

When home became dangerous: tracking the hidden crisis of domestic violence through Paraguay's pandemic years

Cuando el hogar se volvió peligroso: rastreando la crisis oculta de la violencia doméstica durante los años de la pandemia en Paraguay

Andreas Schneider 

¹Investigador independiente. Asunción, Paraguay

ABSTRACT

This study assessed the impact of Paraguay's COVID-19 lockdowns on domestic violence in five major cities using an interrupted time series design and ARIMA models on weekly data (2016–2021) to predict counterfactual outcomes. Analysis of 1,565 cases from prosecutor records showed that, contrary to expectations, reported domestic violence generally declined during lockdown periods. Significant decreases were observed in three of the five cities, with Asunción showing the largest reduction. Although reported incidents increased by an average of 19% annually between 2016 and 2021, the post-pandemic growth rate (15.58%) remained below the pre-pandemic rate (22.04%). Higher temperatures were consistently associated with increased reporting, while public holidays corresponded to lower reporting levels. After lockdowns ended, domestic violence reports resumed positive growth trends, albeit at lower levels than before the pandemic. Overall, the study found no evidence of increased domestic violence during lockdowns in Paraguay. The findings suggest that lockdown measures may have limited victims' access to reporting mechanisms and support services, highlighting the need to consider underreporting when interpreting crime data during crises.

Keywords: domestic violence; lockdown; Paraguay; interrupted time series, counterfactual analysis

RESUMEN

Este estudio evaluó el impacto de los confinamientos por COVID-19 en Paraguay sobre la violencia doméstica en cinco ciudades principales mediante un diseño de series temporales interrumpidas y modelos ARIMA aplicados a datos semanales (2016–2021) para estimar resultados contrafactuales. El análisis de 1.565 casos del Ministerio Público mostró que, contrariamente a lo esperado, las denuncias de violencia doméstica disminuyeron durante los períodos de confinamiento. Se observaron reducciones significativas en tres de las cinco ciudades, siendo Asunción la que registró la mayor disminución. Aunque las denuncias aumentaron en promedio un 19 % anual entre 2016 y 2021, la tasa de crecimiento posterior a la pandemia (15,58 %) se mantuvo por debajo de la observada antes de la pandemia (22,04 %). Las temperaturas más elevadas se asociaron de manera consistente con un mayor número de denuncias, mientras que los feriados se relacionaron con menores niveles de reporte. Las denuncias retomaron una tendencia de crecimiento positiva después de las restricciones, aunque inferior a la observada antes de la pandemia. En conjunto, el estudio no encontró evidencia de un aumento de la violencia doméstica durante los confinamientos en Paraguay y sugiere considerar el subregistro al interpretar datos delictivos en contextos de crisis.

Palabras clave: violencia domestica; cuarentena; Paraguay; series temporales interrumpidas, análisis contrafactual

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Email: rafaelriquelmeb@outlook.com

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Autor correspondiente:

Andreas Schneider
E-mail: me-andy@gmx.de

INTRODUCTION

During the COVID-19 pandemic, which ended officially on May 05, 2023 (World Health Organization, 2023) restrictions on the movement of citizens were imposed in almost all countries of the world to control the spread of the SARS-CoV-2 virus. Paraguay was no exception. The emergence of the coronavirus with the first confirmed case on March 7, 2020 (Mazzoleni Insfrán, 2021) was more than a challenge for the healthcare system and the Paraguayan population. Even in normal times, medical care often depends on each patient's economic means, despite social security.

Nationwide public policies generally pursue a greater public good, such as saving people's lives. However, these measures can also have unintended negative effects. One of the negative pandemic impacts was the fear that perpetrators and victims of domestic violence would be locked up together, exposing women to increased violence (John et al., 2020). This fear appears rational, since a pandemic and social distancing bring new stresses such as health risk, closing of schools and businesses, loss of income among men due to unemployment (Bhalotra et al., 2026), and financial insecurity, which are factors that tend to be associated with domestic violence (Béland et al., 2021; Bradbury-Jones & Isham, 2020; Piquero et al., 2021). In addition, there are also psychological and health care effects such as post-traumatic stress symptoms, confusion, and anger triggered by infection fears, frustration, boredom, cardiovascular disease or type 2 diabetes (Brooks et al., 2020; Chandan et al., 2020). Some of these consequences may have long-lasting effects.

