



REVIEWER'S REPORT

Manuscript No.: IJAR-56489

Title: NUMERISATION DES DONNEES DE LABORATOIRE : ENJEUX DE L'INTER-OPERABILITE ET DE LA SECURITE DES DOSSIERS MEDICAUX ELECTRONIQUES A LIKASI, KAKANDA, KAMBOVE, ET KALEMIE EN RDC

Recommendation:

Accept as it is

Accept after minor revision.....

Accept after major revisionYES.....

Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality			✓	
Clarity			✓	
Significance		✓		

Reviewer Name: Dr. Dillip Kumar Mohapatra

Detailed Reviewer's Report

"Digitization of Laboratory Data: Challenges of Interoperability and Security of Electronic Medical Records in Likasi, Kakanda, Kambove, and Kalemie."

Reviewer's Report

1. Strengths of the Manuscript

1. Relevant and timely topic

The study addresses the important issue of laboratory data digitization and electronic medical records (EMR/DME) in the Democratic Republic of Congo (DRC). Digital health transformation is a key priority in global health systems, especially in low- and middle-income countries.

2. Regional empirical data

The study provides **primary data from four health regions (Likasi, Kakanda, Kambove, and Kalemie)**, which contributes local evidence to the literature on digital health adoption in Africa.

3. Clear study objective

The objective—to analyze the challenges of interoperability and security of electronic medical records—is clearly stated and consistently reflected in the methods and results.

4. Identification of key infrastructural barriers

The manuscript effectively highlights practical challenges such as **lack of electricity, poor**

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internet connectivity, and fragmented digital systems, which are crucial barriers to digital transformation.

5. Policy-oriented recommendations

The study proposes practical recommendations including **standardization of nomenclature, adoption of interoperability standards, data encryption, and infrastructure strengthening.**

2. Weaknesses of the Manuscript

1. Small sample size

The study includes only **30 participants**, which limits the statistical power and generalizability of the findings.

2. Sampling bias

The use of **non-probability convenience sampling** and the heavy concentration of respondents from Likasi (73.33%) may lead to biased representation of the broader region.

3. Limited methodological rigor

The statistical analysis is relatively basic. Apart from descriptive statistics and a chi-square test, **more advanced analyses could strengthen the interpretation of findings.**

4. Insufficient methodological detail

The manuscript does not clearly describe:

- questionnaire validation
- reliability testing
- survey development process

5. Presentation issues in tables and figures

Some tables appear poorly formatted and contain overlapping information. Graphs or figures could improve readability and clarity.

6. Literature review could be strengthened

The introduction relies on limited and somewhat dated references. **More recent literature on digital health interoperability and EMR security should be incorporated.**

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7. Language and grammar issues

Several sections contain minor grammatical errors and inconsistent formatting that require professional language editing.

3. Significance of the Study

The study is significant for digital health policy and health information system development in the DRC and similar low-resource settings.

It highlights critical systemic challenges including:

- heavy dependence on paper-based records,
- fragmented proprietary software systems,
- weak interoperability,
- inadequate cybersecurity practices,
- infrastructural constraints.

The findings can support health policy reforms, national digital health strategies, and implementation of interoperable laboratory information systems.

4. Key Points Identified in the Study

- 83.33% of laboratories still rely on paper-based records.
- Only 10% of facilities have a complete electronic medical record system.
- 43.33% of laboratories perform manual re-entry of data after printing, indicating weak interoperability.
- 70% of digital systems are closed proprietary systems, limiting integration.
- Infrastructure limitations (electricity and internet) affect 56.67% of laboratories.
- 53.33% of professionals fear data loss due to system failures.
- Less than 20% of laboratories use end-to-end encryption.
- The statistical analysis indicates that these challenges are common across the entire region.

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5. Recommendations for Improvement

1. **Increase sample size and improve sampling strategy**

Future studies should include more laboratories and use **probability sampling methods** to improve representativeness.

2. **Enhance methodological transparency**

Provide detailed information about:

- questionnaire development
- validation procedures
- reliability testing

3. **Strengthen statistical analysis**

Consider additional analytical techniques such as:

- logistic regression
- correlation analysis
- comparative analysis between facilities.

4. **Improve presentation of results**

- Redesign tables for clarity.
- Include **figures, charts, or graphs** to visually present key findings.

5. **Update and expand literature review**

Include more recent studies on:

- health information system interoperability
- cybersecurity in digital health
- laboratory information systems in low-resource settings.

6. **Improve language quality and formatting**

The manuscript would benefit from **professional English/French language editing** and consistent formatting.

7. **Expand discussion section**

Compare findings with **similar studies from other African countries** or **global digital health initiatives**.

6. Final Recommendation

Major Revision

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Although the study addresses an important public health issue and provides valuable preliminary data, **methodological limitations, small sample size, and presentation issues require substantial revision before publication.**

Major Revision Justification

Title Section

Lines 1–3

Issue:

The title clearly reflects the study topic but is relatively long and could be simplified for clarity and indexing purposes.

Justification for Revision:

A concise title improves readability and discoverability in databases. The current title could be shortened while preserving the key elements (digitization, interoperability, EMR security, and geographic scope).

Abstract Section

Lines 7–10 (Introduction)

Issue:

The introduction of the abstract provides general background but lacks a clear statement of the **research gap and specific research question.**

Justification for Revision:

The abstract should explicitly state the research gap regarding laboratory data digitization and interoperability challenges in the Democratic Republic of Congo to strengthen the scientific rationale.

