Demographic factors and research productivity of medical students in an Adventist medical school

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Abstract *– This study investigated the potential relationship between selected demographic factors (such as age, sex, and pre-medical course) and research productivity of medical students in an Adventist medical school in the Philippines. Data gathering was performed via review of records and thesis manuscripts submitted by the medical students after completing Level 3 of the medical curriculum. Descriptive and inferential statistics, particularly frequency, distribution charts, and the chi-square test, were used to answer the objectives. Findings reveal that health promotion is the most common technical area under the NUHRA 2023-2028 chosen by the medical students. Other fields that have not yet been explored by the students include halal in health, health systems strengthening, nutrition and food security, and sexual & reproductive health, among others. Meanwhile, the AUP-COM, as a medical school, commonly implements research under the 'New and Emerging areas of Wholistic Health' as part of the research agenda of the university. Only the relationships between 'age and research method' and 'age and research design' yielded valid, although non-significant, results. While there is insufficient evidence to conclude that a medical student's age can influence their choice of research method and research design, the distribution of clustered data points still yielded useful findings, such that younger medical student teams tend to choose a quantitative and descriptive type of research. Additionally, the study demonstrated that both female and male-dominant research teams prefer quantitative over qualitative and mixed methods, and likewise, similar student demographics prefer descriptive over analytic designs. Moreover, research teams composed of most medical students with allied health backgrounds are more likely to utilize quantitative rather than qualitative and mixed methods. Lastly, students with allied health and life science courses are more inclined to apply descriptive rather than analytic research designs. These findings inform the faculty and other relevant stakeholders of the strategic direction to enhance the research productivity of medical students under training as they become good physician-researchers in the future.*

Keywords: research productivity, demographic factors, research methods, research design, medical students

I. INTRODUCTION

Research plays a pivotal role in the search for new knowledge in the medical field and in filling the gaps that need to be addressed in providing better medical care to patients. Before the medical student enters clinical clerkship training, one of the major requirements of any medical school is the completion of medical and/or health research.

From the initial batch of medical students from the Adventist University of the Philippines – College of Medicine (AUP-COM) last 2017, there has been no consistent management and profiling of their research. Moreover, the frequent change of research coordinators in the past years has led to inadequate monitoring of their research productivity. Research productivity, as applied in this study, is defined as the capacity of the student to pursue a particular research topic of interest, applying appropriate research methods and design, completed during the medical curriculum.

Meanwhile, the National Unified Health Research Agenda (NUHRA) (Philippine Council for Health Research and Development, 2024) and the AUP Research Agenda have been updated and implemented in recent years, respectively. Understanding the current research productivity of medical students and identifying the potential association with certain demographic factors, including age, sex, and pre-medical course of medical students, will help in navigating the direction of the medical student research, which will ultimately support the college, university, and national goals.

This study aimed to investigate the link between medical students' demographic factors and research productivity in an Adventist medical school in the Philippines. Specifically, the researchers described the select demographic profile of past AUP-COM Level 3 medical students' profile as to age, sex, and pre-medical course. Researchers also categorized the distribution of past research output by medical students according to the NUHRA, AUP Research Agenda, research method used, and research design applied for each completed study. Lastly, researchers studied the potential relationship between age, sex, and pre-medical course, and research productivity of medical students in terms of research methods and research designs.

II. LITERATURE REVIEW

The nature of this study is rooted in the current research operations of the medical school in focus, the AUP-COM. As the number of research output increases over the years since the official establishment of the college, there is a need to investigate the research productivity of the medical students. This is to facilitate and provide guidance while they are being developed as physician-researchers, as a key component of the five-star plus physician (*College of Medicine | Adventist University of the Philippines*, n.d.).

The literature and related studies on this particular topic are currently limited. Hence, this literature review highlights the importance of certain demographic factors, including medical students' age, sex, and pre-medical course.

Age and Research Productivity

Age has been classified as one of the variables that determine productivity in research. This is evident through the studies of Sax et al. (2002, 438), Levin and Stephen (1991), Oster and Hamermesh (1998), and Hansen, Weisbrod, and Strauss (1978, 735), cited in the study by Hesli and Lee in 2011, among political scientists. While age was included in their review, it was not included in the data collection.

Meanwhile, a qualitative textual analysis revealed that age contributes to research productivity among librarians and non-librarians (Hoffmann et al., n.d.). Additionally, a local Philippine study reveals that younger faculty members are more productive than older counterparts, although not statistically significant (*Socio-Demographic Determinants of Faculty Research Productivity in a Level-III Philippine State College*, n.d.), highlighting age as a factor in this study population. With this old and current mix of literature, the researchers of this study argue that age can potentially influence medical students' productivity in research.

