# Review of: "Statistical Overview of Prevalence of Anaemia with Associated Socioeconomic and Demographic Factors in Nigeria"

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Statistical Overview of Prevalence of Anaemia with Associated Socioeconomic and Demographic Factors in Nigeria

The study utilized data from the 2021 Malaria Indicator Survey in Nigeria to assess the prevalence of anemia in children aged 6-59 months and its associated socioeconomic and demographic factors. Among the findings, male children had a significantly higher risk of anemia compared to females. Additionally, children in rural areas were at a higher risk than those in urban areas, and those with negative malaria rapid test results were less likely to have anemia. The study suggests that intervention efforts should focus on rural areas and mothers with lower education levels. A review of the paper is as follows:

**Introduction**: The introduction effectively introduces the topic of anaemia among under-five children in Nigeria, providing context and rationale for the study. While the introduction provides a comprehensive overview of the significance and prevalence of anaemia in Nigeria, it lacks a clear statement of the specific research objectives or questions that the study aims to address. The introduction introduces various studies and data sources related to anaemia but does not explicitly state the gap or knowledge deficiency that the current research intends to fill. Including a statement about the specific research objectives would help guide the reader on the focus and purpose of the study. Additionally, a concise research hypothesis or question would strengthen the introduction by clearly defining the study's scope and goals.

**Suggestions for Improvement in the Introduction:**

1.      Clearer Structure: Consider organizing the introduction into sub-sections for better clarity. This can include sections on the global context, the local situation in Nigeria, factors associated with anaemia, and the rationale for the study.

2.      Thesis Statement: Include a clear and concise thesis statement or research objective at the end of the introduction. This statement should succinctly convey the purpose of the study and what the researchers aim to achieve.

3.      Expand on Local Statistics: While local statistics from the WHO are mentioned, consider providing additional recent and specific data on anaemia prevalence in Nigeria. This would enhance the current understanding of the problem in the country.

4.      Enhance Transition Sentences: Improve the transition sentences between different ideas or sections. This will help the reader smoothly follow the flow of information and better understand the logical progression of the introduction.

5.      Define Abbreviations: If using abbreviations like RBC (red blood cells), consider defining them upon first use to ensure clarity, especially for readers who may not be familiar with medical terminology.

6.      More Emphasis on Research Gap: Strengthen the emphasis on the research gap by providing more explicit details on what is lacking in the current literature and why the study in Nigeria is necessary. Clearly state how the proposed research will contribute to filling this gap.

7.      Engaging Opening Sentence: Consider starting the introduction with a compelling and engaging opening sentence to capture the reader's attention. This can be a relevant statistic, a thought-provoking question, or a brief anecdote related to anaemia.

8.      Conciseness: Review the introduction for any repetitive information or sentences that can be condensed. Aim for conciseness while ensuring all essential information is retained.

9.      Define Scope: Explicitly define the scope of the study in terms of the population under investigation (e.g., children, women, specific age groups) and the geographical areas within Nigeria.

10.      Include a Roadmap: Provide a brief roadmap or overview of the subsequent sections of the paper in the introduction. This can help the reader anticipate the structure of the research.

11.      Check Referencing Consistency: Ensure consistency in referencing styles for citations, including consistent formatting and citation order.

**Methodology:**

The methodology section is detailed and well-structured, explaining the data source, variables, and analytical methods. However, it could benefit from additional information on ethical considerations, data limitations, and potential biases.

Here are a few points that could enhance clarity and completeness:

1.      Dependent and Independent Variables:

•      The distinction between the dependent variable (prevalence of anaemia in children aged 6-59 months) and independent variables (factors influencing anaemia status) is well-established.

•      It would be beneficial to explicitly mention how the hemoglobin levels were categorized into "normal," "mild," and "moderate/severe" for the dependent variable.

2.      Logistic Regression:

•      The explanation of logistic regression is clear and informative. However, it would be helpful to specify which

specific variables were included in the logistic regression models.

• While the formulae are presented, a brief explanation of the terms (e.g., Logit, β0, β1, Xi) might aid readers who are less familiar with logistic regression.

3. Assumptions of the Logistic Regression Model:

• The assumptions are listed appropriately, but it might be beneficial to briefly explain why each assumption is essential or how it relates to the logistic regression analysis.

4. Chi-Square Test:

• The chi-square section is well-explained, providing a clear understanding of its purpose and calculation.

• It could be beneficial to specify what "r" and "c" represent in the degrees of freedom formula for readers who may not be familiar with contingency tables.

5. Overall Clarity:

• The methods section is well-organized and generally clear. However, it could benefit from a brief paragraph summarizing the key steps, from data collection to statistical analyses, to offer readers an overview before delving into the details.

Still on Methods section:

A few critical elements could be further detailed or added to enhance clarity and reproducibility:

1. Sampling Methodology:

• Specify the sampling design used in the Demographic and Health Survey (DHS) for the 2021 Malaria Indicator Survey (MIS). Detail the procedures for participant selection, including any stratification or clustering.

2. Data Collection Procedures:

• Provide a brief overview of the data collection process during the in-person interviews. Include details on how hemoglobin levels were measured in children aged 6-59 months and if there were any standardization procedures.

3. Missing Data Handling:

• Address how missing data, if any, were handled in the dataset. Describe any imputation methods or exclusion criteria for incomplete or inconsistent data.

