46	30.7		
Clinical Area	Medical Unit	65	43.3		
	Surgical Unit	36	24.0		
	Emergency Unit	11	7.3		
	Intensive Care Unit	38	25.3		
Clinical Experience	1-4 Years	89	59.3		
	5-9 Years	26	17.3		
	10+ Years	35	23.3		
	Total	150	100.0		

Instrumentation

There are multiple questions for each of these subscales and responses are in the form of a frequency rating scale 1 (never) to 5 (Always). Studies have shown that reliability measurement based on internal consistency by using Cronbach Alpha. Table 2 shows the Cronbach Alpha of the questionnaires used in the study:

NO **Cronbach Alpha** Items Resilience 14 .888 **Professional Burnout** 21 .840 Emotional exhaustion 6 874 7 Depersonalization .803 8 .832 Personal Achievement

Table 2. Reliability of the Questionnaire

In determining the strength of the relationship, Cohen's (1998) absolute correlation valves was utilized where r = .10 to .29 meaning small or low, r = .30 to .49 is medium or moderate and larger r = .50 to 1.0 is large or high and interpreted were used furthermore in determining the significant difference value where .01 = small effect, .06 = moderate effect, .14 = large effect. All these Likert scales are based on Vagias' (2006) Likert scale recommendation. Tables 3 and 4 contain the scaled response and qualitative descriptor.

Table 3. Scoring System for Resilience								
Numerical Scale	Scale Average Weight	Scaled Response	Qualitative Descriptor					
5	4.5-5	Always	Very High					
4	3.5-4.49	Often	High					
3	2.5-3.49	Sometimes	Average					
2	1.5-2.49	Rarely	Low					
1	1-1.49	Never	Very Low					

Table 4. Scoring System for Professional Burnout

Numerical Scale	Scale Average Weight	Scaled Response	Qualitative Descriptor
5	4.5-5	Always	Very High
4	3.5-4.49	Often	High
3	2.5-3.49	Sometimes	Average
2	1.5-2.49	Rarely	Low
1	1-1.49	Never	Very Low

Ethical Considerations

Ethical approval was sought from the institutional ethical review center of both the reseachers' affiliate as well as the sample's affiliate. The ethical considerations observed in this study are informed consent, voluntary participation, deception, bias and misrepresentation, confidentiality and plagiarism. The respondents willingly participated in the study and no one was under any compulsion and were informed their right to withdraw from the study had they wish to. Upon approval, inform consent was sought from the respondents who partook in the study. The purpose was clearly explained to eliminate deception. The researchers ensured personal biases would not influence the interpretation of the data gathered and that the confidentiality of their response be observed by safeguarding each respondent's identity and that no information could be directly traced to or linked to them. Furthermore, all references were appropriately acknowledged and ensured to steer clear of plagiarism. All eligible registered nurses received a copy of the questionnaire. Upon their completion, questionnares were collected and sealed.

Results and Discussion

Resilience was quantified using 14 questions. The overall scaled response for resilience was often a qualitative descriptor as high (M = 3.9105, SD = 0.4941). In a detailed analysis, the highest scored item was my life has meaning, with a scaled response of always and qualitative descriptor as high (M = 4.35, SD = 0.803). The lowest scored item was I take things in stride, with a scaled response of sometimes and qualitative descriptor as average (M = 3.49, SD = .653). This, therefore, implies that nurses have a high level of resilience in the workplace. These results contradict the study of Ren et al. (2018) and that nurses had a low and average level of resilience

because the study was conducted in China among 1,356 from 11 general hospitals.

Item	Mean	Std.	Scaled	Qualitative
		Deviation	Response	Descriptor
My life has meaning	4.35	.803	Often	High
I am determined	4.05	.628	Often	High
I keep interested in things	4.05	.659	Often	High
When I'm in a difficult situation, I can find my way out of it	4.02	.781	Often	High
I can find something to laugh about	3.95	.736	Often	High
I can get through difficult times because I've experienced difficulty before	3.92	.681	Often	High
I feel proud that I have accomplished things in life	3.91	.900	often	High
I am friends with myself	3.91	1.016	Often	High
I have self-discipline	3.91	.893	Often	High
In an emergency, I'm someone people can generally rely on	3.84	.715	Often	High
My belief in myself gets me through hard times	3.81	.870	Often	High
I feel that I can handle many things at a time	3.79	.701	Often	High
I manage one way or another	3.76	.682	often	High
I take things in stride	3.49	.653	Sometimes	Average
Resilience	3.9105	0.4941	Often	High

Table 5. Resilience of the Respondents

4.5-5 Always; 3.5-4.49 Often; 2.5-3.49 Sometimes; 1.5-2.49 Rarely; 1-1.49 Never.

Emotional exhaustion was quantified using six-question items. The overall scaled response for emotional exhaustion was sometimes, qualitative descriptor as average (M = 2.804, SD = 0.5170). In a detailed analysis, the highest scored item was working with people all day long requires a great deal of effort with a scaled response of sometimes and qualitative descriptors as average (M = 3.45, SD = 0.879). The lowest-ranked item was I feel like I am at the end of my rope with a scaled response of rarely, qualitative descriptor as low (M = 2.29, SD = 0.854). The results are contradicting with Cishahayo et al. (2017) study that emotional exhaustion is high amongst nurses because the study was conducted among sixty nurses limited to ICU and emergency department.

The Influence of Resilience Towards Professional Burnout Among Registered Nurses 91								
Table 6. Emotional Exhaustion	Fable 6. Emotional Exhaustion							
Item	Mean	Std. Deviation	Scaled Response	Qualitative Descriptor				
Working with people all day long requires a great deal of effort	3.45	.879	Sometimes	Average				
I feel emotionally drained by my work	3.13	.678	Sometimes	Average				
I feel work too hard at my job	2.74	.755	Sometimes	Average				
It stresses me too much to work in direct contact with people	2.62	.753	Sometimes	Average				
I feel frustrated by my work	2.59	.615	Sometimes	Average				
I feel like I am at the end of my rope	2.29	.854	Rarely	Low				
I feel proud that I have accomplished things in life	3.91	.900	often	High				
Emotional Exhaustion	2.804	.5170	Sometimes	Average				

4.5-5 Always; 3.5-4.49 Often; 2.5-3.49 Sometimes; 1.5-2.49 Rarely; 1-1.49 Never.

Depersonalization was quantified using seven questions. The overall scaled level of depersonalization was low and qualitative descriptor as rarely (M = 2.3076, SD = 0.5953). In a detailed analysis, the highest-ranked item was I really don't care about what happens to some of my clients and qualitative descriptor as high and with a scaled response of often (M = 4.05, SD = 0.926). The lowest-ranked item as I have become more insensitive to people since I have been working qualitative descriptor as low and with a scaled response of rarely (M = 2.18, SD = 1.017). The study contradicted Katyal's (2013) study that depersonalization was high. This implies that nurses perceived their depersonalization in terms of burnout as low because the study compared government and private hospitals.

Item	Mean	Std.	Scaled	Qualitative
		Deviation	Response	Descriptor
I really don't care about what happens to some of my clients	4.05	.826	Often	High
I feel tired when I get up in the morning and have to face another day of work	2.61	.940	Sometimes	Average
I am at the end of my patience at the end of my workday	2.45	.856	Rarely	Low
I have the impression that my clients make me responsible for some of their problems	2.39	.740	Rarely	Low
I am afraid that this job is making me uncaring.	2.39	1.140	Rarely	Low
I feel I look after certain clients imperson- ally as if they are an object	2.19	.800	Rarely	Low

Table 7. Depersonalization (n = 150)

01

Journal of Health Sciences ISSN 2599-5456						
I have become more insensitive to people	2.18	1.017	Rarely	Low		
since I have been working						
Depersonalization	2.3076	0.5953	Rarely	Low		
4 5 5 Aburger 3 5 4 40 Often: 2 5 3 40 Sometimes: 1 5 2 40 Rareby: 1 1 40 Naver						

4.5-5 Always; 3.5-4.49 Often; 2.5-3.49 Sometimes; 1.5-2.49 Rarely; 1-1.49 Never.

In terms of personal achievement, eight questions were used to quantify the data. The overall mean of personal achievement was average with a scaled response of sometimes (M = 2.65, SD = 0.4999). In a detailed analysis, the highest-ranked item was I accomplish many worthwhile things in this job, however, it is qualitative descriptor as average, with a scaled response of sometimes (M = 2.69, SD = 1.031). The lowest-ranked item was I feel refreshed when I have been close to my patients/clients at work with a scaled response of rarely and a qualitative descriptor of low (M = 2.27, SD = 0.672). This implies that nurses' perception of personal achievement was low. This result is consistent with the study of Lasebikan and Oyetunde (2012) where nurse's personal achievement was low.

