Statistics Without Assumptions: Assessing the Application of Nonparametric Methods in Data Analysis Practices

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ABSTRACT

This study assessed the application of nonparametric statistical methods in data analysis practices at Davao de Oro State College (DDOSC) using a mixed-methods research design. Faculty members and student researchers with experience in conducting quantitative research were selected through purposive sampling. Data were gathered using a researcher-made questionnaire and analyzed through frequency, percentage, mean, standard deviation, and thematic analysis. The findings revealed that nonparametric statistical methods are generally applied in research practices at DDOSC. The Chi-Square Test emerged as the most commonly applied method, indicating frequent analysis of categorical data in institutional research. This was followed by Spearman Rank Correlation, suggesting regular use in examining relationships involving ordinal or Likert-scale variables. The Mann-Whitney U Test and Kruskal-Wallis Test were also applied, demonstrating respondents' awareness of nonparametric procedures for group comparisons, although these methods were utilized less frequently. Meanwhile, the Wilcoxon Signed-Rank Test obtained the lowest level of application, indicating limited exposure to paired-sample analysis. Overall, the results revealed that researchers tend to rely on basic and commonly used nonparametric techniques, while more specialized statistical procedures remain less utilized. Statistical software applications, particularly IBM SPSS Statistics and Microsoft Excel, were also highly utilized, highlighting their importance in facilitating data organization, computation, and analysis. The qualitative findings revealed several challenges encountered by respondents in applying nonparametric statistical methods, including limited knowledge of statistical concepts, difficulty in selecting appropriate tests based on research design and data characteristics, limited skills in using statistical software, inadequate training and mentoring opportunities, and challenges in interpreting statistical outputs. These findings suggest that while researchers possess familiarity with commonly used statistical tools, gaps remain in their deeper understanding and application of advanced nonparametric techniques. To address these concerns, respondents recommended the implementation of regular statistical training workshops, strengthened research mentoring programs, and hands-on learning activities focused on statistical application and interpretation. They also emphasized the development of user-friendly guides for SPSS and Excel and the provision of accessible reference materials and statistical manuals to support independent learning and enhance researchers' analytical competence.

Keywords: Nonparametric Statistical Methods, Data Analysis Practices, Mixed-Methods Research, Statistical Competence, SPSS, Philippines

INTRODUCTION

The role of statistics in educational research has become increasingly vital in ensuring that decisions, conclusions, and recommendations are based on accurate and reliable evidence. In academic institutions, researchers depend on statistical tools to organize data, test hypotheses, and generate findings that can be used for institutional improvement and policy formulation. The validity of these findings, however, relies heavily on the appropriateness of the statistical methods used during data analysis (Smeeton et al., 2025). Parametric tests are often favored because of their efficiency and power, yet these methods require assumptions such as normal distribution, equal variances,

and interval or ratio data measurement. In many educational studies, these assumptions are often violated due to small sample sizes, non-normal data distributions, or the use of ordinal scales in survey instruments. When such conditions occur, the application of parametric tests may lead to misleading interpretations and inaccurate conclusions. In these situations, nonparametric statistical methods offer a more suitable alternative because they are less restrictive and can provide reliable results even when data do not meet parametric assumptions (Nussbaum, 2024). These methods, such as the Mann-Whitney U Test, Kruskal-Wallis Test, Spearman Rank Correlation, and Chi-Square Test, are particularly relevant in educational research where data characteristics often deviate from the assumptions required by parametric techniques (Kloke & McKean, 2024). Despite their importance, the practical use of nonparametric methods in many academic institutions remains inconsistent, often due to limited awareness, lack of confidence, and insufficient training among researchers. This situation creates a methodological concern, as the improper use or underutilization of nonparametric methods can weaken the quality of research outputs and affect the credibility of institutional studies.

The challenge of selecting and applying appropriate statistical methods continues to affect the quality of research across disciplines. While advancements in research methodologies and statistical software have improved access to a wide range of analytical tools, many researchers still struggle with identifying the correct statistical procedure for their data (Kvam et al., 2022). In particular, nonparametric methods are frequently overlooked because many researchers are more familiar with parametric techniques introduced during foundational research training. This reliance on traditional parametric approaches is evident in localized institutional settings where conventional comparative frameworks, such as the independent or paired t-test are standardly applied to measure educational interventions, as demonstrated in the quasi-experimental evaluation of interactive software strategies by Picaza (2023). Studies have shown that the misuse of parametric tests in cases where assumptions are violated remains common, leading to invalid interpretations and reduced research reliability (Hodges et al., 2023). This problem is particularly significant in educational and social science research, where data are often ordinal, skewed, or derived from small populations that do not satisfy normality assumptions. Researchers may fail to assess the distribution of data before analysis, resulting in inappropriate test selection and potentially biased conclusions (Vrbin, 2022). Moreover, other studies reveal that insufficient statistical literacy, limited access to advanced methodological training, and the complexity of selecting alternative statistical procedures hinder the effective application of nonparametric methods (Weiß, 2022). These global challenges demonstrate that despite the recognized usefulness of nonparametric techniques, researchers worldwide continue to face difficulties in integrating them effectively into research practice. This issue emphasizes the need for institutions to improve researchers' statistical competencies and promote better understanding of assumption-free analytical methods.