4. Ethical Considerations:

• Briefly mention the ethical considerations and approval process for conducting interviews and using the survey data. Note any ethical review boards or committees involved in the study.

5.         Variable Definitions:

•          Offer concise definitions or references for variables used in the study. For instance, clarify what is meant by the "wealth index" and how it was determined.

6.         Multinomial Logistic Regression Interpretation:

•          After mentioning the use of both binary and multinomial logistic regression, provide a brief explanation of how the results of these analyses will be interpreted and reported.

7.         Statistical Significance Level:

•          Specify the level of significance used for hypothesis testing. Common levels are 0.05 or 0.01. Knowing this helps readers understand the threshold for considering results as statistically significant.

8.         Software Validation:

•          Confirm that the Stata software version 14 used for data analysis is appropriate for the chosen statistical methods. This ensures the validity of the results obtained.

9.         References for Statistical Methods:

•          If applicable, consider referencing sources or textbooks that provide detailed explanations of the statistical methods employed. This can be particularly helpful for readers seeking a deeper understanding.

10.        Data Accessibility:

•          Mention the accessibility or availability of the dataset for verification and future research. Provide details on how other researchers or interested parties can access the dataset.

**Results:**

The results section is thorough and presents data using tables effectively. It successfully communicates the associations between various factors and anaemia prevalence in under-five children. Suggestions for improvement include adding practical significance to odds ratios, ensuring terminology consistency, improving formatting for readability, and incorporating visual aids. To enhance the Data Analysis and Results Discussion section, consider the following improvements:

1.         Introduction to Findings: Begin the section with a brief introduction summarizing the main findings and the objectives of the analysis. This will provide context and help readers anticipate the key results.

2.         Descriptive Analysis:

•          Clarity and Readability: While Table 3.1 is informative, improve the clarity and readability by using a more concise format. Consider grouping variables logically to make it easier for readers to follow.

• Data Presentation: Enhance the presentation by using visual elements like charts or graphs alongside the tables. Visual aids can provide a quick overview of the data distribution.

3. Association Analysis (Chi-Square):

• Hypothesis Testing Clarification: Provide a brief explanation of the null and alternative hypotheses (H0 and H1) before presenting the chi-square analysis. This adds clarity to the purpose of the statistical tests.

• Interpretation: After presenting Table 3.2, include a concise interpretation of the associations found. Explain the practical implications of significant associations between variables.

4. Binary Logistic Regression:

• Introduction: Introduce the binary logistic regression analysis by briefly explaining its purpose and how it complements the chi-square analysis.

• Odds Ratio Discussion: Consider adding a brief discussion of the practical significance of the odds ratios presented in Table 3.3. Help readers understand the real-world implications of the observed associations.

5. Consistency and Terminology:

• Uniform Terminology: Ensure consistency in the use of terminology, such as capitalization of "Anaemia" or "anaemia." Choose a consistent format to maintain professionalism and readability.

6. Conclusion and Implications:

• Summarization: Conclude the section with a summarizing paragraph that highlights the key findings and their implications. This will provide a clear takeaway for readers.

• Next Steps: Consider including a brief mention of potential next steps for research or interventions based on the findings.

7. Limitations:

• Data Limitations: Briefly acknowledge any limitations in the dataset or potential biases that could impact the study's outcomes. This demonstrates transparency and a nuanced understanding of the study's constraints.

**Conclusion:**

The conclusion provides a clear and concise summary of the study's key findings. Recommendations include emphasizing critical results, discussing regional differences, exploring relationships between variables, and addressing the implications for interventions. Additionally, it suggests considering future research directions.

Here are some suggestions to enhance the conclusion:

1.      Clarity and Conciseness:

•       Consider breaking the conclusion into distinct sections for better organization. For example, start with a brief summary of the significant associations and then discuss the regional differences.

•       Aim for concise statements to maintain clarity and keep the reader engaged.

2.      Emphasize Key Findings:

•       Clearly emphasize the most critical findings in the initial part of the conclusion. Highlight the factors that showed a significant association with anaemia prevalence.

3.      Regional Differences:

•       Provide a more detailed discussion of the regional disparities. Explain why the northern region has a higher prevalence of anaemia among under-five children compared to the southern region. Are there specific socio-economic or health-related factors contributing to this difference?

4.      Relationships Between Variables:

•       Elaborate on the relationships between variables. For instance, discuss why children in rural areas with lower maternal education and wealth index are more prone to anaemia, especially male children. Provide insights into potential underlying factors contributing to these associations.

5.      Malaria and Anaemia Relationship:

•       Further explore the relationship between malaria and anaemia. While it's mentioned that children who are anaemic tested positive for malaria, provide insights into how this relationship might influence intervention strategies.

6.      Implications for Intervention:

•       Clearly state the practical implications of the findings. How can the results inform public health interventions? What specific measures could be taken to reduce anaemia prevalence in the identified high-risk groups?

7.      Mosquito Nets and Other Factors:

•       Since the use of mosquito nets was not statistically significant, briefly discuss the potential reasons behind this result. Is there a need for further investigation or a different approach to malaria prevention in the study population?

8.      Recommendations for Future Research:

•       Conclude by suggesting avenues for future research. What areas need further exploration based on the current study's limitations or unexpected results?