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Lines 11–14 (Methods)

Issue:

The methodology description is limited and does not explain:

- questionnaire validation
- sampling justification
- statistical tests used.

Justification for Revision:

For methodological transparency, the abstract should briefly mention the **sampling method and analytical techniques**, as these elements are essential for evaluating the scientific rigor of the study.

Lines 15–21 (Results)

Issue:

Although results are clearly presented with percentages, the section lacks **interpretation of the statistical findings**.

Justification for Revision:

The statement " $p > 0.05$ " is presented without explaining the variables tested or the implication of this result. Clarification is needed to improve the interpretability of the statistical findings.

Lines 22–25 (Conclusion)

Issue:

The conclusion is generally appropriate but contains **policy recommendations that are not fully supported by detailed analysis within the results section**.

Justification for Revision:

Conclusions should directly derive from the data presented. Additional explanation or evidence linking findings to the proposed national strategy is required.

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Introduction Section

Lines 47-52

Issue:

The introduction references theoretical models of EMR adoption but does not explain how these models relate to the current study.

Justification for Revision:

The authors should explicitly connect these theoretical frameworks with the study objectives to strengthen the conceptual foundation.

Lines 53-57

Issue:

The statement that Africa has developed a "robust medical infrastructure" may be overly generalized and not adequately supported by references.

Justification for Revision:

The authors should provide stronger evidence or modify the statement to better reflect the heterogeneous health infrastructure across African countries.

Lines 58-67

Issue:

The description of interoperability and security challenges is relevant but lacks specific references to the **DRC health information system context**.

Justification for Revision:

Providing contextual evidence about digital health systems in the DRC would improve the relevance of the argument.

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Lines 73–81

Issue:

The section describing digitization and digital health technologies is overly broad and partially redundant.

Justification for Revision:

The authors should condense this part and focus specifically on **laboratory data digitization and EMR systems**, which are central to the study.

Methods Section

Lines 96–98

Issue:

The study setting is described briefly without detailed information about the **health facilities involved**.

Justification for Revision:

More contextual information about laboratory types (public/private, hospital level) is necessary for understanding the study environment.

Lines 99–105 (Sampling)

Issue:

The study uses a **non-probability convenience sampling technique**, which may introduce sampling bias.

Justification for Revision:

The authors should provide a stronger justification for this approach and discuss its implications for the generalizability of the findings.

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Lines 106–111 (Data Collection Tool)

Issue:

The questionnaire development process and validation procedures are not described.

Justification for Revision:

Information regarding **questionnaire reliability, pilot testing, or validation** should be included to ensure methodological credibility.

Lines 112–119 (Data Analysis)

Issue:

The statistical analysis description lacks detail regarding:

- specific statistical tests used
- significance level
- variable comparisons.

Justification for Revision:

A more detailed explanation of the statistical methods is necessary for reproducibility.

Results Section

Lines 126–128

Issue:

The distribution of respondents shows a strong concentration in Likasi (73.33%), which may influence the representativeness of the results.

Justification for Revision:

The authors should discuss how this imbalance may affect the interpretation of regional findings.

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Lines 154–162

Issue:

The results highlight important findings about paper-based records and interoperability, but the tables are not clearly formatted.

Justification for Revision:

Improved formatting and clearer table titles would enhance readability and interpretation.

Lines 166–170

Issue:

The infrastructure challenges are well presented but lack comparative analysis with other similar studies.

Justification for Revision:

Comparing findings with other digital health studies in Africa would strengthen the discussion.

Lines 172–177

Issue:

The security analysis focuses mainly on perceived risks rather than objective cybersecurity measures.

Justification for Revision:

The authors should clarify whether the data represent perceptions or actual security practices.

Statistical Analysis Section

Lines 179–183

Issue:

The chi-square results are presented without detailed explanation of variables tested.

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Justification for Revision:

The authors should clearly specify the **variables included in the statistical test** and discuss the implications of the non-significant results.

Discussion Section

Lines 185-194

Issue:

The discussion begins with a general overview rather than focusing directly on the study findings.

Justification for Revision:

The discussion should start with a clear interpretation of the key results obtained in the study.

Lines 199-206

Issue:

The interpretation of interoperability challenges is relevant but lacks sufficient empirical comparison with other studies.

Justification for Revision:

Including comparative studies would strengthen the argument and demonstrate the broader relevance of the findings.

Lines 210-216

Issue:

The cybersecurity discussion is brief and does not fully explore the implications of the findings.

Justification for Revision:

The authors should expand this section by discussing best practices in digital health security.

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Limitations Section

Lines 230–233

Issue:

Although limitations are acknowledged, the discussion remains brief.

Justification for Revision:

Additional limitations such as **self-reported data bias and limited statistical power** should be addressed.

Conclusion Section

Lines 235–244

Issue:

The conclusion summarizes the findings well but includes policy recommendations that may require stronger evidence.

Justification for Revision:

The authors should clearly link each recommendation with the specific findings of the study.

References

Lines 287–336

Issue:

Several references are relatively old or not directly related to the African context of digital health systems.

Justification for Revision:

Including more **recent and regionally relevant literature** would strengthen the scientific background of the manuscript.

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Final Reviewer Recommendation

Major Revision

Reasons

1. Small sample size and convenience sampling.
2. Insufficient methodological detail.
3. Limited statistical analysis explanation.
4. Formatting issues in tables and figures.
5. Need for stronger literature integration.
6. Language and clarity improvements required.