Item	Mean	Std.	Scaled	Qualitative
		Deviation	Response	Descriptor
I accomplish many worthwhile things in	2.69	1.031	Sometimes	Average
this job				
I feel full of energy	2.37	.710	Rarely	Low
I am easily able to understand what my patient/client feel	2.23	.689	Rarely	Low
I look after my patient/ client problems very effectively	2.23	.657	Rarely	Low
In my work, I handle emotional problems very calmly	2.35	.655	Rarely	Low
Through my work, I feel that I have a pos- itive influence on people.	2.33	.719	Rarely	Low
I am easily able to create a relaxed atmo- sphere with my patients/ clients	2.35	.695	Rarely	Low
I feel refreshed when I have been close to my patients/clients at work	2.27	.672	Rarely	Low
Personal Achievement	2.65	.499936	Sometimes	Average

Table 8. *Personal Achievement* (n = 150)

4.5-5 Always; 3.5-4.49 Often; 2.5-3.49 Sometimes; 1.5-2.49 Rarely; 1-1.49 Never.

The overall level of professional burnout among nurses was average with a scaled response of sometimes (M = 2.96, SD = 0.304). In ranking the sub-variables of professional burnout, it was noted that emotional exhaustion was average (M = 2.80, SD = 0.517), the personal achievement was average (M = 2.65, SD = 0.4999) and depersonalization was low (M = 2.31, SD = 0.595). This implies that nurses have an average level of professional burnout, specifically looking at emotional exhaustion. This study is consistent with the study of Cishahayo et al. (2017) where professional burnout is found to be high among nurses.

The Influence of Resilience Toward	93			
Table 9. Professional Burnout				
Item	Mean	Std. Deviation	Scaled Response	Qualitative Descriptor
Emotional Exhaustion	2.8042	0.5170	Sometimes	Average
Personal Achievement	2.6492	0.4999	Sometimes	Average
Depersonalization	2.3076	0.5953	Rarely	Low
Professional Burnout	2.9604	0.3042	Sometimes	Average

4.5-5 Always; 3.5-4.49 Often; 2.5-3.49 Sometimes; 1.5-2.49 Rarely; 1-1.49 Never.

Relationship Between Resilience and Professional Burnout

Pearson correlation coefficient was used to examine the relationship between resilience and professional burnout. The relationship between resilience and professional burnout showed a negative relationship (r = -.026, p = .751) at a 95% confidence interval. This means that the higher the resilience the lower the professional burnout of the registered nurses. The study fails to rejects the null hypothesis that there is no significant relationship between resilience and professional burnout. The study was consistent with the st udy of Xie et al. (2011) that there was a negative relationship between resilience and professional burnout.

Table 10. Correlations

Resilience	Professional Burnout				
	Pearson Correlation	026			
	Sig. (2-tailed)	.751			
	Ν	150			

The Difference In Professional Burnout Considering Sex

An independent-samples t-test was conducted to compare the sex scores for males and females on professional burnout. There was no significant difference in scores for males (M = 2.94, SD = .358) and females (M = 2.97, SD = .0278; t (148) = .686, p = .494, two-tailed). The magnitude of the differences in the means (mean difference = .05396, 95% CI: .14365 to -.06963) at equal variance assumed. This study fails to reject the null hypothesis that there is no significant difference in sex when considering professional burnout.

	6
Т	.686
F	1.470
Sig.	.494
df	148
IV	Not Significant

Table 11. The Difference of Professional Burnout Considering Sex

IV = *Qualitative Descriptor*, *S*= *Significant*, *NS*= *Not Significant*

AUP	Research	Office

94

The Difference in Professional Burnout Considering Age

A one-way between-groups ANOVA was conducted to explore the impact of age on professional burnout. Participants were divided into three groups according to their age Group 1: 21 to 27 years; Group 2: 28 to 34 years; Group 3: 35 to 41 years. There was a statistically significant difference at the p > 0.07 level in professional burnout score the age group: F = 5.175. Despite reaching statistically significant the actual difference in mean score between the groups was large. The effect size, calculated using eta squared, was .107. Post- hoc comparison using the LSD test indicated that the mean score for Group 3 (M = 3.08, SD = 0.24) significantly different from Group 1 (M = 2.97, SD = 0.311) and Group 2 (M = 2.89, SD = .311). The study rejects the null hypothesis that there is no significant difference in professional burnout when considering age.

Table 12. ANC	OVA on Age				
	Sum of	df	Mean	F	Sig.
	Squares		Square		
Between	.907	2	.454	5.175	.007
Groups					
Within	12.882	147	.088		
Groups					
Total	13.789	149			

Table 13. <i>Multiple</i>	Comparisons	on Age
---------------------------	-------------	--------

Dependent V	ariable: Profes	sional Burnou	ut			
					95% Confidence Interval	
(I)	Age	Mean Diff	Std. Error	Sig.	Lower Bound	Upper Bound
28-34 years	21-27 Years	086	.0562	.1273	19710	.02485
	35-41 Years	19698*	.0616	.0017	31852	07511

*. The mean difference is significant at the 0.05 level.

The Difference in Professional Burnout Considering the Clinical Area

A one-way between-groups ANOVA was conducted to explore the impact of the clinical area on professional burnout. Participants were divided into four groups according to their clinical area. Group 1: Medical unit; Group 2: surgical unit; Group 3: Emergency unit and Group 4: Intensive care unit. There was a statistically significant difference at the p > 0.004 level in professional burnout score the clinical area: F = 4.633. Despite reaching statistically significant the actual difference in mean score between the groups was small. The effect size, calculated using eta squared, was 0.104. Post- hoc comparison using the LSD test indicated that the mean score for Emergency unit (M = 3.13, SD = 0.222) significantly different from intensive unit (M = 3.02, SD = 0.290), surgical unit (M = 3.02, SD = 0.366) and medical unit (M = 2.86, SD = 0.259). The study rejects the null hypothesis that there is no significant difference in professional burnout when considering the clinical area.

The Influence of Resilience Towards Professional Burnout Among Registered Nurses						
Table 14. ANOVA on C	linical Areas					
	Sum of	df	Mean	F	Sig.	-
	Squares		Square			_
Between Groups	1.199	3	.400	4.633	.004	-
Within Groups	12.591	146	.086			_
Total	13.789	149				

Table 15. Multiple Comparisons on Clinical Areas
Dependent Variable: Professional Burnout

F						
					95% Con	fidence Interval
(I) Clinio	cal Area	Mean Diff	Std. Error	Sig.	Lower Bound	Upper Bound
Emergency Unit	Medical Unit	.270470*	.09574	.005	.08124	.45968
	Surgical Unit	.1156806	.10117	.255	08427	.31563
	Intensive Care Unit	.1136478	.10054	.260	08506	.31236

*. The mean difference is significant at the 0.05 level.

The Difference of Professional Burnout Considering Clinical Experience

A one-way between-groups analysis of variance was conducted to explore the impact of clinical experience on professional burnout. Participants were divided into three groups according to their clinical experience. Group 1: 1 to 4 years; Group 2: 5 to 9 years; and Group 3: 10 years and above. There was a statistically significant difference at the p> 0.002 level in compassion fatigue score the age group: F= 6.337. Despite reaching statistically significant the actual difference in mean score between the groups was moderate. The effect size, calculated using eta squared, was 0.086. Post- hoc comparison using the LSD test indicated that the mean score for 5-9 years (M=3.0696, SD=0.3395) significantly different from 10years and above (M= 3.0590, SD= 0.2077), and 1-4 years (M= 2.8898, SD= 0.3080). The study rejects the null hypothesis that there is no significant difference in professional burnout when considering clinical experience.

		агренет			
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.094	2	.547	6.337	.002
Within Groups	12.695	147	.086		
Total	13.789	149			

Table 16. ANOVA on Clinical Experience

96	6 Journal of Health Sciences ISSN 2599-5456					
Table 17. Mul	tiple Compari	sons on Clinic	cal Experience	2		
Dependent V	ariable: Profes	ssional Burnou	ut			
				95% Con	fidence Interval	
(I) Clinical	Experience	Mean Diff	Std. Error	Sig.	Lower	Unner Bound
					Bound	opper bound
10+ Years	1-4 Years	.193955*	.05863	.004	.0534	.2851
	5-9 Years	01055	.07609	.890	1609	.1398

*. The mean difference is significant at the 0.05 level.

The study sought to find the relationship between resilience and professional burnout among nurses and found that nursing resilience is high implying they have built a high mental and emotional resilience to cope with their work environment because of increasing workload and lack of staff.

In terms of professional burnout, the study concluded that nurse experience a moderate level of professional burnout, specifically highlighting emotional exhaustion as moderate, showed negative relationship between resilience and professional burnout thus when a nurse's resilience level increases, their professional burnout decreases. The findings also revealed no significant difference in professional burnout when sex is considered; however, nurses aged 35 to 41 years experienced a higher level of burnout as compared to other age groups. Those working in accident and emergency unit also had a higher level of burnout as compared to those in medical, surgical and intensive care units. Lastly, nurses with clinical experience of 10 years and above had a higher level of burnout compared to those with less years of clinical experience.