Sex and Research Productivity

Sex is also correlated with research productivity. The same local study from Occidental Mindoro, Philippines, also reveals that female faculty tend to be more research productive than males. However, hypothesis testing did not yield significant results. This is in contrast with previous and older studies that show that men publish more than women (Stack, 2004). This means that the influence of sex on research productivity could be context- and time-specific. Therefore, similar to age, sex can also contribute to the research productivity among medical students; thus, this study has been conceptualized.

Pre-medical Course and Research Productivity

At the time of writing this article, researchers did not find any related studies or literature concerning the potential link between the pre-medical course of the student and research productivity.

The researchers argue that their pre-medical course could be a vital factor in determining their research profile (and productivity) despite this situation. This could be due to their prior experience in research activities during their baccalaureate degrees or exposure to work-related research endeavors they had in the past.

Given both the scarcity and the uniqueness of the target population, the researchers argue that it is essential to investigate the role of age, sex, and pre-medical course in the research productivity of medical students. These gaps in knowledge would further set the direction in improving the research productivity of medical students as they take the medical curriculum provided by the college.

III. MATERIALS AND METHODS

Research Design

This study employs a cross-sectional analytic (retrospective and ecological analysis) study to investigate the link between the medical student demographic profile and research productivity.

Population and Sampling

The target population is all students who completed their research during Level 3 of the medical curriculum (Doctor of Medicine) since 2019. Total enumeration was employed. Students who reached and completed Level 3 but did not complete the research requirement were excluded, as applicable.

There was no in-person interaction with the medical students. All data were gathered through document review of the thesis manuscripts submitted and the student record file, where a total of 34 thesis manuscripts were reviewed and included in the study. Hence, the research output covers 34 research teams from Batch 2019 to Batch 2024 of the medical students.

Ethical Considerations

Researchers sought ethical clearance from the Ethics Review Board of the Adventist University of the Philippines. Researchers assured the college dean and concerned faculty of the privacy and confidentiality of medical student data. Only those specific variables, such as age, sex, and pre-medical course, were obtained from the records.

Data Gathering

All data points were collected using secondary sources to capture the medical students' age (while in Level 3), sex (male or female), and pre-medical course. Approval from the college dean and other concerned faculty was secured before data collection. While no research instrument was used, the following were used as a basis for categorizing the research output of medical students: NUHRA 2023-2038, AUP Research Agenda, types of research methods, and different research designs (based on general concepts of epidemiology). The identity of medical students (i.e., names) from all past batches was only used in tracking research output, but never influenced the results of the study.

Data Analysis

After collecting data, descriptive and inferential statistics were used, such as frequencies, proportions, mean, chi-square test (Fisher's exact) as applicable from the given data. Microsoft Excel and Prism 9 were used in the encoding and analysis of data.

IV. RESULTS AND DISCUSSION

1) Age distribution of medical students

Across all batches, the majority of the students who reached Level 3 medical curriculum and completed the research requirement belong to the 21 to 25-year age group, followed by the 26 to 30-year age group. On the other hand, only a few students belong to the 31-35-year age group, and one student falls under the 36-40-year age group.

This implies that since the start of the Doctor of Medicine (MD) program in AUP-COM, there has been a majority of a younger population. Moreover, the medical school allows students belonging to the older age group as it is not part of the criteria for admissions, as long as the main requirements have been fulfilled (e.g. NMAT, Bachelor's degree, etc.).

The age distribution is illustrated in Figure 1.

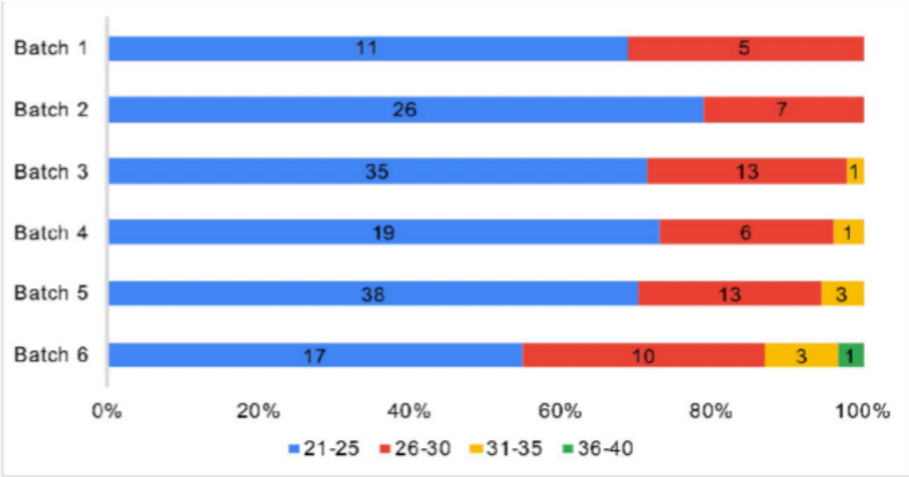

Figure 1. Medical Student Demographics: Age distribution

2) Sex distribution of medical students

The distribution of medical students according to sex (either male or female) was obtained through a review of records and yielded the following results, indicated in Figure 2.

