SHORT REPORT

Spatial epidemiology of intimate partner violence in Kenya: A county-level clustering analysis

Masood Ali Shaikh[1], Syed Muhammad Mubeen[2]

Abstract

Intimate partner violence (IPV) is a significant public health challenge globally. In this study, spatial analysis was done to study the distribution and clustering of IPV perpetrated against women by their current or most recent husband or intimate partner, across counties in Kenya in terms of lifetime and past 12-month prevalence. Using publicly available, county-level data from the Kenya Demographic and Health Survey 2022, secondary analysis was conducted. County-level lifetime and past 12-month IPV prevalence were analysed. GeoDa 1.20.0.36 and ArcMap 10.8.1 were used for spatial analysis and mapping. Lifetime prevalence surpassed the past 12-month IPV prevalence, with distinct geographical disparities across the counties. Statistically significant clustering was noted for both IPV metrics. Findings underscore the need for effective interventions to decrease and eventually eliminate IPV in Kenya.

Keywords: Intimate Partner Violence, Women, Spatial Analysis, Cluster Analysis, Kenya.

DOI: https://doi.org/10.47391/JPMA.32038

Introductio

Intimate partner violence (IPV) is a serious and widespread problem across the world, that affects women in intimate relationships, by harming their health and human rights. It is defined as "behaviour within an intimate relationship that causes physical, sexual or psychological harm, including acts of physical aggression, sexual coercion, psychological abuse, and controlling behaviours".[1] The global lifetime prevalence of experiencing physical and/or sexual IPV at least once, inflicted by either the current or former male intimate partner has been reported as 26%.[1]

The Republic of Kenya is an East African country, lying along the south-eastern coast of Africa, bordered by the Indian Ocean, with an estimated population of 54.3 million in 2022.[2] In many low- and middle-income countries like Kenya, the only national and subnational representative health and population metrics, including IPV, are provided by the cross-sectional Demographic and Health Surveys (DHS). DHSs are implemented by 'The DHS Program' in conjunction with the ministries of health and national statistical offices.[3] The most recent DHS survey was conducted in 2022 by the Kenya National Bureau of Statistics (KNBS) and the Kenyan Health Ministry.[3] The Kenya Health and Demographic Survey 2022 (KDHS 2022), like other DHS surveys used clear definitions of emotional/psychological, physical, and sexual violence that constitute IPV.[4] Physical IPV was defined as being pushed, shaken, slapped, arm twisted, objects thrown at, hair pulled, punched with fist or something that could hurt, beaten, kicked, dragged, chocked or intentionally burned, attacked with a knife, gun, or any weapon. Sexual IPV constituted: being physically forced into unwanted sex, physically forced into performing unwanted sexual acts, or forced with threats or in other ways to perform unwanted sexual acts. While emotional IPV involved: being humiliated in the presence of others, threatened to hurt or cause harm to someone one cares about, insulted, or made to feel bad. The freely available KDHS 2022 country reports, available at the KNBS website, provide detailed survey methodology, questionnaires and findings.[4] The KNBS website also provides KDHS 2022 'County Fact Sheets' for each of the 47 counties that provide county-level key metrics in addition to national metrics for easy comparisons.[5] Based on these fact sheets, the prevalence of having ever experienced IPV, by ever married or ever partnered women aged 15-49 years, perpetrated by their current or most recent husband or partner, was 40%; while IPV experienced in the past 12 months was 28%. These fact sheets provide all metric values rounded to the nearest whole number.

The objectives of this secondary analyses were to study the geography and clustering of IPV inflicted upon women by their current or most recent husband or intimate partner, across counties in Kenya in terms of lifetime and past 12-month prevalence, using the publicly available KDHS 2022 county fact sheets. Although lifetime IPV overlaps with IPV in the past 12 months, they represent different temporal dimensions. The past 12-month IPV prevalence represents

[1]Department of Medicine, College of Medicine, Korea University, Seoul, South Korea; [2]Department of Community Health Sciences, Hamdard University, Karachi, Pakistan.