In the Philippines, the increasing emphasis on research productivity in higher education institutions has amplified the need for stronger competence in data analysis. Faculty members and students are encouraged to produce quality research outputs to meet academic standards, accreditation requirements, and institutional goals. However, despite this growing demand, many researchers still encounter difficulties in selecting and applying appropriate statistical tools, especially when dealing with datasets that violate parametric assumptions (Hodges et al., 2023). Statistical analysis remains one of the most challenging parts of the research process for many graduate students and faculty researchers due to limited statistical background, inadequate mentoring, and lack of practical training in advanced methods. As a result, researchers often rely on familiar statistical tests without fully understanding whether these methods are appropriate for the nature of their data (Vaithilingam et al., 2024). This overdependence on parametric tests can compromise the accuracy of findings and reduce the credibility of research conclusions. Recent Philippine studies have highlighted that many researchers have only moderate levels of competence in statistical analysis and often need assistance in choosing the proper statistical techniques for their studies (Li et al., 2022). Furthermore, institutional support systems for improving statistical literacy, such as workshops and specialized mentoring, are often insufficient, leaving researchers underprepared to address methodological challenges in data analysis (Faizi & Alvi, 2023). This national context indicates the need for localized assessments of data analysis practices to identify gaps in researchers' competencies and formulate strategies for improving the appropriate use of statistical methods, particularly nonparametric techniques. This deficiency closely aligns with broader systemic challenges where a lack

of comprehensive research competence directly hinders institutional research engagement and productivity (Comon & Corpuz, 2024).

In addition, in the Philippines, Davao De Oro**,** research has become an important component of academic development and institutional performance. Faculty members and students are expected to conduct studies that contribute to the advancement of knowledge and provide solutions to educational and community concerns. As research engagement increases, the need for proper data analysis practices becomes more critical to ensure the validity and reliability of research findings. However, despite the growing culture of research within the institution, there may be challenges in the practical application of nonparametric statistical methods among researchers. Many studies conducted in educational settings at the campus involve ordinal data gathered through surveys, small respondent groups, or data that may not satisfy normality assumptions, making nonparametric methods highly relevant. This contextual characteristic is highly typical of regional academic outputs, such as the study by Remulta and Dela Tina-Picaza (2025) in Davao de Oro, which heavily relied on descriptive-correlational frameworks and Likert-scale survey distributions to examine secondary school variables under distance learning modalities. Yet, there may be uncertainty among researchers regarding which nonparametric methods to use, when to apply them, and how to interpret their results. In addition, limited exposure to statistical software, insufficient technical support, and the absence of focused training on assumption-free statistical methods may contribute to difficulties in applying these techniques correctly. These issues may result in the misuse of statistical procedures, thereby affecting the integrity and quality of research outputs generated at the institution. Understanding the current application of nonparametric methods is therefore necessary to determine whether researchers are using suitable analytical tools and to identify the challenges that may hinder effective statistical practice. This understanding can provide valuable insights for improving institutional support mechanisms and enhancing the overall quality of research.

Although many studies have explored statistical competence, research skills, and methodological challenges in higher education, limited literature specifically examines the application of nonparametric statistical methods in localized institutional settings**.** Existing studies often focus on general research capability or broad statistical literacy without paying close attention to how researchers decide on and apply nonparametric techniques when parametric assumptions are violated. Moreover, while the importance of nonparametric methods is acknowledged in methodological literature, there is limited empirical evidence regarding the actual practices, challenges, and institutional conditions influencing their application among faculty and student researchers in local colleges. This lack of focused investigation creates a research gap, particularly in institutions such as Davao De Oro State College (DDOSC) where research capability development is an ongoing priority. Without a clear understanding of how nonparametric methods are being applied and what barriers exist, institutional leaders may find it difficult to design effective interventions that address the specific needs of researchers. In addition, the limited integration of quantitative measures of statistical method usage with qualitative exploration of researcher experiences leaves a gap in understanding the practical realities behind statistical decision-making in institutional research settings. Addressing this gap is important not only for improving methodological practices but also for strengthening the overall quality and credibility of research outputs within academic institutions.

In response to these concerns, the present study aims to assess the application of nonparametric statistical methods in data analysis practices at DDOSC through a mixed-methods research design**.** Specifically, it seeks to determine the nonparametric statistical methods commonly applied in data analysis practices, identify the challenges encountered by researchers in applying these methods, and develop recommendations to improve statistical analysis practices within the institution. By combining quantitative data on the frequency and extent of nonparametric method usage with qualitative insights into researchers' experiences, perceptions, and difficulties, the study intends to provide a comprehensive and contextualized understanding of current statistical practices at DDOSC. The results of the study are expected to guide institutional administrators, faculty members, and student researchers in strengthening methodological competence, enhancing statistical literacy, and developing capacity-building initiatives that promote the proper application of nonparametric techniques. Ultimately, this study seeks to contribute to the improvement of research quality and support the development of more rigorous, reliable, and evidence-based academic outputs.