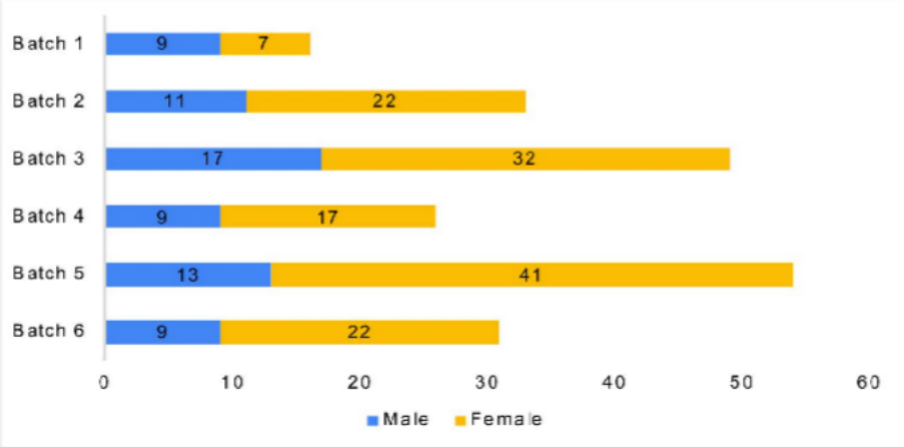

Figure 2. Medical Student Demographics: Sex distribution

In general, female medical students dominate their male counterparts in medical school. Specifically, Batch 5 had the highest number of student composition and the highest number (and proportion) of females. On the other hand, Batch 3 had the highest number and proportion of males, relative to the other five batches.

3) Pre-medical course distribution of medical students

Categories of pre-medical courses completed by the medical students were classified as follows: allied health, life science, physical science, social science, education, food and nutrition, and others. Figure 3 shows the number of students for each field.

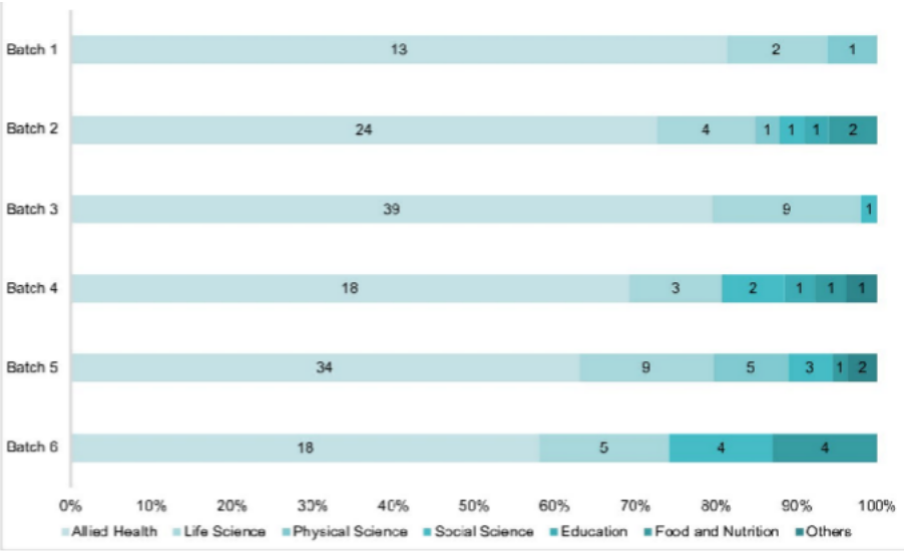

Figure 3. Medical Student Demographics: Pre-medical Course

The stacked horizontal bar chart shows the distribution of pre-medical courses taken by the medical students belonging to each batch. Around 70% of medical students represent the allied health sciences (e.g., med tech, nurses, physical therapists, etc.), followed by the life science courses (e.g., biology, human biology, etc.) and physical sciences (physics, chemistry, biochemistry, etc.).

Meanwhile, the darker shades represent the social sciences, education, food and nutrition, and other courses like business management, music courses, etc. These pre-medical courses are not common in medical school, yet they can still serve as a pre-medical course. Food and nutrition, while being a health-related course, has given a separate classification for monitoring purposes.

4) Research productivity distribution based on NURHA

The NUHRA 2023-2038 is the latest national agenda for research, which was used to categorize the past thesis manuscripts of AUP-COM students. The distribution of research productivity of medical students was illustrated in Figure 4.