The study recommends that nursing administrators should conduct continuous professional education to enhance resilience among nurses. Secondly, nursing administrators should create a work environment that is in accordance with the nurse-patient ratio, appropriate working hours and appropriate workload. This would help in decreasing the nurse's burnout. Further research should be done using a qualitative research design to better understand the effect of burnout on nursing staff wellbeing.

References

Chang, Y. & Chan, H. (2013). Optimism and proactive coping in relation to burnout among nurses. *Journal of Nursing Management*, 23(3), 401-408. doi:10.1111/jonm.12148

Cishahayo, E. U., Nankundwa, E., Sego, R., & Bhengu, B. R. (2017). Burnout among nurses working in critical care settings: A case of a selected tertiary hospital in Rwanda. *International Journal of Research in Medical Sciences*, 5(12), 5121. doi:10.18203/2320-6012.ijrms20175430

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. (2nd ed.). Erlbaum.

Delgado, C., Upton, D., Ranse, K., & Furness, T. (2017). Nurses' resilience and the emotional labour of nursing work: An integrative review of empirical literature. International Journal of Nursing Studies, 70, 71-88.

The Influence of Resilience Towards Professional Burnout Among Registered Nurses

- Ezenwaji, I. O., Eseadi, C., Okide, C. C., Nwosu, N. C., Ugwoke, S. C., Ololo, K. O., & Oboegbulem, A. I. (2019). Work-related stress, burnout, and related sociodemographic factors among nurses. *Medicine*, 98(3), e13889. doi:10.1097/md.00000000013889
- Hayes, B., Douglas, C., & Bonner, A. (2013). Work environment, job satisfaction, stress and burnout among haemodialysis nurses. *Journal of Nursing Management*, 23(5), 588-598. doi:10.1111/jonm.12184
- Hsieh, H., Hung, Y., Wang, H., Ma, S., & Chang, S. (2015). Factors of resilience in emergency department nurses who have experienced workplace violence in Taiwan. *Journal of Nursing Scholarship*, 48(1), 23-30. doi:10.1111/jnu.12177
- Katyal, S. (2013). Burnout among nurses working in government and private hospitals. *Studies* on Home and Community Science, 7(2), 83-85. doi:10.1080/09737189.2013.11885396
- Koen, M. P., Van Eeden, C., & Wissing, M. P. (2011). The prevalence of resilience in a group of professional nurses. *Health SA Gesondheid*, *16*(1). doi:10.4102/hsag.v16i1.576
- Kutluturkan, S., Sozeri, E., Uysal, N., & Bay, F. (2016). Resilience and burnout status among nurses working in oncology. *Annals of General Psychiatry*, 15(1). doi:10.1186/s12991-016-0121-3
- Lahana, E., Papadopoulou, K., Roumeliotou, O., Tsounis, A., Sarafis, P., & Niakas, D. (2017). Burnout among nurses working in social welfare centers for the disabled. *BMC Nursing*, 16(1). doi:10.1186/s12912-017-0209-3
- Lasebikan, V. O. & Oyetunde, M. 0. (2012). *Burnout among nurses in a Nigerian general hospital: prevalence and associated factors.* International Scholarly Research Notices, 1-6.
- Lee, H., Yen, M., Fetzer, S., & Chien, T. W. (2014). Predictors of burnout among nurses in Taiwan. Community Mental Health Journal, 51(6), 733-737. doi:10.1007/s10597-014-9818-4
- Li, X., Guan, L., Chang, H., & Zhang, B. (2014). Core self-evaluation and burnout among nurses: The mediating role of coping styles. *PLoS ONE*, 9(12), e115799. doi:10.1371/ journal.pone.0115799
- Ren, Y., Zhou, Y., Wang, S., Luo, T., Huang, M., & Zeng, Y. (2018). Exploratory study on resilience and its influencing factors among hospital nurses in Guangzhou, China. *International Journal of Nursing Sciences*, 5(1), 57-62. doi:10.1016/j.ijnss.2017.11.001
- Rushton, C. H., Batcheller, J., Schroeder, K., & Donohue, P. (2015). Burnout and resilience among nurses practicing in high-intensity settings. *American Journal of Critical Care*, 24(5), 412-420. doi:10.4037/ajcc2015291

Journal of Health Sciences | ISSN 2599-5456

- See, K. C., Zhao, M. Y., Nakataki, E., Chittawatanarat, K., Fang, W., & Phua, J. (2018). Professional burnout among physicians and nurses in Asian intensive care units: A multinational survey. *Intensive Care Medicine*, 44(12), 2079-2090. doi:10.1007/s00134-018-5432-1
- Smith, G. D. & Yang, F. (2017). Stress, resilience and psychological well-being in Chinese undergraduate nursing students. *Nurse Education Today*, 49, 90-95. doi:10.1016/j. nedt.2016.10.004
- Tay, W. Y., Earnest, A., Tan, S. Y., & Ng, M. J. (2014). Prevalence of burnout among nurses in a community hospital in Singapore: A cross-sectional study. *Proceedings of Singapore Healthcare, 23*(2), 93-99. doi:10.1177/201010581402300202
- Thomas, L. J. & Asselin, M. (2018). Promoting resilience among nursing students in clinical education. *Nurse Education in Practice*, 28, 231-234. doi:10.1016/j.nepr.2017.10.001
- Thomas, L. J. & Revell, S. H. (2016). Resilience in nursing students: An integrative review. *Nurse Education Today*, *36*, 457-462. doi:10.1016/j.nedt.2015.10.016
- Vagias, W. M. (2006). Likert-type scale response anchors. Clemson International Institute for Tourism & Research Development, Department of Parks, Recreation and Tourism Management. Clemson University
- Waddill-Goad, S. M. (2019). Stress, fatigue, and burnout in nursing. *Journal of Radiology* Nursing, 38(1), 44-46. doi:10.1016/j.jradnu.2018.10.005
- Xie, Z., Wang, A., & Chen, B. (2011). Nurse burnout and its association with occupational stress in a cross-sectional study in Shanghai. *Journal of Advanced Nursing*, *67*(7), 1537-1546. doi:10.1111/j.1365-2648.2010.05576.x

<u>98</u>

Dental Needs Assessment and DMFT/dmft Rates of Students from School for the Deaf: Basis for the Development of an Oral Health Promotion Tool

Vivien Lou L. Desabille, Lyke Joy P. Halasan, Karissa D. Pajares, Nhelsar Mel V. Sarmiento, Riomel A. Aguilera, Lychel Lee R. Gabuco, Deborah Cynthia T. Gatchalian, Magda Georgetta R. Resontoc, Herminiano I. Subido Jr., and Lorcelie B. Taclan Adventist University of the Philippines

raaguilera@gmail.com

Abstract

ndividuals who have disabilities tend to neglect their oral health, especially those who have impaired hearing, mostly due to a lack of effective communication. This study assessed the oral health status of selected deaf students in CALABARZON based on their knowledge, attitude, and practices on oral health. A total of 58 respondents answered a questionnaire followed by a mouth examination and used a descriptive - correlational design to analyze the data gathered. Based on the results, the level of Oral Hygiene Practices signifies a low - very low result of their DMFT/dmft rates while their Oral Hygiene Knowledge showed a higher output similar to the Oral Hygiene Attitude. The findings revealed that the higher the level of oral hygiene practices, the lower the results of their DMFT/dmft rate are. Furthermore, the study revealed that the participants, although deaf, are knowledgeable, well informed to process the right information that they know about oral health, and are capable of how to properly take good care of their oral hygiene, specifically their teeth. Hence, it is recommended to conduct a seminar about basic dental regimen and proper nutrition to the educators of the deaf students to utilize the modules formulated by the researchers for the deaf students' use.

Keywords: DMFT/ dmft rates, Oral hygiene knowledge, attitude, and practicesn

People with hearing problems like children and younger adults appear to be underprivileged of dental health than their non - disabled counterparts. It is a prime feature for all children and those with special needs to have good dental health because dental care influences an individual's aesthetics and conversations. To define it has a strong foundation of biological, mental, and community projections (Suma, 2015).

Improper dental care affects the normal function of the teeth, thus infection in the oral cavity has a direct impact on the physical and mental performance of an individual (Mustafa et al., 2018). As claimed by the 2015 United Nations report on individuals with health issues in Asia and the Pacific, 12.9% of the 1,442,586 claims that persons with disabilities in the Philippines are categorized with hearing disability. There is only a small portion of the total population acquired by the deaf, and yet, it reached up to almost 1.5 million (Malik, 2016).

Hearing problems primarily destroys communication. Individuals with hearing problems are at risk of having dental problems because of unclear and inadequate communication with the dental personnel. The scope of disturbance relies on age on onset, training, and embracing of the disability (Samnieng, 2014) Hearing impairment is an unrevealed handicap that leads to communication division which might hamper knowledge transfer. That was proven and Journal of Health Sciences | ISSN 2599-5456

showed in the results of Tugeman et al.'s (2016) study between individuals aged 7-14 years old; hearing-impaired children had substandard oral health knowledge, poor oral hygiene practice, and inflated plaque maturity.