METHOD

This study employed a mixed-methods research design to assess the application of nonparametric statistical methods in data analysis practices at Davao de Oro State College (DDOSC). The mixed-methods approach was utilized because it integrates quantitative and qualitative research techniques within a single study to provide a more comprehensive understanding of the research problem. According to Creswell and Plano Clark, mixed-methods research combines numerical data with qualitative insights, enabling researchers to obtain a more complete interpretation of the phenomenon being investigated. In this study, the quantitative component determined the nonparametric statistical methods commonly applied in data analysis practices at DDOSC, while the qualitative component explored the challenges encountered by the respondents and the recommendations they proposed to improve the application of these methods. This design was appropriate because it enabled the researcher to examine measurable patterns of statistical method utilization while simultaneously gaining deeper insights into the respondents' experiences, concerns, and suggestions. The integration of quantitative and qualitative findings strengthened the validity of the study by providing both statistical evidence and contextual explanations regarding the current application of nonparametric statistical methods within the institution.

The study was conducted at Davao de Oro State College (DDOSC), Province of Davao de Oro. The institution was selected because it actively promotes research engagement among faculty members and students, making it an appropriate setting for investigating the application of nonparametric statistical methods in academic research. Since quantitative research is widely conducted within the institution, DDOSC provided a relevant environment for examining the statistical techniques commonly employed by researchers in analyzing data. Furthermore, the accessibility of the respondents and the institutional relevance of the study facilitated the efficient collection of both quantitative and qualitative data. Conducting the study in this locale generated findings that are directly applicable to improving research practices and statistical data analysis within the institution.

The respondents of the study consisted of one hundred (100) faculty members and student researchers of Davao de Oro State College who had conducted quantitative research involving statistical data analysis. These respondents served as the participants for both the quantitative and qualitative components of the study. They were selected because they possessed firsthand experience in choosing and applying statistical methods during the conduct of research, making them capable of providing reliable information regarding the use of nonparametric statistical methods, the challenges they encountered, and the recommendations they could offer for improving current practices. Faculty members involved in research advising and students who had completed or were currently conducting quantitative studies provided valuable information regarding actual statistical practices within the institution. Utilizing a single group of respondents ensured consistency between the quantitative and qualitative findings and facilitated a comprehensive interpretation of the results.

Purposive sampling was employed in selecting the respondents. This sampling technique was considered appropriate because the study specifically required participants who possessed sufficient knowledge and experience in conducting quantitative research and statistical data analysis. Through purposive sampling, only faculty members and student researchers who had previously utilized statistical methods in their research were included. This approach ensured that the respondents were capable of providing meaningful, relevant, and accurate information regarding the application of nonparametric statistical methods. Consequently, purposive sampling enhanced the quality, credibility, and relevance of the data collected.

The researcher utilized a researcher-made questionnaire as the primary data gathering instrument. The questionnaire was developed following an extensive review of related literature, statistical textbooks, and previous studies concerning nonparametric statistical methods and quantitative data analysis. The instrument was carefully constructed to align with the objectives of the study and consisted of two major sections corresponding to the quantitative and qualitative components.

The first section comprised structured survey items designed to determine the extent to which various nonparametric statistical methods were applied by the respondents in their research activities. A five-point Likert scale was employed to measure the frequency or extent of utilization of each statistical method.

The second section consisted of open-ended questions intended to gather qualitative information regarding the respondents' experiences in applying nonparametric statistical methods.

Prior to the actual administration of the questionnaire, the instrument underwent a comprehensive content validation process. It was evaluated by three experts, namely a statistician specializing in quantitative data analysis, a research methodology expert, and an experienced educational researcher with expertise in questionnaire development. The validators assessed the instrument based on the following criteria: relevance of the items to the objectives of the study, clarity of wording, appropriateness of language, logical organization of the questionnaire, and overall suitability of the instrument for the target respondents.

Based on the recommendations of the validators, several improvements were incorporated into the questionnaire. Ambiguous statements were rephrased to improve clarity, technical terms were simplified to facilitate better respondent understanding, repetitive items were removed, the sequence of questions was reorganized to improve logical flow, and the wording of the open-ended questions was refined to encourage more comprehensive responses. These revisions enhanced the content validity and readability of the instrument.

To establish the reliability of the quantitative section of the questionnaire, a pilot test was conducted among thirty (30) faculty members and student researchers who possessed characteristics similar to those of the actual respondents but were not included in the final study. The responses obtained from the pilot testing were analyzed using Cronbach's alpha to determine the internal consistency of the instrument. The computed Cronbach's alpha coefficient indicated that the questionnaire possessed acceptable internal consistency, demonstrating that the survey items reliably measured the intended constructs.

After validation and reliability testing, the researcher sought approval from the appropriate institutional authorities to conduct the study. Upon approval, the validated questionnaire was administered either personally or through an online platform, depending on the respondents' accessibility and convenience. Before participating in the study, all respondents were informed about the objectives of the research, the voluntary nature of their participation, the confidentiality of their responses, and their right to withdraw at any point without any consequences. Informed consent was obtained from every participant before the actual data collection.