Gibbs et al. (2020, p. 2) argue that intimate partner violence is rooted in a complex interplay of structural and cultural factors, including patriarchal privilege, which reinforces male dominance and control over women; the normalization of violence within interpersonal relationships, which can lead individuals to view abuse as acceptable or inevitable; and poverty, which exacerbates stress and limits options for those seeking to escape abusive situations. These factors might reinforce one another, creating an environment in which intimate partner violence can persist and even escalate.

In a systematic review of 18 studies, mostly U.S. based cities, Piquero et al. (2021) found that reports of domestic violence significantly increased. They concluded that domestic violence increased in response to lockdown orders. Mohler et al. (2020) came to a similar conclusion when they investigated cases of domestic violence in the cities of Los Angeles and Indianapolis. However, Campedelli et al. (2021) found no significant effect for intimate partner violence in Los Angeles after the implementation of the lockdown. Halford et al. (2020) found a 45% decrease in domestic abuse cases one week after the first lockdown on March 23, in one U.K. police force area. However, the authors think that the decline might be due to a reduction in reporting and recording.

In a more regional context Perez-Vincent et al. (Perez-Vincent and Carreras, 2022) analyzed different reporting channels on domestic violence in six Latin America countries (except Paraguay). They found that specialized hotline calls increased during the lockdown, while others, such as emergency calls or police complaints decreased. Studies on domestic violence often found increasing rates, especially when service calls rather than crime records were examined (Hoeboer et al., 2024).

Routine activity theory is a natural candidate for explaining changes in crime levels (Cohen & Felson, 1979). The theory suggests that crime is more likely to occur when potential offenders converge in space and time with suitable criminal targets in the absence of capable guardians. However, it is also likely that the coronavirus and the public policies adopted have increased

some types of crime or that the pandemic has spawned new criminals, which could be better explained by the general strain theory (Agnew, 1992, 2001). Agnew (1992) describes three mayor types of strain: “(1) strain as the actual or anticipated failure to achieve positively valued goals, (2) strain as the actual or anticipated removal of positively valued stimuli, and (3) strain as the actual or anticipated presentation of negatively valued stimuli” (p. 50). Following both theories, the author would expect increasing incidents of domestic violence.

This article aims to provide a pending assessment of the impact of the coronavirus on criminal charges of domestic violence by examining time series from the five largest cities (by population) in Paraguay between 2016 and 2021. In doing so, the analysis contributes Paraguayan data to the pandemic literature on domestic violence, as well as on crime theories. It also contributes to studies on gender inequality, of which domestic violence is arguably one of the most extreme expressions.