There is an alarming situation for dental diseases among hearing and speech impaired children because they receive less general care as well as oral care than the normal population. Hence, efforts should be produced to uplift the parents and teachers in the school of these young individuals to nurture and upgrade their oral health. Very young individuals and those who are living in various institutional homes are mainly supported by parents, siblings, or nursing aids for general care including preservation of oral hygiene. Most of the caretakers do not have the required knowledge to appreciate the importance of dental hygiene and the proper diet of the disabled. These children may be more vulnerable to dental caries if they lodge in at home and indulge with cariogenic snacks and other unhealthy and unacceptable eating habits (Shivakumar, 2018).

As claimed by RV Integrated School for the disabled, there is a total of 76 speech and hearing-impaired children, 47 males and 29 females, age 5 to 18 years of both genders were surveyed and details about their dental hygiene application, previous dental visit, and oral health knowledge were secured through a survey questionnaire. The results revealed that around 61% of the children had never visited a dentist, and 17.11% of them brushed with a minimum of one to two times daily respectively. 42% of the children had dental caries, and gingivitis was noticed in 35% of the children and malocclusion in 19% of them (Suma, 2015).

Knowledge about oral health is the indication to arrest dental health problems and schools are the best place to teach school-age children about preventive dental health practices and through them learning can outstretch their families and community members as well (Sandeep et al., 2014). Dental care is created to be an extremely unfulfilled health care necessity, especially among individuals with special needs. Their dental health may be mistreated because of the focus on their health conditions, other major diseases, or limited access to oral health care. Moreover, dental care is sought only on an emergency foundation. Their dental needs are said to be extremely underserved due to health care neglect by caretakers, parents, communication division, or socioeconomic issues. Learning research has revealed that these hearing-impaired young individuals can modify their attitudes about oral hygiene routine measures if only given a little bit of motivation and support by professionals (Tariq et al., 2017).

Hard-of-hearing children acquire poor oral health care and may have increase vague untreated needs. This could be seen by their inability to participate with the dental treatment and also inadequate knowledge and awareness about oral health care due to communication barriers (Vinay, 2019). In a handicapped community like hearing-impaired children, both dental and oral health awareness were highly disregarded thus, they would only rely on their parents and/or guardians to execute the oral health care that they need in everyday life resulting in insufficient measures in the health care systems (Khalaf & Asiri, 2017).

Childhood is the best stage for the formation of healthy habits in these children who can change their health profile at a later stage of their life. Education in oral health is the key to the prevention of oral diseases (Doichinova & Peneva, 2015). Studies proved that oral hygiene instructions whether direct or indirect should benefit not only hearing-impaired but also normal children. The focus of the study is to recognize the importance of visual instruction as a motivational tool on the oral hygiene condition of children with health issues. The method of brushing teeth is needed for the effective preservation of dental hygiene. Dissimilar techniques

Dental Needs Assessment and DMFT/dmft Rates of Students from School for the Deaf: Basis for the Development of an Oral Health Promotion Tool **101** like simple scrubbing, bass method was recommended to children. In the paper, the horizontal scrub method of brushing the teeth was emphasized since it is a technically sound method that could be easily practiced (Vinay, 2019).

In the research of the Philippine National Oral Health Survey in 2006 (Monse et al., 2015) showed children from government schools in the primary level obtained a limited amount to no oral care. Using the Decayed, Missing, and Filled Permanent Teeth (DMFT/dmft) index, their results revealed that the mean score of DMFT to 6-year-old students was 8.4 while on the other hand a score of 2.9 from the 12-year-old age group. In connection, government funds were used for more urgent matters instead of spending it on oral health care.

Dental professionals should take into consideration having an interpreter while delivering oral health care and should also be aware of inaccessibility to the dental services of the community (Vichayarant & Kositpumivate, 2014). It was stated in 1979, that the main vision for oral health worldwide was announced by the WHO. During the year 2000, dental caries as a worldwide average would be not exceeding to more than 3 DMFT by the age of 12. In conformity by the year 1982, it was assigned as part of the strategy of health for all and on the succeeding years, the organization supported the promotion of oral health to become a vital part of health for all by the year 2000. While in the year 1994, it was declared by the WHO to be named as World Health Day simply because to give importance and emphasis on one's oral health (WHO, 2020).

Health education is necessary but will not answer the issue alone. Where special children are concerned, learning and motivational activity should be widened to their parents, caregivers, and instructors. Customization of the treatment protocol is an indispensable requisite when special children are dealt with. Constant motivation and augmentation in the structure of the visual guide are useful to achieve good oral hygiene levels in CHI (Vinay, 2019).

Hearing and/or Speech impairments (HSI) claimed to have problems communicating with the dental team, including the need for the profession to enhance a helpful communication strategy when dealing with these individuals. They created a toolkit designed to guide the delivery of oral hygiene directive, dental health education, and dental assessment for patients with HSI, and how it is used resulted in an effective dental health output in a patient with such illnesses (Ahmad et al., 2016).

The application of sign and spoken languages do not vary. "Either if the two can be applied to impart and contribute facts, tell true stories or lies, provide poems, and tell jokes, to tackle scientific and abstract matters as well as have a speech or a lecture" (Soriano, 2015, p. 2). A bill pending in Congress aspires to declare Filipino Sign Language (FSL) as the native sign language of the Filipino Deaf and the formal language of government in all its proceedings with the Deaf. The bill also mandates the application of FSL in schools, broadcast media, and workplace (Soriano, 2015, p. 102).

According to (Tugermana, 2014) the oral health care for the hearing impaired (OCHI) program would qualify the schoolteachers and hearing-impaired children to give more command over the personal and environmental factors which would compromise their health. The mediation program resulted in the necessary knowledge and attitude near preserving and enhancing oral health. Given to have the teachers and trainers together with the dentists would enable the latter to focus on patient care. The oral health learning has reached the oral health knowledge gap among hearing and hearing-impaired children by providing the children the knowledge in an appropriate way and lesser interaction hindrances. Ultimately, the trained

-	00
	112

Journal of Health Sciences | ISSN 2599-5456

schoolteachers may encourage the students and the community for a greater oral hygiene practice.

The objective of this research was to assess and determine the Dental needs and DMFT/ dmft rates of students in selected Deaf Institutions in NCR and some areas in CALABARZON.

Methodology

Research Design

This is a quantitative study with a descriptive-correlational design. In this study, the provided information gathered from the participants who completed the provided questionnaires. The results are then depicted in numerical form, the descriptive design was used to describe specific behavior and variables like knowledge, attitude, and practices, and the correlational design figured out if two or more variables are related and if so, in what way.

Population and Sampling Technique

The researchers have visited the four deaf institutions and asked for a copy of the total number of enrolled students then placed it in a fishbowl and randomly picked 93 names but only 58 respondents were compliant. The selected participants' age ranges from 6 to 35 years old. They were all enrolled in a private institution, from Kinder up to Senior High School during the collegiate year 2019 - 2020. The demographic characteristics of the respondents are shown in Table 1.

Demographic	Variable	Frequency	Percentage
Age	6-9 y.o.	5	8.6
	10-12 y.o.	17	29.3
	13-above	36	62.1
Sex	Male	24	41.4
	Female	34	58.6
Estimated monthly	₱10,000-30,000	5	8.6
salary of parents	₱51,000-above	2	3.4
	Does not know	51	87.9

Table 1. Demographic Characteristics of the Respondents

Instrumentation

A self-constructed interview type of questionnaire with the collaboration of the class adviser and sign language interpreter was used to gather data for this study. All questions were connected to the type of answer choices per variable and items were carefully obtained according to their relevance in the study. The questionnaire was divided into four parts to come up with the most relevant data that fit the research. The first part consists of the demographic data including the socio-economic status wherein there are corresponding ranges of wage as to what amount their parents earn within one month. If the respondent does not have any idea as to what amount AUP Research Office Dental Needs Assessment and DMFT/dmft Rates of Students from School for the Deaf: Basis for the Development of an Oral Health Promotion Tool 103 to answer they may choose the option "does not know".

The second part is asking questions that fit into the person's knowledge of proper oral hygiene and the third and fourth parts follow the same format of questionnaires but are based on the individual's attitude and practices about oral health. Dichotomous type of questions was used and had a total of 30 items.

The researchers made sure of the consistency, validity, and reliability of the research instrument through validation made by three-panel members, the University Research Office, and a Licensed Statistician. Also, the researchers used a mouth mirror, explorer, periodontal probe, and cotton plier for the mouth examinations. Upon recording the oral examination results, DMFT Index for the adult while lowercase letters for the young respondents; caries frequency among the respondents was assessed with the use of the said index. It expressed the total number of teeth that are decayed (D), missing (M), or filled (F) in each respondent. All teeth except the third molars were also examined in identifying each component separately.