After retrieving the completed questionnaires, the researcher examined the responses for completeness and organized the quantitative and qualitative data separately for analysis. Quantitative responses were encoded and prepared for statistical analysis, while qualitative responses were transcribed, coded, and organized for thematic analysis. This systematic procedure ensured that the data gathering process was ethical, organized, accurate, and consistent with accepted research standards.

For the quantitative component, frequency, percentage, mean, and standard deviation were utilized to analyze the data regarding the nonparametric statistical methods commonly applied by the respondents. Frequency and percentage were used to describe the distribution of respondents according to the statistical methods they employed. The mean was used to determine the average level of application of each nonparametric statistical method, thereby identifying the methods most frequently utilized in data analysis practices at DDOSC. The standard deviation measured the variability of responses, indicating the degree of consistency among respondents in applying these statistical techniques. Collectively, these descriptive statistical tools provided a comprehensive numerical summary of the respondents' statistical practices.

For the qualitative component, thematic analysis was employed to analyze the respondents' answers regarding the challenges encountered and the recommendations proposed in applying nonparametric statistical methods. The

qualitative responses were carefully reviewed, transcribed, coded, and categorized according to recurring concepts and common patterns. Similar responses were grouped into themes representing the major challenges experienced by the respondents and the recommendations they considered essential for improving statistical analysis practices within the institution. The identified themes were subsequently interpreted and integrated with the quantitative findings to provide a richer understanding of the research problem. Through the integration of both quantitative and qualitative data, the study presented a comprehensive assessment of the current application of nonparametric statistical methods at Davao de Oro State College and identified practical interventions for strengthening statistical research practices.

A complete copy of the researcher-made questionnaire, including the quantitative survey items and the qualitative open-ended questions, is presented in Appendix A. Providing the complete research instrument enhances the transparency, credibility, and replicability of the study by allowing future researchers to examine the content, structure, and alignment of the questionnaire with the objectives of the research.

RESULTS

Table 1 Distribution of Respondents According to Profile Variables (n = 100)

Profile Variables	**Frequency**	**Percentage**
Role		
Faculty Researchers	45	45%
Student Researchers	55	55%
Total	**100**	**100%**
Academic Discipline/Department		
Teacher Education	35	35%
Business and Management	15	15%
Arts and Sciences	18	18%
Agriculture and Related Sciences	12	12%
Computing/Technology Programs	10	10%
Other Academic Programs	10	10%
Total	**100**	**100%**
Years of Research Experience		
Less than 1 year	25	25%
1–3 years	38	38%
4–6 years	25	25%
More than 6 years	12	12%
Total	**100**	**100%**
Number of Quantitative Studies Conducted		
1–2 studies	42	42%

3–5 studies	35	35%
More than 5 studies	23	23%
Total	**100**	**100%**
Level of Statistical Training Received		
No formal statistical training	18	18%
Basic training/workshops attended	52	52%
Advanced statistical training	30	30%
Total	**100**	**100%**

The table shows that the respondents consisted of 45 faculty researchers (45%) and 55 student researchers (55%), indicating that the study captured perspectives from both experienced and emerging researchers within Davao de Oro State College. The slightly higher representation of student researchers reflects the active involvement of students in conducting quantitative research as part of their academic requirements.

In terms of academic discipline, the largest proportion of respondents came from Teacher Education (35%), followed by Arts and Sciences (18%) **and** Business and Management (15%). This distribution suggests that quantitative research practices are evident across various academic programs, although some disciplines may have greater exposure to statistical analysis due to the nature of their research activities.

Regarding research experience, most respondents had 1–3 years of research experience (38%), followed by those with less than one year (25%) and 4–6 years (25%). Only **12%** reported having more than six years of research experience. This indicates that many respondents were relatively early in their research engagement, which may influence their familiarity and confidence in applying advanced statistical techniques.

In terms of the number of quantitative studies conducted, 42% had conducted one to two studies, while 35% had completed three to five studies. Meanwhile, 23% had conducted more than five quantitative studies, suggesting that respondents had varying levels of exposure to statistical procedures.

For statistical training, more than half of the respondents (**52%**) reported attending basic statistical workshops, while 30% had received advanced statistical training. However, 18% indicated having no formal statistical training, which may explain the challenges identified in the qualitative findings, particularly regarding test selection, software application, and interpretation of statistical outputs.

Nonparametric Statistical Methods Commonly Applied in Data Analysis Practices at DDOSC

Table 1 presents the nonparametric statistical methods commonly applied by the respondents in data analysis practices at Davao de Oro State College.

Table 1 Nonparametric Statistical Methods Commonly Applied in Data Analysis Practices at DDOSC

Nonparametric Statistical Methods	n = 100	
	Frequency	**Percent**
Chi-Square Test	30	30%
Spearman Rank Correlation	25	25%

Mann-Whitney U Test	18	18%
Kruskal-Wallis Test	15	15%
Wilcoxon Signed-Rank Test	12	12%
TOTAL	**100**	**100%**

The results indicate that the Chi-Square Test obtained the highest frequency (30%), making it the most commonly applied nonparametric statistical method among respondents. This suggests that researchers at DDOSC frequently conduct studies involving categorical variables, frequency distributions, and survey-based data where Chi-Square analysis is appropriate. Its higher utilization may be attributed to its straightforward application and familiarity among researchers.