METHODS

The global pandemic gave researchers worldwide the opportunity to analyze a quasi-natural experiment. In this paper, the author used an interrupted time series design with ARIMA models for each city to analyze the longitudinal effects of the interventions caused by the pandemic. That way the author took advantage of the time series nature and account for pre-intervention trends (Kontopantelis et al., 2015; Wagner et al., 2002). Data from the five largest cities in Paraguay was used: the capital Asuncion (462.241 inhabitants), Ciudad del Este (325.819 inhabitants), Luque (259.705 inhabitants), Capiatá (236.999 inhabitants) and San Lorenzo (225.395 inhabitants) (Instituto Nacional de Estadística, 2023). These cities were selected to maximize representativeness. The weekly data on domestic violence for the cities under consideration came from official records from the public prosecutor's office via a freedom of information request. Data were collected from January 2016 until December 2021 with week starting on Mondays. Temperature data were collected from Visual Crossing (2024). This study also made use of the Residential mobility data from the Google mobility reports during the pandemic.¹ The paper used Article 229 of the Paraguayan Penal Code as a definition of domestic violence, which is comparable to most international definitions.² Paraguay implemented a partial lockdown with social distancing, school closures, and suspension of public events between March 10, and March 19, 2020. This partial lockdown was transformed into a total lockdown, with the confirmation of the first death due to the new virus, on March 20th. The total lockdown lasted until May 3, 2020. The effects of stay-at-home restrictions were modeled as a step function, whereby 0 represents the time before the period of stay-at-home restrictions and 1 otherwise. Since Paraguay implemented a pre-lockdown, a dichotomous variable was coded to capture an immediate pulse effect. In addition, the same procedure was used to examine the first week immediately after the end of the lockdown to capture possible time lags in reporting domestic violence incidents. To capture the post-intervention trend, a binary variable was coded that took the value 1 at the start of the intervention and increased by 1 until the length of the series, and 0 otherwise. In addition, two more covariates were included to estimate the dependent variable which have not been affected by the intervention: Temperature and holidays. The relationship between violent crimes, temperature and temporal

¹ <https://www.google.com/covid19/mobility/>

² This article and its amendments (Law 6394/22) reflect a comprehensive definition of domestic violence. The article covers both physical and psychological violence against a spouse, ex-spouse, concubine or sentimental partner. The article also includes relatives up to the fourth degree, children, adolescents, elderly or disabled person who live in the same household. The prison sentence can be between one and six years.

variables are well known (Cohn, 1993; Field, 1992). Temperature data, is represented as the weekly average in degrees Celsius, and holiday is a dummy variable which takes the value 1 if a week had a national holiday, and 0 otherwise. ARIMA models require to be stationary. To accomplish this, all time series were differenced, i.e., $Y_t = Y_t - Y_{t-1}$. Visual inspection of the correlogram and a Ljung-Box test was used to make sure that the residuals are independent. Finally, the fitted ARIMA models were used to predict counterfactuals if the pandemic had not been occurred. All analyses were performed using the statistical software R with version 4.5.1 (R Core Team, 2024) and the scientific and technical publishing system Quarto (Allaire et al., 2024), and Extensions (Schneider, 2024b). Table 1 provides a summary for the variables used in the analysis.

Table 1. *Summary statistics of weekly variables used*

Descriptive summary statistics (2016 - 2021)					
Variable	Asuncion N = 313 [†]	Capiata N = 313 [†]	Ciudad del Este N = 313 [†]	Luque N = 313 [†]	San Lorenzo N = 313 [†]
Domestic Viol.	57 (22), (18 112)	12 (8), (1 41)	33 (11), (7 61)	23 (11), (3 62)	28 (10), (7 56)
Average Temp.	24 (4), (11 32)	24 (4), (11 32)	24 (4), (11 32)	24 (4), (11 32)	24 (4), (11 32)
Holidays	59 (19%)	59 (19%)	59 (19%)	59 (19%)	59 (19%)
Year	2,981 (851), (1,729 4,271)	628 (351), (299 1,287)	1,717 (353), (1,165 2,146)	1,191 (424), (515 1,807)	1,480 (290), (1,002 1,884)