Figure 4. Research productivity based on NUHRA

The leading technical area in NUHRA adopted by the research teams of medical students is health promotion, followed by disease management, and then mental health. Other technical areas were also covered by the rest of the research teams, as shown in the horizontal bar chart above.

Other areas in NUHRA that are not covered by the existing research topics include halal in health, health systems strengthening, nutrition and food security, and sexual & reproductive health (not reflected in the chart).

5) Research productivity distribution based on the AUP Research Agenda

The Adventist University of the Philippines Research Office has implemented its own agenda for conducting research within the university, which includes the medical school in focus (AUP-COM). The distribution of research productivity based on the research agenda of the university is shown in Figure 5.

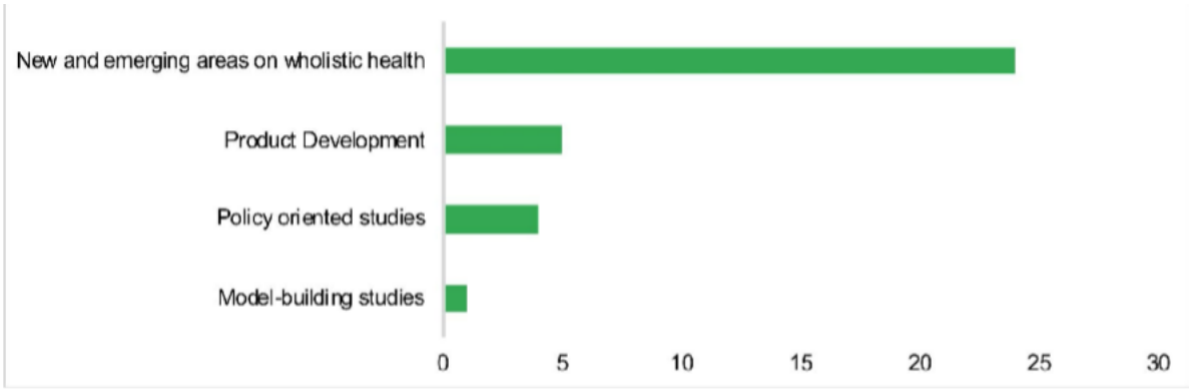

Figure 5. Research productivity based on the AUP Research Agenda

Currently, there have been more than 20 research outputs dedicated to the new and emerging areas of holistic health, which is the highest, relatively far from the other areas like product development, policy-oriented studies, and model-building studies, respectively. This finding is not uncommon since it is aligned with the college's principle and niche of providing whole person care (WPC) (Bayot et al., 2024).

6) Research productivity distribution based on the type of research methods

The research methods applied in each study were obtained from the thesis manuscripts submitted by the research team of medical students as they finish Level 3 of the medical curriculum. The distribution is shown in a pie chart in Figure 6.

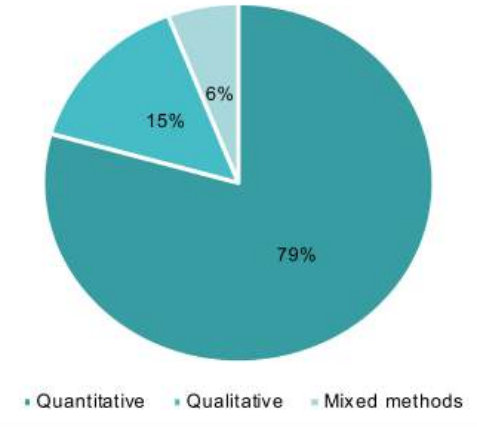

Figure 6. Research productivity based on the type of research methods

In this categorization, nearly 80% of medical students use quantitative methods (e.g., surveys, questionnaires, specimen collection) in performing their research. This is followed by a minimal proportion of 15% for qualitative methods (e.g., interviews and focus group discussions) and lastly by mixed methods, which accounted for 6% of the total. Generally, students (aside from medical students) perceive difficulty in conducting qualitative methods as it needs a longer time, effort, and skills (competence) to properly conduct. Furthermore, there are few mentors available for consultation regarding qualitative studies, especially in the healthcare and clinical field.

7) Research productivity distribution based on research design

The research designs applied in all submitted thesis manuscripts were also collected, which can be classified into cross-sectional, experimental study, case study, or phenomenological study, among others. Results are shown in Figure 7.