Correspondence: S.M. Mubeen. e-mail: syed.mubeen@hamdard.edu.pk

ORCID ID: 0000-0002-4542-5905

Submission completed: 23-08-2025 **1st Revision received:** 23-09-2025

Acceptance: 14-02-2026 **Last Revision received:** 13-02-2026

current risk while lifetime IPV reflects historical burden.

Methods

The cross-sectional KDHS 2022 was conducted by the Kenya National Bureau of Statistics in partnership with the Ministry of Health, Kenya, from February to July, 2022. The survey used a two-stage stratified cluster sampling methodology. Clusters and households were selected in the first and second stages, respectively. In total, 15,127 ever married or partnered women aged 15-49 years, responded to the IPV questionnaire. The detailed survey design and methodology is provided in the KDHS 2002 report.[4]

The open-source and freely available data was downloaded as PDF files on June 03, 2025, for each of the 47 counties of Kenya provided as a 'Fact Sheet' based on the KDHS 2022, from the Kenya National Bureau of Statistics website.[5] These county fact sheets provide key findings from the KDHS 2022 including two metrics on IPV, i.e. "Women age 15-49 who have ever been married or had an intimate partner and have ever experienced physical, sexual, or psychological/emotional violence committed by their most recent husband/partner (%)" and "Women age 15-49 who have ever been married or had an intimate partner and have experienced physical, sexual, or psychological/emotional violence committed by any husband/partner in the last 12 months (%)".

Data was analysed from June 03-11, 2025. Percentages of these two IPV metrics by county were scrapped from the PDF files, and an Excel file was created, which was joined with the GIS shapefile of Kenya's counties, downloaded from the DHS website.[6] Two choropleth maps showing percentages of each metric, using quantile classification method with five classes, were created. Quantile method splits the data into specified number of classes, e.g. 5, by ensuring that each class has an equal number of data points.

Moran's I,[7] a univariate global measure of spatial autocorrelation was assessed for both metrics, which quantifies the degree to which a given metric is either similarly clustered or dispersed across a geographical area, e.g. Kenya. It assesses whether neighbouring geographical units, e.g. counties, have a spatial pattern that is either similar, dissimilar, or random, i.e. has positive, negative, or no spatial autocorrelation, respectively. Hence, for the entire study area, e.g. Kenya, the global Moran's I assess the overall level of spatial autocorrelation. The statistical significance of the distribution of Moran's I values under the null hypothesis of spatial randomness was determined by the permutation test – using 999 permutations – to obtain the pseudo *p*-values.

Next, local spatial autocorrelation statistic 'Local Indicators of Spatial Association' (LISA)[8] was used that measures the similarity/dissimilarity of a metric's value at a specific location/county relative to its values at the neighbouring counties. The LISA provides a localised, i.e. geographic subdivision, e.g. county level measure of spatial autocorrelation by identifying clusters of similar (high-high or low-low) or spatial outliers (high-low or low-high) at the individual spatial units/counties.

Prior to Moran's I and LISA analyses, a spatial weights/proximity matrix was created using first order queen contiguity weights, which quantifies how locations, e.g. counties are connected, i.e. are neighbours, determining which counties influence each other in the autocorrelation analysis by determining patterns in spatial units. Since the two counties of Turkana and Marsabit in the north-western part of Kenya are divided by the Turkana River (shown as empty area in the maps), they were manually connected in the spatial proximity weights matrix to correctly reflect their neighbourhood status.

Descriptive analysis was done in Excel, while choropleth maps were created using ArcMap 10.8.1, while Moran's I and LISA analysis were done in GeoDa 1.20.0.36.