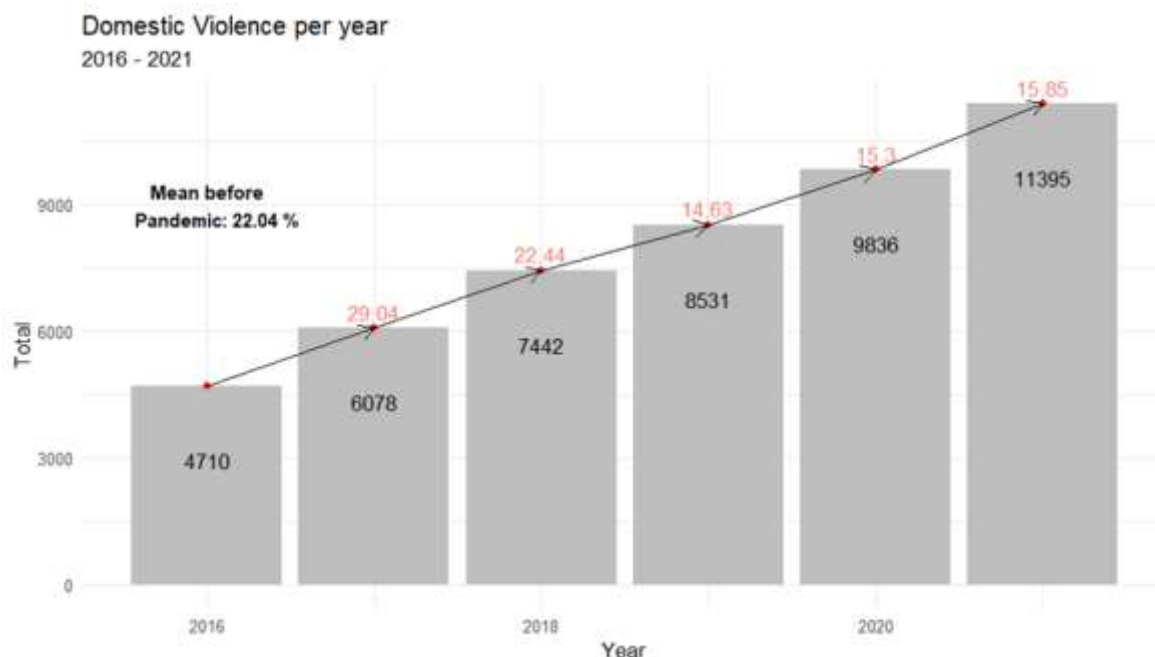
[†] Mean (SD), (Min Max); n (%)

Data: Weekly data from Public Ministry

Note. Own elaboration with data from the Public Ministry (2026)