The Spearman Rank Correlation obtained the second highest frequency (25%), indicating that respondents frequently analyze relationships involving ordinal variables, particularly data obtained from Likert-scale instruments. This finding reflects the common use of survey research designs within the institution.

Meanwhile, Mann-Whitney U Test (18%) and Kruskal-Wallis Test (15%) were moderately applied, suggesting that researchers use these methods when comparing differences between independent groups. However, their lower frequencies may indicate that fewer studies conducted at DDOSC require group comparison analyses.

The Wilcoxon Signed-Rank Test obtained the lowest frequency (12%), suggesting limited application of paired-sample analysis. This may indicate that researchers have fewer studies involving repeated measurements or related samples or may have limited familiarity with the conditions requiring this statistical procedure.

Overall, the findings reveal that while nonparametric statistical methods are utilized at DDOSC, application is concentrated on more familiar techniques such as Chi-Square and Spearman Rank Correlation. This suggests that researchers possess basic competence in nonparametric analysis but may require further exposure to more specialized statistical procedures.

Level of Data Analysis Practices Using Nonparametric Statistical Methods

Table 2 presents the level of data analysis practices using nonparametric statistical methods.

Table 2. Level of Data Analysis Practices Using Nonparametric Statistical Methods

Statements	Mean	SD	Descriptive Level
1. I employ the Chi-Square Test to examine relationships between categorical variables in research data.	4.32	0.68	Highly Applied
2. I utilize Spearman Rank Correlation in assessing relationships among ordinal or ranked variables.	4.18	0.71	Applied
3. I apply the Mann-Whitney U Test to determine differences between two independent groups.	3.95	0.73	Applied
4. I use the Kruskal-Wallis Test to compare significant differences among three or more independent groups.	3.74	0.77	Applied
5. I implement the Wilcoxon Signed-Rank Test in analyzing differences in paired or related samples.	3.41	0.81	Applied

6. I apply nonparametric statistical methods when data violate assumptions of normal distribution.	3.88	0.69	Applied
7. I demonstrate competence in selecting appropriate nonparametric tests based on research design and data type.	3.90	0.72	Applied
8. I utilize IBM SPSS Statistics in conducting nonparametric data analysis procedures.	4.25	0.65	Highly Applied
9. I use Microsoft Excel as a preliminary tool for data encoding and organization prior to statistical analysis.	4.10	0.70	Applied
10. I consistently integrate nonparametric statistical techniques in the analysis of research data.	3.85	0.74	Applied
OVERALL MEAN	**3.96**	**0.72**	**Applied**

The table shows that the overall mean of 3.96 (SD = 0.72) is interpreted as Applied, indicating that nonparametric statistical methods are generally utilized in data analysis practices at DDOSC, but the application is more focused on selected techniques rather than a full range of statistical tools. The relatively low variation in responses also suggests a fairly consistent level of practice among respondents.

In terms of specific indicators, the highest mean is the Chi-Square Test (M = 4.32, SD = 0.68), described as Highly Applied, indicating that it is the most frequently used nonparametric method. This implies that respondents commonly deal with categorical data and rely heavily on frequency-based analysis in their research work.

The second highest is the use of IBM SPSS Statistics (M = 4.25, SD = 0.65), also interpreted as Highly Applied, suggesting that SPSS is the primary software used in conducting statistical analysis, particularly for nonparametric tests.

Next is the Spearman Rank Correlation (M = 4.18, SD = 0.71), interpreted as Applied, indicating frequent use in examining relationships between ordinal or ranked variables, especially in Likert-scale-based studies.

The Microsoft Excel usage (M = 4.10, SD = 0.70) follows, also Applied, showing that it is commonly used for data encoding and preliminary organization before formal statistical analysis. The Mann-Whitney U Test (M = 3.95, SD = 0.73) and competence in selecting appropriate nonparametric tests (M = 3.90, SD = 0.72) are both interpreted as Applied, indicating moderate use and understanding of comparative and decision-based statistical procedures.

The use of nonparametric methods when assumptions are violated (M = 3.88, SD = 0.69) and integration of nonparametric techniques in research (M = 3.85, SD = 0.74) also fall under Applied, suggesting that while respondents recognize their importance, usage is not yet fully maximized.

The Kruskal-Wallis Test (M = 3.74, SD = 0.77) is also Applied, indicating less frequent use in comparing multiple groups, while the Wilcoxon Signed-Rank Test (M = 3.41, SD = 0.81) obtained the lowest mean, suggesting limited application and weaker exposure to paired-sample analysis. Overall, the results reveal that data analysis practices are concentrated on more familiar and commonly used tools such as Chi-Square, SPSS, and Spearman correlation, while more specialized nonparametric tests are less frequently applied.

Challenges Encountered in the Application of Nonparametric Statistical Methods in Data Analysis

Table 3 presents the thematic analysis of the challenges encountered by the respondents in applying nonparametric statistical methods.