Results

Based on the fact sheets, the lifetime prevalence of IPV in ever-partnered Kenyan women aged 15-49, inflicted by their current or most recent husband/intimate partner was 40%, while IPV prevalence in the same demographic was 28% in the past 12-months.[5] The county-level lifetime IPV prevalence ranged from 14% in Mandera to 60% in Bungoma. Ten counties reported prevalence of 50% or greater (Bungoma, Busia, Embu, Homa Bay, Kirinyaga, Kisii, Migori, Murang'a, Samburu, and Tana River). Figure 1 shows the 47 counties of Kenya, and Figure 2 displays the map of ever/lifetime IPV prevalence by each country. Several north-eastern counties show low prevalence, while several western counties show high prevalence. The 12-month

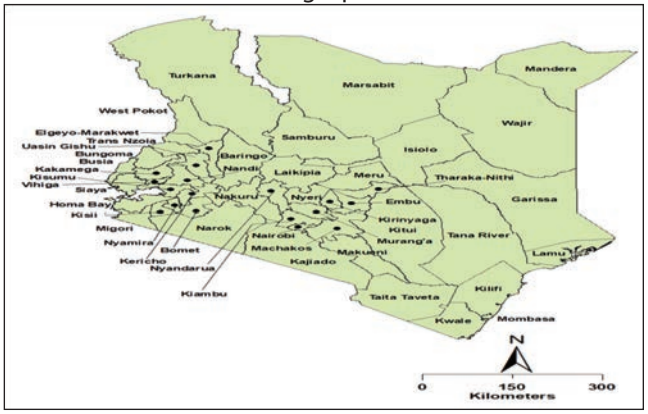

Figure-1: County-Level Administrative Divisions of Kenya (47 Total).

prevalence of IPV in ever-partnered Kenyan women aged 15-49, inflicted by their current or most recent husband or intimate partner ranged from 9% in Wajir to 48% in Bungoma and Embu counties. Figure 3 shows the map of IPV prevalence in the past 12 months by each county. Again, several north-eastern counties show low prevalence and western counties in general show high prevalence.

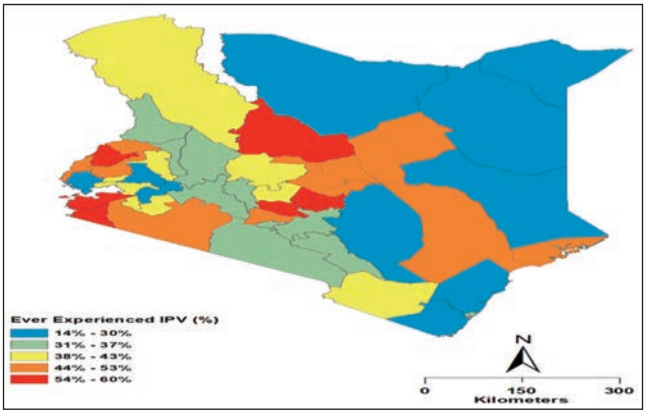

Figure-2: Geographic Variation in Lifetime Prevalence of Intimate Partner Violence (%) Among Women Across Kenyan Counties.

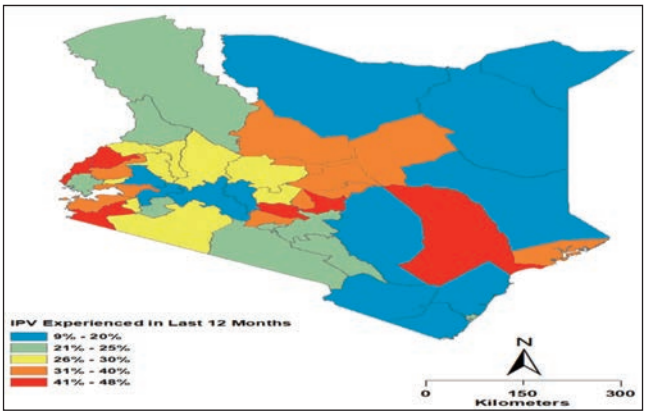

Figure-3: Geographic Variation in the Past 12-Month Prevalence of Intimate Partner Violence (%) Among Women Across Counties in Kenya.