The DMF Index is an essential tool to assess the caries experience in dental epidemiology. In computation for the DMFT, it is viewed as the total of all the numbers of Decayed, Missing, due to caries, and Filled Teeth in the permanent dentition. The mean number of DMFT is the total of individual DMFT values divided by the total of the population. The same format of computation to lowercase letters dmft (Lo, 2020).

By Individual DMFT/dmft:

Permanent teeth: Total each component separately then total D + M + F = D M FPrimary teeth: Total each component separately then total d + m + f = d m f

By group average:

Total the D, M, F for each respondent. Then, divide the total D M F by the number of individuals in the group.

Permanent dentition: Average DMF=	<u>Total D M F</u>
Total number of the subjects examined	
Primary dentition: Average dmf=	Total d m f
Timary dentition. Average dim-	<u>10tal u III I</u>

Total number of the subjects examined

Only 36 deaf students among 50 students responded to their survey and mouth examination. With variables like knowledge, attitude, and practices comprising 10 questions under each category that were asked in the pilot study. In this reliability test, the statistician used Cronbach's alpha to quantify the internal consistency of the data and how closely the relation of set items are as a group. It is the commonly used tool among reliability coefficients. Therefore, the results revealed their levels of knowledge and attitude, a good reliable result of .690 and .665 while practices account for .599 with an acceptable result. Among the 30-item questionnaire, it sums up to .727 with a good reliable result with the complete raw data.

Data and Statistical Analysis

The letters of consent from parents were collected before distribution and filling out the questionnaire forms. The deaf students were asked to respond to the given questionnaire with the help of their respective teachers and with sign language interpreters. The researchers gathered all the necessary information and data which was then sent to the statistician for the result interpretation. Once the results were evaluated, the researchers revised the sample questionnaires based on the Statistician's suggestion and recommendations. DMFT/dmft rates were also utilized after the revision of data has been made.

Dental caries assessment were also noted during the time of oral examination with assistance of the researchers' accompanying dentist since there was no available Dentist at the three deaf schools. The gathered data had been treated making use of the Statistical Package for the Social Sciences (SPSS) version 22. The statistical treatment such as the measure of central tendency with mean and measure of dispersion like standard deviation was used to regulate the respondents' DMFT results and level of oral hygiene attitude. The ANOVA Test was used to direct the significance of Oral hygiene practices through age and socio-economic status between groups and within groups. Along with the use of Tukey HSD (Honestly Significant Difference) test to interpret the mean difference among age and socio-economic status of the respondents. Also, Levene's test and t-test were used to direct the differentiation of Oral Hygiene practices based on the gender of the respondents, and Pearson product-moment correlation coefficient was also used to regulate the correlation between knowledge, attitude, and practices.

Ethical Considerations

The researchers applied for clearance to conduct a research study at the AUP-ERB and Executive Committee of the Research Office with the approved study protocol code 2019-ERB-AUP-069. Hence, ethical clearance and authorization letters from the university were provided for the appropriate head of selected deaf schools to be used in the study as well as consent letters for the parents of the respondents. The participants were given adequate information regarding the study as well as the decision to choose to submit themselves for the study or to decline participation. All consent forms were attached to the survey questionnaires and kept confidential. The respondents had the choice to write their names or not in the survey questionnaire. The results were only seen by the researchers. Each respondent was assigned a specific code before being forwarded to the statistician for analysis.

Results and Discussion

Variable	Mean	Standard	Scale response	Verbal
		Deviation		Interpretation
DMFT	0.3021	0.23919	0.21 - 0.40	low
Dmft	0.0921	0.21104	020	very low
AUP Research Office				JHS Vol. 3 No. 2 December 2020

DMFT/dmft Rate of the Respondents

Table 1. DMFT/dmft Rate of the Respondents

Dental Needs Assessment and DMFT/dmft Rates of Students from School for the Deaf: Basis for the Development of an Oral Health Promotion Tool 105

Table 1 shows that the respondents have low DMFT rates and very low dmft rates. The verbal interpretation of below average denotes to a decrease number of dental decay widespread accompanied by low dental treatment needs.

Interpretation Guide of DMFT/dmft Index

The Decayed, Missing, Filled (DMF) index has been applied for approximately 80 years and is well-accepted as key steps of caries experienced in dental epidemiology. In relation, the rank per person can start from 0 to 28 or 32, based on whether the third molars are used in the counting. When the index is useful only to tooth surfaces (five per posterior tooth and four per anterior tooth), it is called the DMFS index, and scores per person can range from 0 to 128 or 148, depending on whether the third molars are incorporated. While in primary dentition, the scores can start from 0 to 20 for children. The dmfs index expresses the number of involved surfaces in first dentition (five per posterior tooth and four per anterior tooth), with a score can start from 0 to 88 surfaces. Because of the difficulty in distinguishing between teeth extracted due to caries and those that have naturally exfoliated, missing teeth may be unidentified (Lo, 2020).

Level of Oral Hygiene Knowledge of the Respondents

Item	R	F	Р	S. R.	V.I.
Toothbrusing is good for the teeth.	Yes	58	100	81-100	Strongly Agree
	No	0	0		
Mouthwash lessens bad breath	Yes	53	91.4	81-100	Strongly Agree
	No	5	8.6	0-20	Disagree
Teeth are important in chewing and grinding food	Yes	56	96.6	81-100	Strongly Agree
	No	2	3.4	0-20	Disagree
A decayed tooth can affect the way I eat.	Yes	23	39.7	21-40	Slightly Agree
	No	35	60.3	61-80	Agree
Toothache can affect my daily activities	Yes	24	41.4	41-60	Moderately Agree
	No	34	58.6	41-60	Moderately Agree
Any food I eat can affect the health of my teeth.	Yes	21	36.2	21-40	Slightly Agree
	No	37	63.8	61-80	Agree
Milk will help strengthen my teeth.	Yes	56	96.6	81-100	Strongly Agree
	No	2	3.4	0-20	Disagree
Cheese, egg, fish and meat makes my teeth strong.	Yes	56	96.6	81-100	Strongly Agree
	No	2	3.4	0-20	Disagree

Table 2. Oral Hygiene Knowledge of the Respondents

06 Journal of Health Sciences ISSN 2599-5456							
Candies and soft drinks are bad for my teeth.	Yes	26	44.8	41-60	Moderately Agree		
	No	32	55.2	41-60	Moderately Agree		
Teeth should be cleaned $1-2$ times a year by a dentist.	Yes	53	91.4	81-100	Strongly Agree		
	No	5	8.6	0-20	Disagree		
Legend: $R = Response; F = Frequency; P = Percent; SR = Scale Response; VI = Verbal Response$							

The total mean score of 58 students is \overline{X} 6.8448 (SD = 1.99826) interpreted as high. It means that their mind and body are well-informed to process right information that they know about oral health.

Oral Hygiene Attitude Survey Questions With Verbal Interpretation

Item	R	F	Р	S. R.	V.I.
I am afraid to go to the dentist.	Yes	12	20.7	21-40	Slightly Agree
	No	46	79.3	61-80	Agree
Visiting a dentist is a waste of time	Yes	16	27.6	21-40	Slightly Agree
	No	42	72.4	61-80	Agree
I am not bothered in other people's opinion about my teeth.	Yes	11	19	0-20	Disagree
	No	47	81	81-100	Strongly Agree
Visiting a dentist will just add up to our expenses.	Yes	16	27.6	21-40	Slightly Agree
	No	42	72.4	61-80	Agree
I prefer to neglect the pain in my tooth.	Yes	14	24.1	21-40	Slightly Agree
	No	44	75.9	61-80	Agree
I am not comfortable to ask questions to my dentist.	Yes	19	32.8	21-40	Slightly Agree
	No	39	67.2	61-80	Agree
I prefer not to brush my teeth before sleep- ing.	Yes	14	24.1	21-40	Slightly Agree
	No	44	75.9	61-80	Agree
I feel comfortable even without brushing my teeth.	Yes	7	12.1	0-20	Disagree
	No	51	87.9	81-100	Strongly Agree
I am happy with the appearance of my teeth.	Yes	53	91.4	81-100	Strongly Agree
	No	5	8.6	0-20	Disagree

Table 5. Oral Hygiene Attitude Survey Questions With Verbal Interpretation

Dental Needs Assessment and DMFT/dmft Rates of Students from	School for the	Deaf: Basis	for the Deve	lopment of an Oi	ral Health Promotion Tool 10
Vegetables are healthy but I don't eat them.	Yes	21	36.2	21-40	Slightly Agree
	No	37	63.8	61-80	Agree
Legend: $R = Response$; $F = Frequency$; $P = Percent$; $SR = Scale Response$; $VI = Verbal Response$					

Level of Oral Hygiene Practices of the Respondents

	Mean	Standard Deviation	Scaled Response	Verbal Interpretation
Practices	8.7759	1.20005	8.1 - 10.0	very high

The total mean score of 58 students was the \overline{X} 8.7759 (SD = 1.20005) interpreted as very high. It means that the respondents are well-informed about their oral health. The respondents can easily practice the proper way of taking good care of their oral hygiene.