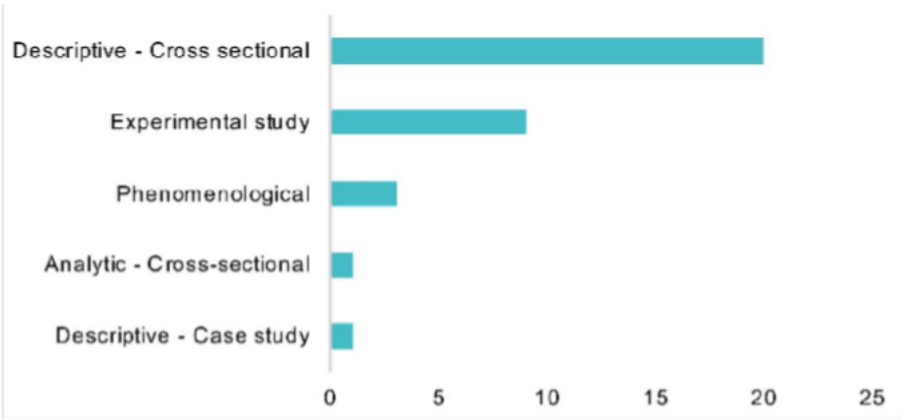

Figure 7. Research productivity based on the research design

By research design, which indicates the framework of how the research is being implemented, the medical students usually employ a descriptive-cross-sectional study (encompassing 20 research teams). This is followed by experimental studies, which obtained only half the frequency of the previous study design. Interestingly, only a few studies employ an analytic cross-sectional design, which includes testing the identified hypotheses.

8) Link between demographic factors and research productivity (in terms of research method)

a) Age and Research Method

To investigate the association between medical students' age and research method used, the chi-square test was applied. Clustering of data points (per research team, as either young or old based on mean age) was applied to fulfill the requirements of the test. The component horizontal bar chart is illustrated in Figure 8.

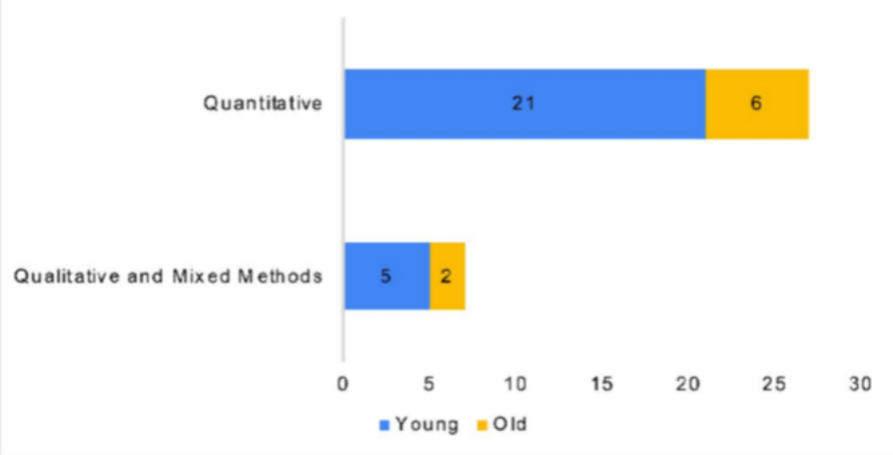

Figure 8. Link between Age and Research Method

Based on the chi-square test (Fisher's exact test), there is no significant difference (p-value > 0.05) in the choice of research method (whether quantitative or qualitative and mixed methods) between the young and older age groups of medical students. In other words, as applied in this study, a research team composed of predominantly older than 25 years old does affect the choice of research method (and otherwise).

Moreover, looking at the horizontal bar chart, it is obvious that more young and old groups choose quantitative methods over other research methods. While this cannot be statistically and solely explained by the variable age, there can be other factors that make this possible. This includes the more frequent exposure of medical students to quantitative methods in their pre-medical courses or previous academic and work engagements.

On the other hand, the faculty of research (whether in the undergraduate or graduate degree) could be more adept at teaching research concepts using quantitative research, while few have expertise in qualitative research.

b) Sex and Research Method

The relationship between medical students' sex and the research method used was examined using the chi-square test. Data points are clustered according to quantitative, qualitative, and mixed methods, stratified by the predominant sex per research team as either male or female. The horizontal bar graph is illustrated in Figure 9.