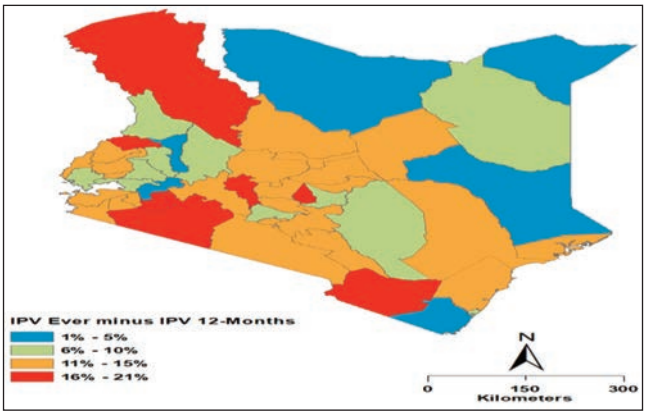

Figure-4: County-Level Difference Between Lifetime and Recent (Past 12-Month) IPV Prevalence (%) Among Women in Kenya.

Figure 4 displays the map of past 12-month IPV prevalence, subtracted from the lifetime/ever IPV prevalence by each country. In all counties, lifetime IPV prevalence was higher than past 12-month IPV prevalence. The largest difference by county between lifetime and past 12-month IPV prevalence was of 21 percentage points for Taita Taveta country, while the smallest difference was of one percentage point between Kwale and Marsabit counties.

The graphs showing results of global Moran's I and LISA are presented in Figures 5 to 7. Figure 5-A shows the Moran's I scatterplot depicting positive spatial autocorrelation for the lifetime IPV prevalence. Each county is represented by a point and the plot shows the relationship between the

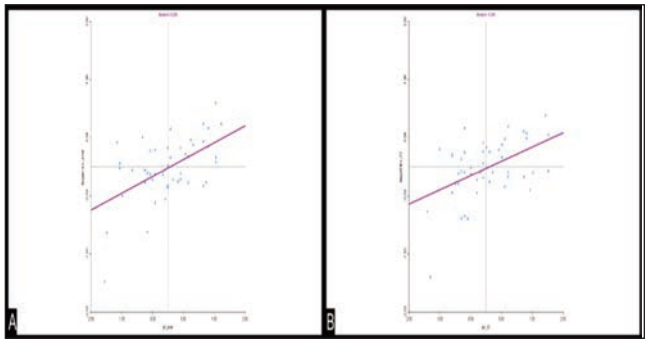

Figure-5: Results of Global Moran's I: (A) Lifetime Prevalence of Intimate Partner Violence (IPV), (B) Past 12-Month Prevalence of IPV.

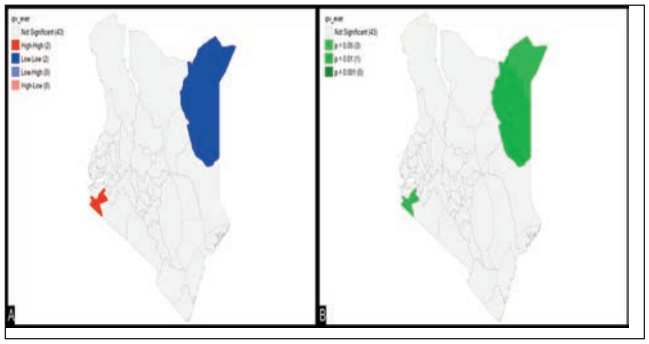

Figure-6: Lifetime prevalence of intimate partner violence: (A) LISA cluster map and (B) statistical significance map.

