Author Reflexivity Statement for: Geospatial Patterns of Progress towards UNAIDS "95-95-95" Targets and Community Vulnerability in Zambia: Insights from Population-based HIV Impact Assessments

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Author Reflexivity Statement

1. *How does this study address local research and policy priorities?*

Our study investigates the progress towards UNAIDS '95-95-95' targets and community vulnerability in Zambia, providing insights into the spatial distribution of HIV care continuum metrics. By highlighting the need for tailored interventions in specific regions, our study contributes to local research and policy priorities in addressing HIV epidemic disparities across different population groups and geographical regions in Zambia.

2. *How were local researchers involved in study design?*

Study authors include local researchers from the Centre for Infectious Disease Research in Zambia, and local policymakers from the Zambia Ministry of Health. At the design stage, the senior author convened a workshop during which local health authorities and researchers shared their priorities and key knowledge gaps that they would like addressed to inform policy. The study also involved US researchers with expertise in HIV epidemiology and spatial analysis, fostering a collaborative and supportive international partnership.

3. *How has funding been used to support the local research team?*

Funding for this study was used to support the local research team through capacity building, training, and resources necessary for data analysis. Financial support also facilitated travel and collaborations between local and international researchers, contributing to knowledge exchange and partnership strengthening. The Centre for Infectious Disease Research in Zambia is a recipient of subaward funding from grants to NYU from the US National Institutes of Health (1R01MH124478, 1R01AI174932, 1R01AI174932).

4. *How are research staff who conducted data collection acknowledged?*

There was no data collection in this study. However the publicly available data sources, the Zambia Population-based HIV Impact Assessment (ZAMPHIA) was acknowledged in our manuscript.

5. *Do all members of the research partnership have access to study data?*

Data used in this study is publicly available from the Population-based HIV Impact Assessment (PHIA) database.

6. *How was data used to develop analytical skills within the partnership?*

Local researchers were trained in geospatial analysis techniques and involved in data interpretation, contributing to capacity building and skill development. Regular meetings were held to discuss data analysis, findings, and skill development, promoting a supportive and collaborative learning environment.

7. *How have research partners collaborated in interpreting study data?*

We conducted a follow-up workshop with the Ministry of Health and CIDRZ in Zambia to present preliminary study results. The interpretation of the results by local researchers and health authorities was integrated while writing the manuscript.

8. *How were research partners supported to develop writing skills?*

Early career researchers and local researchers were supported by senior academics and researchers from the US to develop and refine their writing skills. The partnership provided opportunities for manuscript drafting, revision, and feedback, promoting skill development and capacity building. Furthermore, the senior author (Dr. Bershteyn) provided a manuscript-writing workshop to local Zambian investigators. Additional written guidance on manuscript-writing was shared virtually. For manuscripts being lead-authored by Zambian investigators, Dr. Bershteyn provides direct mentoring in the form of iterative written and/or verbal feedback on scientific writing. While writing this manuscript, all authors provided input on the manuscript draft and read and approved the final manuscript.

9. *How will research products be shared to address local needs?*

The study will be published in an open-access journal, ensuring accessibility for local researchers, policymakers, and stakeholders in Zambia and beyond. A post-publication dissemination plan includes sharing key findings and recommendations with relevant stakeholders in Zambia to inform local policy and intervention development. Furthermore, Research products have been shared with the Zambia Ministry of Health and CIDRZ in the form of a slideshow presentation and a report.

10. *How is the leadership, contribution, and ownership of this work by LMIC researchers recognized within the authorship?*

LMIC researchers' leadership and contributions are recognized through their authorship positions, reflecting their significant roles in the study's design, analysis, and interpretation. The

authorship includes a balance of researchers from Zambia and the US, showcasing a collaborative international partnership.

11. How have early career researchers across the partnership been included within the authorship team?

Early career researchers from both Zambia and the US have been included in the authorship team, reflecting their contributions to the study and supporting their professional development. Particularly, Zambian co-authors include a blend of senior and early-career researchers. One co-author from CIDRZ and one co-author from the University of Cincinnati were enrolled in degree programs.

12. How has gender balance been addressed within the authorship?

Out of thirteen co-authors, ten identify as male and three identify as female. The first author identifies as male, and the senior author identifies as female.

13. How has the project contributed to the training of LMIC researchers?

The project has provided opportunities for capacity building and skill development among LMIC researchers through their involvement in study design, data analysis, and interpretation. Collaborations with US researchers facilitated knowledge exchange, training in geospatial analysis techniques, and development of writing skills. The third author (Dr. Nyimbili) applied for a PhD program at the time that this analysis was underway in 2022 and was admitted in 2023. Dr. Nyimbili is now a first-year PhD student at New York University with the intent to conduct dissertation research with Dr. Bershteyn on the theme of this paper. Additionally, Drs. Cuadros and Bershteyn have conducted trainings in Zambia, including a two-day workshop by Dr. Cuadros in 2023 on geospatial analysis methods, and a workshop by Dr. Bershteyn in 2023 on scientific paper-writing.

14. How has the project contributed to improvements in local infrastructure?

While the project may not have directly contributed to physical infrastructure improvements, it provides valuable insights to inform targeted interventions and resource allocation in Zambia. By identifying geospatial patterns and disparities in the HIV care continuum, the study's findings can help guide local infrastructure investments to better address the HIV epidemic in vulnerable regions. Furthermore, the research grant provided support for local salaries, travel, and research supplies. Additionally, Zambian investigators have been granted courtesy access to NYU's supercomputers to address the lack of local high-performance computing resources. The team is exploring ways to collaborate with companies and institutions on the African continent to increase local supercomputing access.

15. What safeguarding procedures were used to protect local study participants and researchers?

To protect the privacy and well-being of study participants, ethical approval was obtained from relevant institutional review boards, and informed consent was acquired from all participants included in the PHIA study, the data source of our study.