Oral Hygiene Practice Survey Questions With Verbal Interpretation

Item	R	F	Р	S. R.	V.I.
We sometimes talk about our oral health at	Yes	57	98.3	81-100	Strongly Agree
home.					
	No	1	1.7	0-20	Disagree
I visit my dentist every time my tooth	Yes	49	84.5	81-100	Strongly Agree
aches.					
	No	9	15.5	0-20	Disagree
I visit the dentist, whenever I have a decayed tooth	Yes	53	91.4	81-100	Strongly Agree
	No	5	86	0.20	Disagraa
	INO	5	0.0	0-20	Disagree
Whenever I visit the dentist, I am always accompanied by my parents.	Yes	56	96.6	81-100	Strongly Agree
	No	2	3.4	0-20	Disagree
I use pea – sized toothpaste on my teeth.	Yes	46	79.3	61-80	Agree
	No	12	20.7	21-40	Slightly Agree
I brush my teeth at least $1 - 2$ minutes.	Yes	50	86.2	81-100	Strongly Agree
	No	8	13.8	0-20	Disagree
I also brush my tongue every time I brush	Yes	55	94.8	81-100	Strongly Agree
	No	3	5.2	0-20	Disagree
I use mouthwash once a day.	Yes	51	87.9	81-100	Strongly Agree
	No	7	12.1	0-20	Disagree
I use floss after eating.	Yes	50	86.2	81-100	Strongly Agree

Table 7. Oral Hygiene Practice Survey Questions With Verbal Interpretation

AUP Research Office

JHS Vol. 3 No. 2 | December 2020

Journal of Health Sciences ISSN 2599-5456							
No	8	13.8	0-20	Disagree			
Yes	42	72.4	61-80	Agree			
No	16	27.6	21-40	Slightly Agree			
	Health Sciences IS No Yes No	Health Sciences ISSN 2599-5No8Yes42No16	No 8 13.8 Yes 42 72.4 No 16 27.6	No 8 13.8 0-20 Yes 42 72.4 61-80 No 16 27.6 21-40			

Legend: R = *Response; F* = *Frequency; P* = *Percent; SR* = *Scale Response; VI*= *Verbal Response*

Based on the collected results the level of Oral Hygiene Practices which accounts to a very high result as evidenced by a low - very low results of their DMFT/dmft rates. The level of oral hygiene Knowledge of the deaf students shows a higher output as same as the oral hygiene Attitude of the deaf students.

For future researchers make a technical set of survey questionnaires that will be suited to each school for the deaf and to further assess the level of their oral hygiene knowledge, attitude, and practices. A divided scope of respondents is suggested to the future researchers to the category they belong; e.g., early or late American or Filipino Sign Language learner and to their grade or year level be applied and additional variables be added to further understand possible barriers in order to achieve a lower DMFT/dmft rate and good oral health results.

References

- Ahmad, M.A-B., Al-Bayaty, F.H., & Ghani, F.A. (2016). Care to care: An innovative oral health educational method for patients with hearing and/or speech impairments. *Malaysian Dental Journal, 39*(1). https://mda.org.my/home/mdj-archive-2015-to-2018/
- Doichinova, L. & Peneva, M. (2015). Motivational training programme for oral hygiene of deaf children. *International Journal of Science and Research (IJSR)*, 4(2), 1124-1126.https:// pdfs.semanticscholar.org/3ad2/e2d893f78d42f059617bf61bcd4351b0793d.pdf
- Khalaf, K. & Asiri, Y. (2017). *Basic practices of oral hygiene and awareness of oral and dental disease among deaf and dumb population in Saudi Arabia. Dentistry World.* https://www.researchgate.net/publication/328874044_Basic_practices_of_oral_giene_and_awareness_of_oral_and_dental_disease_among_deaf_and_dump_population_in_Saudi_Arabia
- Lo, D. E. (2020). Caries process and prevention trategies: Epidemiology, Epidemiology: The DMF Index. https://www.dentalcare.co.uk/en-gb/professional-dentist-education/cpdcourses/cpd368/epidemiology-the-dmf-index
- Malik, H. A. (2016). Economic and social survey of asia and the pacific: Year end update. *United Nation Economic and social commission for the asia and the pacific (ESCAP)*. https:// www.unescap.org/sites/default/files/publications/2016-year-end-update.pdf
- Monse, B., Benzian, H., Araojo, J., Holmgren, C., Palenstein, V., Naliponguit, E-C., & Heinrich-Weltzein. W. (2015). A silent public health crisis: untreated caries and dental infections among 6- and 12-year-old children in the Philippine national oral health survey 2006. *Asia Pac J Public Health*, 27(2), 2316-2325. doi:10.1177/1010539512469250
Dental Needs Assessment and DMFT/dmft Rates of Students from School for the Deaf: Basis for the Development of an Oral Health Promotion Tool 109

- Mustafa, M., Asiri, F.Y. I., AlGhannam, S., AIQarni, I. A. M., AIAteeg, M. A., & Anil, S. (2018). Extent of awareness regarding oral health and dental treatment needs among Individuals with hearing and speech impairments in Saudi Arabia. *Journal of International Society of Preventive and Community Dentistry*, 8(1), 70-76. DOI: 10.4103/jispcd_jispcd_194_17.
- Samnieng, P. (2014). Dental cares for patients who have a hearing impairment. *International Journal of Clinical Preventive Dentistry*, 10(4), 215-218.
- Sandeep, V., Vinay, C., Madhuri, V., Veerabhadra, V., Uloopi, K. S., & Chandra Sekhar, R. (2014). Impact of visual instruction on oral hygiene status of children with hearing impairment. *Journal of International Society of Preventive and Community Dentistry*, 32(1), 39-43. https://doi.org/10.4103/0970-4388.127053.
- Shivakumar, K. M. (2018). Dental caries experience and oral hygiene status among hearing and speech impaired children of Karad city, Maharashtra, India. J Int Oral health, 10(6), 283-286.
- Soriano, J. (2015). Interacting with persons with disabilities. *Getting it right: Reporting on Disability in the Philippines*, 102.https://asiafoundation.org/publication/getting-it-right-reporting-on-disability-in-the-philippines/
- Suma, G. (2015). Dentition status and oral Health practice among hearing and speech-impaired children: A cross-sectional study. *International Journal of Clinical Pediatric Dentistry*.
- Tariq, K., Imam, H., & Parvez, M. (2017). Knowledge, Attitude and Practices before and after dental health education among hearing and speech impaired children. *Annals of Punjab Medical College, 11*, 222-226. https://www.researchgate.net/publication/321634633_ Knowledge_Attitude_and_Practices_Before_and_After_Dental_Health_Education_ among_Hearing_and_Speech_Impaired_Children
- Tugeman, H. R., Rahman, N. A., Yusoff, A., & Daud, M. k. (2016). Oral health knowledge, practice and dental plaque maturity status of hearing-impaired children. *Sains Malaysiana Journal*, 4(5), 761-768.
- Tugermana, H. (2014). Effect of oral health education programme on oral health awareness and plaque maturity status among hearing-impaired children.
- Vichayarant, T. & Kositpumivate, W. (2014). Oral health conditions and behaviors among hearing impaired and normal hearing college students at Ratchasuda College, Nakhon Pathom, Thailand. Southeast asian J trop Med public health, 45(5), 1228-35. doi: 10.1186/s12903-015-0008-8.
- Vinay, C. (2019). Impact of visual instruction on oral hygiene status of children with hearing impairement. *J Indian Soc. Pedod.* Prev.

110

Journal of Health Sciences | ISSN 2599-5456

World Health Organization (2020). Oral health information system: Oral health surveillance. https://www.who.int/oral_health/action/information/surveillance/en/index1.htm

Comparing the Effects of Re-Centrifugation with Rimming, Without Rimming, and Preliminary Pipetting of Serum of Blood Samples on the Risk of Hemolysis

Bebien Mae Christel P. Andio, Laura Lee S. Clifford, Shanygne R. Paso and Yanna Yvonne C. Macayan Adventist University of the Philippines

yycmacayan@aup.edu.ph

Abstract

n the laboratory, it is a common practice to rim a blood sample and centrifuge it a second time if there is no distinct separation of the serum from the blood components. However, some books and published procedures state that this can induce hemolysis in the blood sample. A procedure by the Metropolitan Laboratory suggests that the partially separated serum be pipetted into another tube before recentrifugation to avoid inducing hemolysis. Three methods were applied in the study to determine which condition gives the least amount of hemolysis or variation - with rimming, without rimming, and preliminary pipetting. Potassium was measured to see whether significant difference existed in the three settings. The results showed that the group of samples that were not rimmed had the least amount of potassium levels next to the control group. Using one-way ANOVA, it was determined that no significant difference existed between the methods. Any of the methods can be used in separating serum from other formed elements. Results are objective evidences to help standardize procedure in specimen handling in the pre-analysis stage. Future researchers may use other analytes, such as protein and calcium, to explore if differences in the technique will affect the results.