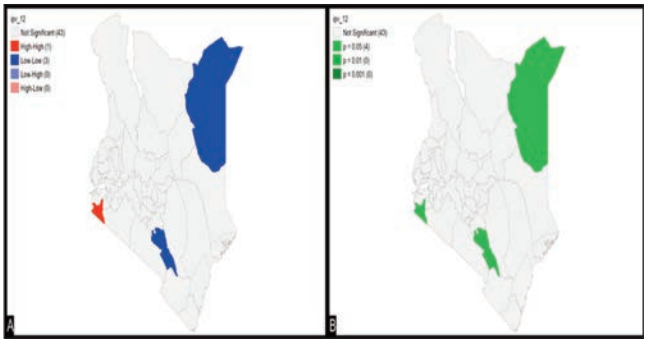

Figure-7: Past 12-month prevalence of intimate partner violence: (A) LISA cluster map and (B) statistical significance map.

IPV values at each county and the average value at neighbouring counties. The plot shows a positive trend along the diagonal with a Global Moran's I statistic of 0.289, indicating that counties with high lifetime IPV prevalence tend to be near other high prevalence counties and the counties with low prevalence clustering around other low prevalence counties. The pseudo p-value for the statistical significance of Moran's I test was 0.001. This result of the lifetime IPV prevalence was moderately positive autocorrelation/clustering. Figure 5-B shows the Moran's I scatterplot for the IPV prevalence in the past 12 months. The plot shows similar positive trend with the Moran's I statistic of 0.245. Together with the pseudo p-value of 0.004, these results indicate that the IPV in the past 12-months was statistically significant with moderate spatial autocorrelation.

Figure 6 shows the maps of LISA cluster and its statistical significance for the lifetime IPV prevalence. In Figure 6-A, two counties of Mandera and Wajir in the north-eastern part, show low-low clusters in blue colour, where lifetime IPV prevalence was consistently low relative to its neighbouring counties. Two counties of Migori and Kisii in the south-eastern part, show high-high clusters in red colour, where lifetime IPV prevalence was consistently high relative to the neighbouring counties. Figure 6-B shows the statistical significance map that confirms their statistical significance at the 0.0l level for Wajir county, for the remaining three at the <0.05 level. All other counties were noted to be not statistically significant.

Figure 7 shows the maps of LISA cluster and its statistical significance for the IPV prevalence in the past 12 month. In Figure 7-A, two counties of Mandera and Wajir in the north-eastern part, and the Makueni county in the southern part show low-low clusters in blue colour, where IPV prevalence in the past 12 months was consistently low relative to its neighbouring counties. While the Migori county in the south-eastern part, show high-high cluster in red colour, where IPV prevalence in the past 12 months was high relative to the neighbouring counties. Figure 7-B, shows the statistical significance map that confirms their statistical significance at the <0.05 level for all four counties, while the rest of the counties were noted to be not statistically significant.

Discussion

In this study, geography of intimate partner violence was examined across counties in Kenya, using the data from the most recent national and county-level representative survey conducted in 2022. This is the first study on the spatial analysis of IPV, in terms of lifetime and the past 12-month prevalence, perpetrated against women by their current or most recent husband or intimate partner in Kenya.

Results show a consistent pattern across all counties, where lifetime IPV prevalence exceeds past 12-month IPV prevalence, suggesting accumulation of IPV experiences over time, with relatively fewer instances of violence reported in the most recent period of past 12 months. However, this county-based disparity in two IPV prevalence metrics varied widely. These variations may also reflect differences in reporting behaviours by women, effectiveness of intervention at county level, or county-level socio-cultural factors influencing IPV persistence over time.

Both IPV metrics clearly showed geographic disparity suggesting that their spatial distribution is determined by different and distinct underlying processes that drive these county-based differences. The statistically significant values of Global Moran's I and LISA statistical values indicate that the spatial distribution of IPV is not random in Kenya but shows clustering. However, the preponderance of "Not Significant" counties for both metrics, suggests relatively stable IPV prevalence across most of the country, with only a few localised clusters driving the observed clustering. These observed patterns warrant further exploration to better understand the underlying socio-demographic, behavioural, and attitudinal factors of IPV influencing these county-based variations.