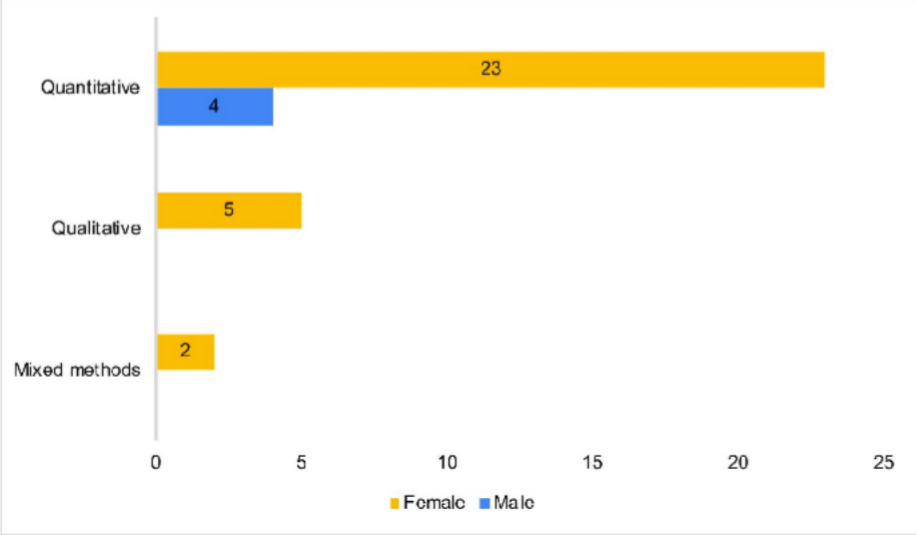

Figure 9. Link between Sex and Research Method

Due to the minimal size of research teams (as the level of analysis), values were not sufficient to carry out the inferential test, thus rendering the statistical test output invalid.

While inferential statistics cannot be used in this kind of situation, looking at the bar chart, it can be noticed that for research teams where females are predominant, the quantitative method is highly favored compared to the other two groups.

Meanwhile, for research teams with a majority of males, the choice they made was for the quantitative method alone.

c) Pre-medical course and Research Method

Similar to the previous relationships, the chi-square test was also applied to determine the association between pre-medical course and research productivity (in terms of research method used).

Figure 10 illustrates the distribution of research teams per research method vis-à-vis the predominant pre-medical course.

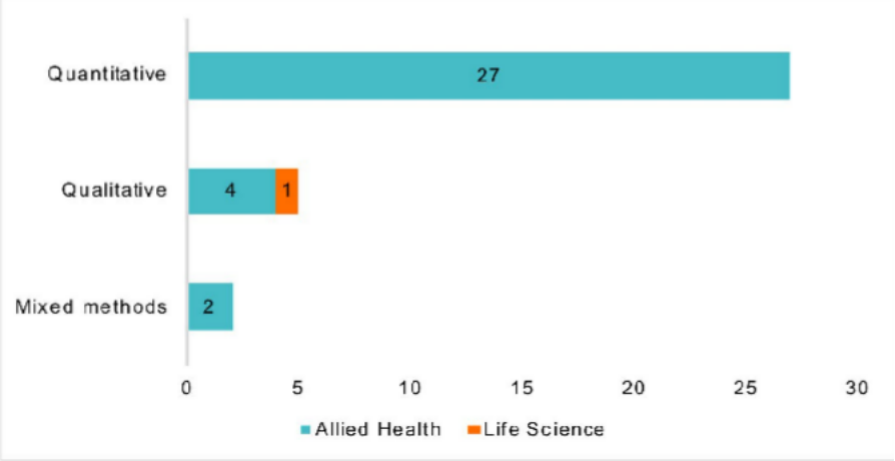

Figure 10. Link between Pre-medical Course and Research Method

Similar to findings between sex and research methods, the chi-square test failed to provide a valid statistical output.

Nevertheless, it is evident from the component horizontal bar chart that the majority of allied health professionals (who later on become medical students) still prefer the quantitative method over qualitative and mixed methods.

Furthermore, one research team composed of medical students with a background in the life sciences chose a qualitative method for their study. This can be explained by other factors outside the pre-medical course, such as the advice from the research adviser, methodologist, and expert opinions from the research coordinators and panel members during the defense and consultations.

9) Link between demographic factors and research productivity (in terms of research design)

a) Age and Research Design

In the relationship between the research team's age (mean age) and the choice of research design, the chi-square test output returned non-significant findings as the p-value is greater than the alpha ($p > 0.05$).

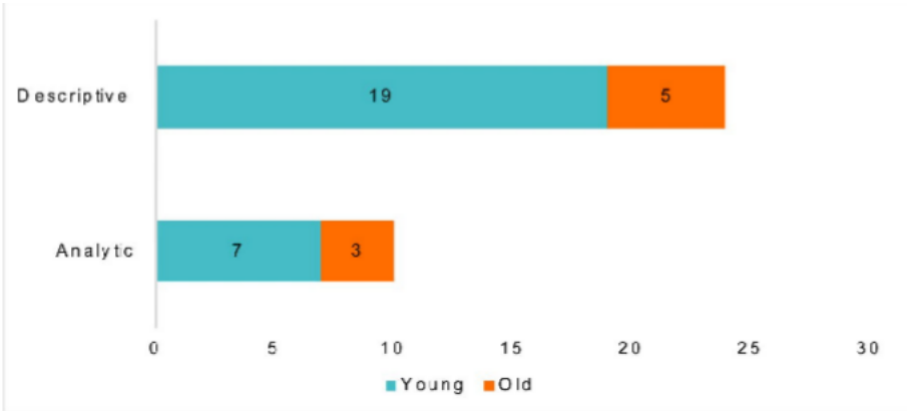

Figure 11. Link between Age and Research Design

Because of this, the researchers do not have sufficient evidence to say that the (mean) age of medical students as a variable can influence the choice of research design. Although it can be noticed from the chart that both young and old age groups prefer descriptive over analytic epidemiologic design.

b) Sex and Research Design

Because the assumptions for the chi-square test were not met, the sex and research design relationship can only be analyzed using the descriptive data as shown in the chart in Figure 12.