Keywords: rim, hemolysis, serum, pipetting

It is important to keep a blood specimen for testing free from hemolysis as hemolyzed specimens may produce inaccurate results. This is especially important in the clinical chemistry section of the laboratory. According to Bishop et al. (2013), chemistry specimens are most frequently rejected for hemolysis. When the RBC membrane disrupts in the occurrence of hemolysis, hemoglobin and other intracellular components are released into the serum. Destroyed red cells will then result in a blood sample that does not represent the patient's true status because of intracellular components released in high concentrations (Estridge & Reynolds, 2012; Simundic, Nikolac, Ivankovic, et al, 2009). Poor venipuncture, inappropriate needle bore, freezing, overcentrifugation, excessive

turbulence of sample, and temperature are some of a number of pre-analytical factors that induces hemolysis (Estridge & Reynolds, 2012; Quest Diagnostics, 2016; Sowemimo-Coker, 2002;Turgeon, 2003). Hemolysis may also occur in vivo (Kottke-Marchant & Davis, 2012).

A common encounter in the laboratory is when serum is partially separated after centrifugation. When this happens, the common practice is to rim the sample and centrifuge it a second time. Some books state that this action may induce hemolysis, thus, cause false laboratory results (Dasgupta & Sepulveda, 2012).

In regard to such situation, the Metropolitan Medical Laboratory (2016) suggested a procedure that may prevent 112

Journal of Health Sciences | ISSN 2599-5456

the disruption of RBC membranes if the sample is not already hemolyzed. Blood samples are allowed to clot within the recommended 30-minute clotting time. The whole blood is then centrifuged for 15 minutes to separate the serum for testing. There are instances when the serum does not completely separate and one reason for this is that tubes were improperly balanced during centrifugation (Dasgupta & Sepulveda, 2012). Also, this may result from the blood that has not yet fully clotted. When this happens, the partially separated serum must be pipetted and transferred to another tube. The tube into which the serum is transferred will be centrifuged and the fully separated serum is again pipetted and transferred to another tube, ready for processing (Metropolitan Medical Laboratory, 2016).

The study compared three methods before re-centrifugation: with rimming, without rimming, and pipetting the partially separated serum. is the study also determined which of the three methods provide the least amount of hemolysis or variation and to determine whether significant difference exists between the amount of hemolysis and variations in potassium measurements. Potassium levels were tested since it is the major intracellular cation in the body. Its concentration is 20 times greater inside the cells than outside (Bishop et al., 2013). The test to determine the degree of hemolysis in each sample was performed by the Hi-Precision Diagnostics Laboratory.

Methodology

Research Design

Incidental sampling was used for this study and the design was experimental. Randomization is not necessary because the experiment will be done on the laboratory technique, not on the subjects Twenty-five males were chosen as subjects and each qualified under the following specified criteria:

- a.) A hematocrit level of 40 54% (Rodak et al., 2012).
- b.) A hemoglobin level of 13.3 18 mg/dL, which is derived from the reference range of hematocrit level in adult males using the rule of three (Rodak et al., 2012).
- c.) Did not take any anticoagulants, aspirin and any other related drugs. These were avoided because they may have prolonged the clotting time of blood samples (Dasgupta & Sepulveda, 2012).
- d.) Did not have moderate to exhaustive exercise which may have caused increased potassium levels in the blood by 0.3-3 mmol/L (Bishop et al., 2013).
- e.) Do not have hemolytic anemia and a recent cardiopulmonary bypass (Kottke-Marchant & Davis, 2012).

Population and Sampling Techniques

Individuals who willingly participated in the study were screened to see if they fit under the criteria mentioned above. They were asked concerning taking anticoagulants and other related drugs, exercise and conditions that may cause in vivo hemolysis. Those who were qualified proceeded to be tested for their hematocrit and hemoglobin values.

The 25 male individuals who qualified to undergo the procedure were all college students in the Adventist University of the Philippines with ages within the range of 18 to 28 years old.

Comparing the Effects of Re-Centrifugation with Rimming, Without Rimming, and Preliminary Pipetting of Serum of Blood Samples on the Risk of Hemolysis 113 Materials

Hematocrit of the patients who passed the screening were determined through Adam's Microhematocrit Method. The maximum packing time was determined and the subjects' samples in capillary tubes, obtained through skin prick by a baby or feather lancet, were centrifuged for 3 minutes in a microhematocrit centrifuge. The hematocrit was then measured using a Microhematocrit Reader.

After measuring the hematocrit, the subjects' hemoglobin was determined through the rule of three. The hematocrit values were each divided by 3 to obtain the hemoglobin concentration of the samples.

A total of 12 mL whole blood in four 3 mL red top evacuated tubes was obtained from each of the 25 male subjects by way of the evacuated tube system. There were, in total, 100 tubes. The size of the needle bore used was 21 gauge. The applied disinfectant was allowed to dry before collection to avoid hemolysis. Prolonged application of the tourniquet and forearm exercise was also avoided to prevent high plasma potassium concentrations and hemoconcentration.

Seventy-five of the 100 samples, three from each individual, were under the experimental group. The samples in this group were allowed to clot for only 10 minutes which is lower than the recommended 30-minute clotting time. This was done to obtain blood samples that were only partially clotted which was necessary for research testing. The remaining 25 tubes, one from each individual, served as the control group. The control group was given the recommended 30-minute standing time for complete clotting. The control group is labelled A.



Figure 1. Process of Preparing the Completely and Partially Separated Sera

After the designated clotting time for the samples, the tubes were centrifuged for 15 minutes as recommended by the WHO. After the tubes were centrifuged, there was a complete separation of the serum from the blood components in the control tubes while the experimental tubes did not have a well-defined separation. This was as expected.

Serum in the control tubes (A) was pipetted and transferred to another tube ready for testing. The 75 experimental tubes were tested after undergoing different experimental settings. Since the serum of all the experimental tubes were partially separated, the tubes were subject to undergo re-centrifugation. Three different methods were applied for each of the subjects' three

114

tubes before they were centrifuged a second time.

The experimental tubes from each individual were labelled B, C, and D. The tubes labelled B were not rimmed. They proceeded immediately to re-centrifugation after the first spin. The tubes labelled C were rimmed before they were re-centrifuged. For tubes labelled D, the procedure mentioned by the Metropolitan Medical Laboratory was used. The partially separated serum was pipetted and transferred to another tube. These second tubes, where the partially separated sera were transferred into, were the tubes that underwent second re-centrifugation, not the original tubes. The serum samples of the experimental tubes were then ready for testing after having been re-centrifuged.



Figure 2. Three Methods Done Before Re-Centrifugation of the Experimental Tubes and the Testing for Hemolysis

The serum ready for processing were transferred into plastic test tubes to prevent any complications during specimen transport. The samples were brought to the Hi-Precision Diagnostics Laboratory located at Unit G01-G02 San Jose Bldg, Sta Rosa Estates Comm'l Strip, Tagaytay Rd, Sta Rosa, Laguna. The samples' potassium levels were measured through Direct Ion Selective Electrode using the Cobas B121 Analyzer by Rothe with the manufacturer's reagents (C1, C2, C3). The hemoglobin concentration of the samples was not measured because no test for hemoglobin concentration on serum was available, only tests done on whole blood.

Data Analysis

For the analysis of the gathered data, raw data were encoded and online computations were done under the supervision and aid of the statistician for the study. One-way ANOVA was used for the hypothesis in order to analyze whether there are significant differences in the three methods.

Ethical Considerations

Ethical considerations were observed to ensure confidentiality and anonymity in handling the data. Waiver was signed by the subjects and they were made aware of the extent of the use

AUP Research Office	JHS Vol. 3 No. 2 December 2020

Comparing the Effects of Re-Centrifugation with Rimming, Without Rimming, and Preliminary Pipetting of Serum of Blood Samples on the Risk of Hemolysis 115 of the blood samples collected. Subject numbers and not the real names of the subjects were disclosed to the High-Precision Diagnostics Laboratory to maintain anonymity of the subjects.

Results and Discussion

There are three methods employed by clinical laboratories for partially separated serum samples.

Re-centrifugation. This is repeating the centrifugation process after examining the blood sample having a partially separated serum. According to Metropolitan Medical Laboratory (2016), "Do not respin the original tube". This method causes prolonged contact between serum and the clot and may cause trans-membrane diffusion, changing the concentrations of analytes in the serum (Zhang, 1998).

Rimming. This is done by removing the stopper of the tube, inserting the wooden applicator stick, wrapping the fibrin clot to remove it (Cornell University College of Veterinary Medicine, 2016; Ernst, 2007). In the Philippines, it is a practice to rim the clotted blood when there is no well-defined separation of the serum from the blood constituents after the centrifugation. Once this is done, the sample is re-centrifuged to completely separate the whole blood. Excessive use of this method or vigorous rimming may destroy the cells and cause hemolysis (Bush & Mangan, 2003).