Comparison of lifetime and past 12-month IPV prevalence in terms of LISA maps show essentially similar spatial clustering patterns, suggesting a strong temporal persistence in IPV prevalence, where the counties experiencing high, low, and non-significant IPV rates over a lifetime continue to report about similarly high/low/non-significant rates in the past 12 months. This lack of notable shifts in clustering suggests that IPV prevalence is deeply entrenched in these counties. This relatively stable but very high IPV prevalence for both metrics in Kenya also reflects a serious public health and human rights problem.

The major strength of this study entails the use of Kenya Demographic and Health Survey-2022 data, which is the most recent and the only county-level representative survey data available on IPV. While the limitations involve: self-reported IPV information by the respondents; being limited to only women of 15-49 years age group; IPV perpetrated by the current or the most recent husband or intimate partner; and finally, IPV experienced by women in heterosexual intimate relationships only. Collectively, these limitations may lead to an underestimation of the true burden of both IPV metrics in Kenya. Finally, prevalence for both metrics was scrapped from the fact sheets that

provide metric values rounded to the nearest whole number, but it is unlikely that it would change the meaning of the findings.

Results highlight the need for developing targetted strategies and interventions to reduce and eventually eradicate IPV in Kenya. Health education and promotion campaigns targetting socio-cultural norms and practices that perpetuate the pernicious practice of IPV in the country are needed. Furthermore, these findings indicate the need for more nuanced spatial analysis in terms of correlates and determinants of the county-level disparities in Kenya. Future studies need to extend this analysis by using more advanced spatial analysis methods, like Geographically Weighted Regression, spatial Bayesian analysis, and spatial regression (e.g., Spatial Lag, Spatial Error models) with past-year IPV as the outcome and lifetime IPV (or lifetime-excluding-past-year) as a key covariate. This will help to extricate the intricacies driving both IPV metrics in Kenya at the county level.

Conclusion

The high burden of IPV in terms of lifetime and past 12-month prevalence in Kenya, coupled with wide county-level disparities in these two metrics, indicate the urgency of targetted interventions to eradicate the prevailing health problem and human rights violation. The clustering reported in this study can help in identifying priority counties to intervene with more urgency.

Disclaimer: None.

Conflict of interest: None.

Funding disclosure: None.

References

1. World Health Organization. Intimate partner violence. [Online] [Cited 2025 March 3]. Available from: URL:https://apps.who.int/violence-info/intimate-partner-violence/
2. Macrotrends. Kenya population (1950–2025) [Internet] [Cited 2025 June 2]. Available from: URL:https://www.macrotrends.net/global-metrics/countries/ken/kenya/population
3. The DHS Program [Online] [Cited 2025 June 3]. Available from: URL: https://dhsprogram.com/
4. Kenya National Bureau of Statistics. Kenya demographic and health survey 2022 [Internet]. Available from: https://www.knbs.or.ke/reports/kdhs-2022/ (accessed 2025 Jun 3)
5. Kenya National Bureau of Statistics. Kenya demographic and health survey 2022 – KDHS country fact sheets [Online] [Cited 2025 June 3]. Available from: URL: https://www.knbs.or.ke/reports/kdhs-2022/
6. Spatial Data Repository – The DHS Program. [Online] [Cited 2024 November 14]. Available from: URL: https://spatialdata.dhsprogram.com/home/
7. Moran PA. Notes on continuous stochastic phenomena. Biometrika 1950;37:17-23
8. Anselin L. Local indicators of spatial association—LISA. Geogr Anal 1995;27:93-115. doi:10.1111/j.1538-4632.1995.tb00338.x

Author Contribution:
MAS: Concept, literature review, writeup, data analysis and final revision.
SMM: Literature review, writeup, data analysis and final review.