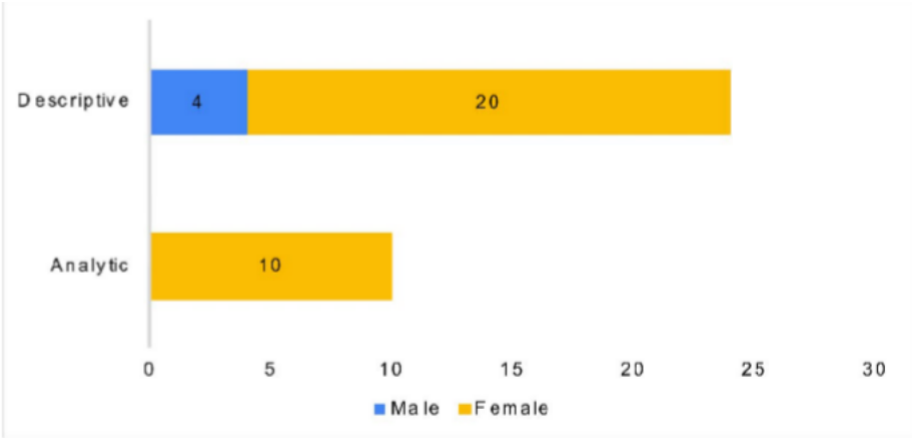

Figure 12. Link between Sex and Research Design

At a glance, more female-dominant, together with all male-dominant research teams, applied a descriptive study design in contrast to the analytic design.

c) Pre-medical course and Research Design

Lastly, the pre-medical course and research design relationship was not assessed by chi-square because of failure to meet its requirements. Findings are shown in Figure 13.

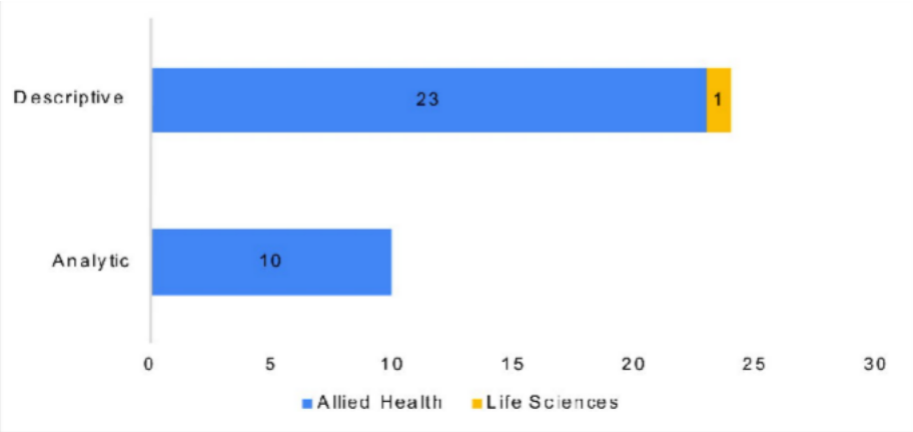

Figure 13. Link between Pre-medical Course and Research Design

Meanwhile, the descriptive data shows that most research teams with an allied health background (including one life science) prefer descriptive design over analytic.

Generally, findings from this study infer the following insights. Firstly, demographic factors such as age, sex, and pre-medical course influence the distribution of the research productivity profiles in terms of nationwide and university-wide agenda, as well as in research methods and research designs.

Secondly, while a majority of focus on a particular technical area or field of interest is generally acceptable, whether it is from NUHRA or a university research agenda, allowing the students to explore other fields not commonly adopted can be an effective means to orient students to the possibility of addressing identified gaps in those areas, through research. However, it is still important to acknowledge that aside from the topic's relevance, a researcher's interest and applicability in investigating that particular field of study remain essential aspects of research productivity.

Finally, the current findings from this study can only be beneficial, accurate, and reflective given the existing size and character of the target population. In other words, these findings can only lead to inferences appropriate for the 34 research teams that have completed the medical curriculum's research requirements. This indicates that instead of a one-time assessment, the researchers hereby recommend a continuous analysis to observe the dynamics in research productivity of medical students as new batches are being added and as new strategies are being implemented within the medical school in terms of research. Despite this,

the study yielded vital information about the current status of research productivity in a relatively young Adventist medical school based in the Philippines.