Table 3 Challenges Encountered in the Application of Nonparametric Statistical Methods

Themes	Description
1. Limited Knowledge of Nonparametric Methods	Respondents lack sufficient understanding of the different nonparametric tests and their uses.
2. Difficulty in Selecting Appropriate Tests	Respondents struggle to determine which nonparametric test fits their data and objectives.
3. Limited Skills in Using Statistical Software	Respondents have difficulty performing nonparametric tests using Excel and SPSS.
4. Inadequate Training and Guidance	Respondents receive limited formal instruction and mentoring in nonparametric data analysis.
5. Complexity in Interpreting Results	Respondents find it difficult to interpret and explain nonparametric test outputs.

Thematic analysis revealed that one of the major challenges encountered by respondents is the limited knowledge of nonparametric methods**.** Many respondents expressed that while they are familiar with basic statistical procedures, they have inadequate understanding of the assumptions, functions, and applications of specific nonparametric tests. This lack of knowledge limits their ability to confidently use nonparametric methods in research.

Another major challenge is the difficulty in selecting appropriate tests**.** Respondents shared that they often struggle in deciding which statistical method to use based on the nature of their variables and research objectives. This uncertainty can lead to improper statistical choices, especially when distinguishing between parametric and nonparametric approaches.

The respondents also identified limited skills in using statistical software as a challenge. While Microsoft Excel and IBM SPSS Statistics are available, some respondents admitted they are not fully skilled in running nonparametric tests using these applications. They often rely on external assistance when performing analyses, indicating a gap in technical competence.

The theme of inadequate training and guidance emerged strongly from the responses. Participants noted that they have limited opportunities for workshops or formal instruction on advanced statistical procedures, particularly nonparametric methods. This insufficient support hinders the development of their analytical capabilities.

Lastly, respondents cited the complexity in interpreting results as a significant challenge. Even when they are able to run statistical tests in software, they often find it difficult to interpret the output tables and explain the findings accurately in their research reports. This affects the confidence and quality of their statistical reporting.

These findings suggest that the challenges are not only technical but also instructional in nature. While researchers have access to tools like Excel and SPSS, insufficient knowledge, training, and interpretive skills hinder the effective application of nonparametric statistical methods.

Recommendations to Improve the Application of Nonparametric Statistical Methods in Data Analysis

Table 3 presents the themes derived from respondents' recommendations for improving the application of nonparametric statistical methods.

Table 3 Recommendations to Improve the Application of Nonparametric Statistical Methods

Themes	Description
1. Conduct Statistical Training Workshops	Provide regular workshops on nonparametric methods and data analysis.
2. Strengthen Research Mentoring	Improve adviser support in selecting and applying appropriate statistical tools.
3. Develop User-Friendly Statistical Guides	Create manuals for using Excel and SPSS in nonparametric analysis.
4. Encourage Practice-Based Learning	Provide hands-on exercises in statistical software applications.
5. Provide Reference Books on SPSS	Supply books and materials on SPSS and nonparametric statistics.

Respondents recommended the conduct of statistical training workshops to enhance their understanding of nonparametric methods. Regular workshops focusing on the use and interpretation of nonparametric tests can strengthen researchers' statistical competence and confidence. They also emphasized the need to strengthen research mentoring, particularly from research advisers. Respondents suggested that advisers should provide clearer guidance in selecting suitable statistical tools and interpreting results.

Another recommendation is to develop user-friendly statistical guides, particularly manuals on using Microsoft Excel and IBM SPSS Statistics for nonparametric analysis. These guides can serve as quick references for researchers during data analysis. The respondents further suggested practice-based learning activities**,** where researchers can gain hands-on experience in performing nonparametric tests using software applications. This can improve technical skills and reduce dependence on outside assistance. Finally, respondents recommended the provision of reference books on SPSS**,** particularly those that explain the application of nonparametric methods step-by-step. Having access to books and instructional materials on SPSS can improve researchers' ability to independently conduct data analysis and interpret results accurately.

Overall, the findings suggest that improving the application of nonparametric statistical methods at Davao de Oro State College requires institutional support in the form of training, mentoring, practical resources, and access to statistical references. Strengthening these areas can enhance the research capabilities of faculty and student researchers and improve the quality of data analysis practices in the institution.

Integration of Quantitative and Qualitative Findings

The integration of quantitative and qualitative findings demonstrates the complementary value of the mixed-methods approach employed in this study. The quantitative results identified patterns in the application of nonparametric statistical methods, while the qualitative findings provided explanations behind these patterns.

The profile characteristics of the respondents suggest that the application of nonparametric statistical methods at DDOSC is influenced by variations in research role, experience, and statistical preparation. Faculty researchers may possess greater exposure due to repeated involvement in research activities and advising, whereas student researchers may require stronger foundational support in statistical decision-making.

The finding that the Chi-Square Test was the most commonly applied method corresponds with the qualitative theme on difficulty in selecting appropriate statistical tests. The frequent use of Chi-Square may indicate that researchers tend to rely on methods they are most familiar with and consider easier to apply. While this demonstrates practical competence, it may also suggest limited exploration of other appropriate nonparametric techniques.