Preliminary pipetting of serum. This method is introduced by the Metropolitan Medical Laboratory (2016). This laboratory procedure mentioned that when the serum in the original tube has not completely separated after centrifugation, the partially separated serum is to be pipetted and transferred to a different tube. The tube in which the partially separated serum is placed will be centrifuged and the supernatant will be pipetted and transferred to another tube, thus, leaving the red cell pellet. This is the serum that is to be used for testing. This method avoids the prolonged contact between the serum and the cells.

The experiment was done to determine which of the three methods provided the least amount of hemolysis and if there is significant difference between the amount of hemolysis and variation in potassium measurements.

Test Subject	A (Control) mmol/L	B (Without Rimming) mmol/L	C (With Rimming) mmol/L	D (Pre-pipetting) mmol/L
1	3.72	4.39	4.49	3.61
2	4.17	3.96	4.03	4.09
3	3.33	3.52	3.80	4.86
4	3.69	3.81	3.72	3.70
5	4.28	4.18	4.26	4.06
6	4.35	5.16	4.64	5.13
7	3.91	4.19	4.05	4.37
8	3.68	3.81	3.70	3.84

Table 1. Subjects' Potassium Levels

116 Journal of Health Sciences ISS			SN 2599-5456	
9	3.45	3.79	3.75	3.60
10	3.50	3.74	3.61	3.59
11	3.87	4.00	4.19	4.06
12	3.82	3.85	3.77	3.79
13	3.40	3.44	3.55	3.56
14	3.86	3.97	3.98	4.01
15	4.07	3.90	4.16	4.14
16	3.77	3.76	3.92	3.94
17	4.33	4.16	4.29	4.16
18	3.96	4.24	4.36	4.30
19	3.88	3.88	4.04	3.98
20	3.74	3.78	3.83	3.79
21	4.83	4.86	4.88	4.57
22	4.30	4.27	4.38	4.57
23	4.04	4.18	4.74	4.82
24	3.40	3.36	3.65	3.51
25	4.45	4.42	4.50	4.34
MEAN	3.91	4.02	4.09	4.10

REFERENCE RANGE: 3.50-5.30 mmol/L

Table 1 shows the results having 25 persons with 4 samples each, a total of 100 samples with A as the Control Group, B as the Without Rimming group, C as the With Rimming Group, and D as the Pre-Pipetting Group.

The Mean Potassium Level for the control group (A) is 3.912, for the without rimming group (B) is 4.0248, for the with rimming group (C) is 4.0916 and for the pre-pipetting group (D) is 4.0956. According to Figure 3, re-centrifugation without rimming resulted to the least amount of potassium levels next to the control group.



Figure 3. Potassium Level vs Experimental Settings

Comparing the Effects of Re-Centrifugation with Rimming, Without Rimming, and Preliminary Pipetting of Serum of Blood Samples on the Risk of Hemolysis 117
Table 2. Comparison of Three Outputs by One-Way ANOVA

Treatment	Ν	Mean (mmol/L)	SD	df	F	p-value
W/0 R	25	4.0248	0.4056	3,96	0.239	0.788
W/ R	25	4.0916	0.3731			
Р	25	4.0956	0.43946			

Data show that there was no statistically significant difference between groups determined by one-way ANOVA (F (3,96) = 0.239, p = 0.788). Meanwhile, in search for further results, the statistician tried to compare the three treatments to the control group. Results are shown in Table 3. Still, statistically significant difference was not found.

(I)	(J)	Mean Difference	Std.	Sig	95% Confidence Interval	
TREATMENT	TREATMENT	(I-J)	Error	Sig.	Lower	Upper
		(1 0)			Bound	Bound
CONTROL	WITHOUT R	11280	.11280	.750	4077	.1821
	WITH R	17960	.11280	.388	4745	.1153
	Р	18360	.11280	.368	4785	.1113
WITHOUT R	CONTROL	.11280	.11280	.750	1821	.4077
	WITH R	06680	.11280	.934	3617	.2281
	Р	07080	.11280	.923	3657	.2241
WITH R	CONTROL	.17960	.11280	.388	1153	.4745
	WITHOUT R	.06680	.11280	.934	2281	.3617
	Р	00400	.11280	1.000	2989	.2909
Р	CONTROL	.18360	.11280	.368	1113	.4785
	WITHOUT R	.07080	.11280	.923	2241	.3657
	WITH R	.00400	.11280	1.000	2909	.2989

 Table 3. Comparison of Three Treatments vs Control Group

*To determine if the value is significant, the Significance (Sig) should be less than 0.05.

The Metropolitan Medical Laboratory (2016) said not to re-spin the original tube. It might cause changes in the analytes of the serum, particularly potassium. In contrast, Table 3 showed that there is no significant difference between the control and re-centrifugation without rimming. Preliminary pipetting, recommended by the MML – which lessens the contact of cells with the serum, had no significant difference with re-centrifugation without rimming. The latter had lesser potassium levels than the former.

Preliminary pipetting was expected to offer the least amount of hemolysis and that there would be significant difference between the groups. Potassium was measured in four different settings to serve as the basis of comparison between the groups. Potassium level is directly proportional to the degree of hemolysis (Association for Clinical Biochemistry, 2013). The method that resulted to least amount of potassium levels is re-centrifugation without rimming.

	-	0
-1		v
		~
		Ο

Journal of Health Sciences | ISSN 2599-5456

Among the four methods employed, the best one to use in the laboratory is the Control. It has the fastest processing time because there is complete separation of sera after the 30-minute clotting time. Re-centrifugation, which takes another 15 minutes, is not needed and the sera can be tested immediately. The whole process before testing would only take around 45 minutes. Within the 30-minute time frame, the lab scientist can perform other tests while waiting for the blood to clot, making it the most convenient and least time-consuming. Hemolysis is avoided because samples are centrifuged only once, which best represents the patient's true status. Also, it is the least expensive because it does not require additional materials like applicator sticks, pipet tips and test tubes.

References

- Association for Clinical Biochemistry (2013). *Potassium (serum, plasma, blood)*. http://www.acb.org.uk/Nat%20Lab%20Med%20Hbk/Potassium.pdf
- Bishop, M.L., Fody, E.P., & Schoeff, L.E. (2013). *Clinical chemistry: Techniques, principles, correlations (7th ed.)*. Lippincott Williams & Wilkins.
- Bush, V. & Mangan, L. (2003). *The hemolyzed specimen: Causes, effects, and reduction*. LabNotes.
- Cornell University College of Veterinary Medicine. Sample collection. *ECLINPATH*. http://www.eclinpath.com/chemistry/sample-collection-chem/. Accessed June 2016.
- Dasgupta, A. & Sepulveda, J.L. (2013) Accurate results in the clinical laboratory: A guide to error detection and correction. Elsevier.
- Ernst, D. (2007). To the point: Articles in phlebotomy. *Preanalytical errors that occur after specimen collection*. http://duiform.weebly.com/uploads/1/2/0/1/12016444/blood_preanalytical_errors_after_collection.pdf. Accessed March 2017.
- Estridge, B.H. & Reynolds, A.P. (2012). *Basic clinical laboratory techniques (6th ed.)*. Cengage Learning.
- Kottke-Marchant, K. & Davis, B.H. (2012). *Laboratory hematology practice*. John Wiley & Sons.
- Metropolitan Medical Laboratory (2016). *Centrifugation of blood specimens*. https:// www.metromedlab.com/SiteContent/Documents/File/ReferenceGuide/additional/ Centrifugation.pdf
- Rodak, B.F., Fritsma, G.A., & Keohane E.M. (2012). *Hematology: Clinical principles and applications (4th ed.).* Elsevier.

Comparing the Effects of Re-Centrifugation with Rimming, Without Rimming, and Preliminary Pipetting of Serum of Blood Samples on the Risk of Hemolysis 119 Quest Diagnostics (2016). Serum, plasma or whole blood collection. https://www.

- quest Diagnostics (2010). Serum, plasma or whole bloba conection. https://www. questdiagnostics.com/home/physicians/testing-services/specialists/hospitals-lab-staff/ specimen-handling/serum-plasma-whole-blood.html
- Simundic, A.M., Nikolac, N., Ivankovic, V. (2009). Comparison of visual vs. automated detection of lipemic, icteric and hemolyzed specimens: Can we rely on a human eye? Clin Chem Lab Med.
- Sowemimo-Coker SO. (2002). *Red blood cell hemolysis during processing*. Transfusion Medicine Reviews.
- Turgeon, M.L. (2003). *Linne & Ringsrud's clinical laboratory science: The basics and routine techniques (6th ed.)*. Mosby.
- Zhang, D. (1998). Clinical chemistry: Effect of serum-clot contact time on clinical chemistry laboratory results. http://clinchem.aaccjnls.org/content/44/6/1325