V. CONCLUSION

This study sought to investigate the link between demographic factors such as age, sex, and pre-medical course and research productivity of medical students. Health promotion is the most commonly chosen technical area/topic under the NUHRA 2023-2028 by the medical students. Several other fields have not yet been explored. Collectively, almost all completed research of the medical students adheres to the 'New and Emerging areas of Wholistic Health' as part of the AUP Research Agenda.

Only the relationships between 'age and research method' and 'age and research design' yielded valid, although non-significant, results. While there is not enough evidence to say that a medical student's age can influence their choice of research method and research design, the distribution of clustered data points still yielded useful findings, such that younger medical student teams (aggregate level) tend to choose a quantitative and descriptive type of research.

Using the available descriptive data for sex and pre-medical course, the following hypotheses were generated: Both female and male-dominant research teams prefer quantitative over qualitative and mixed methods, and likewise, similar demographics prefer descriptive over analytic designs. Research teams composed of more medical students with allied health backgrounds are more likely to utilize quantitative rather than qualitative and mixed methods. Lastly, students with allied health and life science courses are more inclined to apply descriptive rather than analytic research designs.

With these findings, the researchers recommend the following strategies and approaches:

- Continue the use of the latest NUHRA and AUP Research Agenda as guide in determining the topic/s for medical students' (and faculty's) research. This will contribute to attaining the goals for research at the institutional and regional/national scales.
- Continue monitoring and evaluation of the research productivity of medical students to validate and compare the trends and relationships observed from the data, and likewise to enhance the robustness of the inferential statistics as population size increases over time.
- Explore other factors aside from age, sex, and pre-medical course that may influence the choice of research method and design, affecting overall productivity.
- Aside from the quantitative method, encourage the medical students (research teams) to employ the qualitative method and mixed methods as necessary and applicable to answer their research objectives.
- Explore the possibility of forming research teams that are well-represented by age, sex, and pre-medical courses to encourage better sharing of knowledge, skills, and experiences in terms of research. This will foster interprofessional collaboration while still in the medical school, and in preparation for the actual practice of medicine in the future.

- While descriptive designs are generally applicable in medical schools, explore the advantages of using the analytic research designs during the conceptualization and development stages of the research protocol, where applicable, considering other factors such as limited time and budget constraints of medical students.
- Provide learning and development opportunities for both faculty and medical students to acquire essential research skills and competencies.

AUTHORS' CONTRIBUTIONS

Marlon L. Bayot is mainly responsible for the conceptualization, design, and analysis of the study, including the generation of the research report. Ruth S. Palomero and Ronalyn S. Sanchez contributed as co-authors and helped in the study implementation, through the stages of drafting, analyzing, presenting, and finalizing the report. Both the author and co-authors collectively shared time and effort in the conduct and completion of this study.

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REFERENCES

Bayot, M. L., Mendoza, D. A., Berto, D. D. L., & Felicen, C.J. R. (2023, September). Whole Person Care (WPC) and Clinical Clerk Competencies (CCC) - A Rapid, Self-Perception Survey. Scientific Poster presented at the Consortium of Adventist Medical Education Leaders (CAMEL) Conference 2023, Loma Linda University, California, USA.

College of Medicine | Adventist University of the Philippines. (n.d.). https://www.aup.edu.ph/?p=2979

Hesli, V. L., & Lee, J. M. (2011). Faculty Research Productivity: Why Do Some of Our Colleagues Publish More than Others? *PS Political Science & Politics*, *44*(2), 393–408. https://doi.org/10.1017/s1049096511000242

Hoffmann, K., Berg, S. A., & Koufogiannakis, D. (n.d.). *Examining Success: Identifying Factors that Contribute to Research Productivity Across Librarianship and Other Disciplines*. Scholarship@Western. https://ir.lib.uwo.ca/wlpub/60/?utm_source=ir.lib.uwo.ca_2Fwlpub_2F60_utm_medium=PDF_utm_campaign=PDFCoverPages

Philippine Council for Health Research and Development. (2024, March 14). *NUHRA 2023-2028 - Philippine Council for Health Research and Development*. https://www.pchrd.dost.gov.ph/publications/nuhra-2023-2028/

Socio-Demographic Determinants of faculty Research productivity in a Level-III Philippine State College. (n.d.). ResearchGate. https://www.researchgate.net/publication/362980557_Socio-Demographic_Determinants_of_Faculty_Research_Productivity_in_a_Level-III_Philippine_State_College?utm_source=chatgpt.com

Stack, S. (2004). Gender, Children and Research Productivity. *Research in Higher Education*, *45*(8), 891–920. https://www.jstor.org/stable/40197370