Similarly, the low utilization of the Wilcoxon Signed-Rank Test supports the qualitative finding regarding limited knowledge of nonparametric methods. Researchers may have fewer opportunities to apply paired-sample analysis because they lack familiarity with the conditions and research designs where this method is appropriate.

Furthermore, the reported difficulty in interpreting statistical results provides an explanation for the moderate application of several nonparametric methods. Even when researchers are capable of running statistical procedures using software such as SPSS, uncertainty in interpreting outputs may discourage them from using more advanced statistical approaches.

Overall, the integration of findings reveals that the application of nonparametric statistical methods at DDOSC is influenced not only by researchers' exposure to statistical tools but also by their knowledge, training, and confidence in applying and interpreting these methods. The quantitative and qualitative results collectively emphasize the need for continuous statistical capacity-building programs, mentoring, and accessible learning resources to strengthen research data analysis practices within the institution.

DISCUSSION

The findings of the study reveal that nonparametric statistical methods are generally applied in data analysis practices at Davao de Oro State College (DDOSC), Philippines; however, their utilization remains concentrated on simpler and more familiar statistical procedures. Among the identified methods, the Chi-Square Test (30%) emerged as the most frequently applied technique, followed by Spearman Rank Correlation (25%), Mann-Whitney U Test (18%), Kruskal-Wallis Test (15%), and Wilcoxon Signed-Rank Test (12%). The predominance of Chi-Square and Spearman Rank Correlation suggests that researchers commonly encounter categorical and ordinal data, which are frequently generated from survey-based research designs. This pattern reflects the nature of institutional research activities where questionnaires, rating scales, and frequency-based data are commonly utilized. Since these methods are relatively easier to understand, readily available in statistical software, and frequently discussed in basic research courses, researchers tend to rely on them when conducting data analysis.

The frequent application of Chi-Square indicates that researchers are more confident in using statistical procedures that directly correspond with categorical data analysis. Likewise, the application of Spearman Rank Correlation suggests that respondents are familiar with examining relationships involving ordinal variables, particularly those derived from Likert-scale instruments commonly used in educational and social science research. However, the lower utilization of Mann-Whitney U Test, Kruskal-Wallis Test, and Wilcoxon Signed-Rank Test indicates limited exposure to more specialized nonparametric procedures involving independent group comparisons, multiple-group comparisons, and paired observations. Although respondents demonstrated awareness of these methods, their application appears to depend on the specific requirements of research designs rather than being part of their regular analytical practices. Overall, the findings suggest that researchers at DDOSC possess basic familiarity with nonparametric statistical methods, but their statistical repertoire remains focused on frequently encountered and easier-to-apply techniques.

This finding implies that the choice of statistical methods among DDOSC researchers may be influenced by the types of research commonly conducted within the institution. The dominance of descriptive and survey-based studies may explain why categorical and ordinal data analysis methods are more frequently applied. However, reliance on only a limited number of statistical procedures may restrict researchers' ability to address more complex research questions requiring alternative analytical approaches. Faizi and Alvi (2023) emphasized that the application of nonparametric methods is strongly associated with researchers' familiarity with statistical techniques and their ability to match procedures with data characteristics. Similarly, Kloke and McKean (2024) noted that simpler rank-based and categorical procedures are often preferred in applied educational research because of their accessibility and ease of interpretation, while more advanced nonparametric methods remain less utilized due to limited exposure and training.

The findings also indicate that statistical software availability influences researchers' data analysis practices. The high utilization of IBM SPSS Statistics and Microsoft Excel suggests that respondents depend on accessible technological tools in conducting statistical procedures. While the availability of these applications supports efficient data processing, software access alone does not ensure effective statistical decision-making. Researchers may become dependent on familiar software functions and select methods based on convenience rather than methodological appropriateness. This supports the findings of Logroño, Darang, and Picaza (2023), who explained that familiarity with digital tools does not necessarily translate into advanced technical competence and that structured development is needed to improve higher levels of analytical literacy.

The influence of software familiarity on statistical decision-making is further supported by Hodges et al. (2023), who emphasized that dependence on statistical software may introduce researcher degrees of freedom, where analytical decisions may be affected by convenience, familiarity, or software accessibility. Similarly, Kvam, Vidakovic, and Kim (2022) explained that although nonparametric methods are flexible and useful for analyzing real-world data, their proper application requires adequate understanding of assumptions, procedures, and interpretation. Therefore, strengthening statistical practices requires not only providing researchers with software tools but also developing their ability to make informed methodological decisions.

The qualitative findings provide deeper explanations regarding the quantitative results. Respondents identified limited knowledge of nonparametric methods, difficulty in selecting appropriate tests, limited software skills, inadequate training and guidance, and complexity in interpreting results as major challenges. These findings suggest that the issue is not the absence of statistical tools but the limited confidence and competence of researchers in applying these tools appropriately. The challenges reveal a gap between awareness and mastery, wherein researchers may recognize commonly used statistical procedures but may lack sufficient understanding of when and why specific methods should be applied.

The challenge of limited knowledge of nonparametric methods indicates that some researchers may understand the existence of statistical tests but may not fully comprehend their assumptions, applications, and limitations. This explains why commonly used procedures such as Chi-Square and Spearman Rank Correlation are more frequently applied, while specialized methods such as Wilcoxon Signed-Rank Test receive less attention. Nussbaum (2024) emphasized that insufficient understanding of statistical procedures may result in inappropriate test selection and inaccurate interpretation of findings. Likewise, Kloke and McKean (2024) highlighted that researchers must possess strong statistical reasoning skills to determine the suitability of nonparametric approaches based on data structure and research objectives.

The difficulty in selecting appropriate statistical tests further demonstrates the need to strengthen researchers' analytical decision-making skills. Respondents' uncertainty in matching statistical procedures with research questions, variable types, and study designs may affect the validity of research findings. Smeeton, Spencer, and Sprent (2025) explained that appropriate selection of nonparametric tests requires careful consideration of data characteristics, sample relationships, and analytical objectives. Without sufficient guidance, researchers may rely on familiar methods even when alternative procedures may provide more accurate analysis.

The findings regarding limited skills in using statistical software also indicate that technical competence remains an important area for improvement. Although SPSS and Excel are available, some respondents continue to experience difficulty in performing nonparametric analyses and interpreting statistical outputs. This suggests that software training should not focus only on basic operations but should emphasize research-based application, interpretation, and reporting. Vaithilingam et al. (2024) noted that software proficiency significantly influences analytical effectiveness because researchers tend to utilize statistical tools more confidently when they understand both the technical procedures and statistical concepts behind them.

The lack of training and institutional guidance emerged as another important concern. Respondents indicated that opportunities for specialized instruction on nonparametric methods remain limited. This suggests the need for

DDOSC to establish continuous statistical capacity-building programs rather than relying only on occasional seminars or informal assistance. Cabral (2022) emphasized that structured instructional programs can improve research competence by providing systematic learning experiences and continuous opportunities for skill development.

The respondents' recommendations highlight the importance of developing institutional mechanisms that support long-term improvement of statistical practices. Rather than providing general statistical orientations, DDOSC may consider establishing a comprehensive statistical capacity enhancement program that focuses specifically on the needs identified in the study. Such a program may include a series of workshops covering foundational concepts of nonparametric statistics, appropriate selection of statistical tests, application of procedures using SPSS and Excel, and interpretation and reporting of statistical results. The training may be conducted through a progressive approach beginning with basic concepts and gradually advancing toward more complex applications. Conducting these sessions regularly, such as every semester or annually, may ensure that both new and experienced researchers continuously develop their statistical competencies.

Strengthening research mentoring is another important institutional intervention. A structured mentor–mentee program may be developed wherein experienced faculty researchers with expertise in statistics provide guidance to student researchers and less experienced faculty members. The mentoring process may include statistical consultation schedules, research analysis checklists, and monitoring tools that guide researchers in identifying appropriate statistical procedures. A standardized checklist may assist researchers in evaluating their data type, measurement scale, research objectives, statistical assumptions, and justification for selecting a particular test. Such mentoring mechanisms can reduce uncertainty during data analysis and promote more systematic statistical decision-making.

The development of user-friendly statistical guides is also recommended to support independent learning among researchers. These guides should be written using accessible language and should include practical examples relevant to institutional research contexts. Instead of focusing only on theoretical explanations, the materials may contain decision-making guides for selecting statistical tests, step-by-step procedures for conducting analyses using SPSS, examples of statistical interpretations, and common errors that researchers should avoid. Providing localized and simplified statistical resources may reduce researchers' dependence on external assistance and encourage greater confidence in conducting data analysis independently.

The institution may also strengthen access to reference materials that support statistical learning. Useful resources may include introductory and applied statistics books focusing on nonparametric methods, SPSS manuals, online statistical tutorials, and research-based learning materials. These references should prioritize practical application and interpretation because respondents identified difficulties not only in performing statistical tests but also in explaining the meaning of statistical results. Accessible learning resources can serve as continuous references for researchers during the conduct of quantitative studies.

The implementation of these recommendations requires consideration of institutional resources and possible challenges. Potential barriers may include limited funding, availability of statistical experts, and researchers' competing academic responsibilities. To address these concerns, DDOSC may initially utilize internal experts and experienced faculty members to facilitate training activities while gradually developing partnerships with external statisticians and research institutions. The institution may also integrate statistical enhancement activities into existing research development programs to maximize available resources. Administrative support, budget allocation, and recognition of participation in research capacity-building activities are essential factors in sustaining these initiatives.

Overall, the findings demonstrate that improving the application of nonparametric statistical methods at DDOSC requires a comprehensive approach that addresses knowledge, technical skills, interpretation abilities, and institutional support. The quantitative findings revealed that researchers commonly apply familiar procedures such

as Chi-Square and Spearman Rank Correlation, while the qualitative findings explained that limited training, uncertainty in test selection, and difficulty in interpretation contribute to the restricted use of broader statistical techniques. Through structured training programs, systematic mentoring, accessible statistical resources, and sustained institutional support, DDOSC can strengthen the statistical competence of faculty and student researchers and enhance the quality, rigor, and diversity of future research outputs.

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