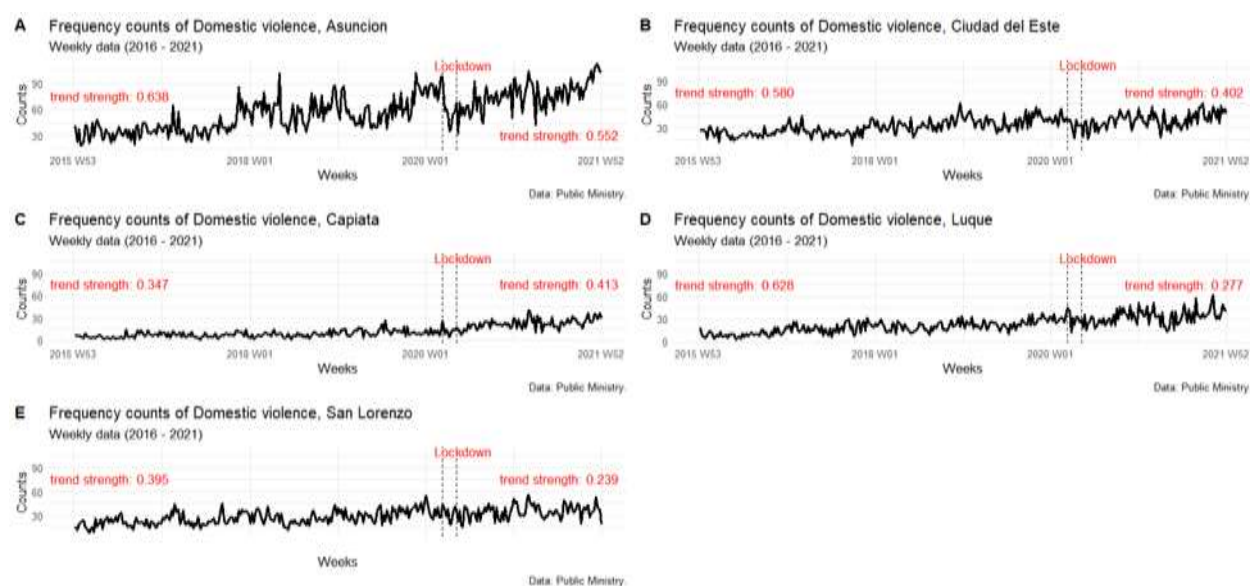
RESULTS

This section presents the results of the policy intervention starting with the partial lockdown on March 10th, followed by the stricter lockdown on March 20th, and by one week after the lockdown. First, I will start with the more general descriptive results before proceeding with the analysis of the individual cities. Figure 1 shows the evolution of domestic violence since 2016. The cumulative reported cases for the five cities under consideration increased year by year. However, the average post-pandemic value of 15.58% is far below the pre-pandemic value of 22.04%.

Figure 1. *Evolution of domestic violence over time (absolute and %-change)*

Note. Own elaboration with data from the Public Ministry. Values in red are %-changes (2026)

The following Figure 2 shows reported domestic violence for each city with their respective pre- and post-pandemic trend strength. All cities show an increasing trend up to 2019, more pronounced in some, such as Asuncion and Luque (Figure 2, A, D), and less pronounced in others, such as Capiata and San Lorenzo (Figure 2, C, E). Post-pandemic trends show mixed results with Capiata standing out (Figure 2, C) as being the only city to show a higher trend level in the post-pandemic than pre-pandemic. All other cities show a trend strength below pre-pandemic levels with a more pronounced change in Luque (Figure 2, D). However, all trends are positive, which indicates non-permanent benefits of (if any) previous decreases of domestic violence. Table 2 presents the model results, including model specification, accuracy measure, and statistical autocorrelation test for each city.

Figure 2. *Weekly domestic crimes in the five largest cities in Paraguay between 2016 and 2021*

Note. Own elaboration with raw data from the Public Ministry. The area between the two dashed lines indicates the lockdown period (2026)

Asuncion

The public policy intervention impacted most in Asuncion. The week of the partial lockdown shows a non-significant increase. The more stringent lockdown, however, shows a significant decline in reported cases. This decline is still significant one week after the lockdown was lifted, however, slightly increasing week after week. Weekly average temperature significantly increases domestic violence by one case per week, on average. Weeks with a public holiday are also significant and indicate a reduction of reported domestic violence.

Ciudad del Este

In the second largest city, Ciudad del Este, about 320 kilometers from Asuncion, neither the partial lockdown nor the stricter measures show any significant results. The week after the stricter lockdown shows a significant reduction of 7 reported cases. As in Asuncion, an increase in the weekly average temperature is indicative of an increase in domestic violence cases. This increase is statistically significant. Holidays in a week are indicative of a significant decrease of about two cases per week.

Luque

The results for the city of Luque show a significant increase during the partial lockdown, and an immediate and significant decrease during the total lockdown of almost the same magnitude. Luque also shows a significant increasing trend over time, however, small in magnitude. The average weekly temperature is significant and positive, indicating an increase in reported cases.

Capiata

Concerning the city of Capiata, almost all variables of interest are significant with the exception of week with holiday. The partial lockdown shows a significant increase of reported cases, followed by a significant decrease of the same magnitude during the more stringent measures. In the week following the end of the lockdown the results show a significant increase of five reported cases with a slow but significant increasing trend. An increase in weekly, average temperature is indicative for more reported domestic violence, however, small in magnitude but significant.

San Lorenzo

Although the signs point in the same direction as the results of the other cities considered, the public policies implemented by the Paraguayan government to reduce the spread of the virus have not had a significant impact on domestic violence. However, an increase of the average weekly temperature is significant and indicates an increase in reported cases of domestic violence. Results for the city of San Lorenzo may indicate non-compliance of stay-at-home orders.

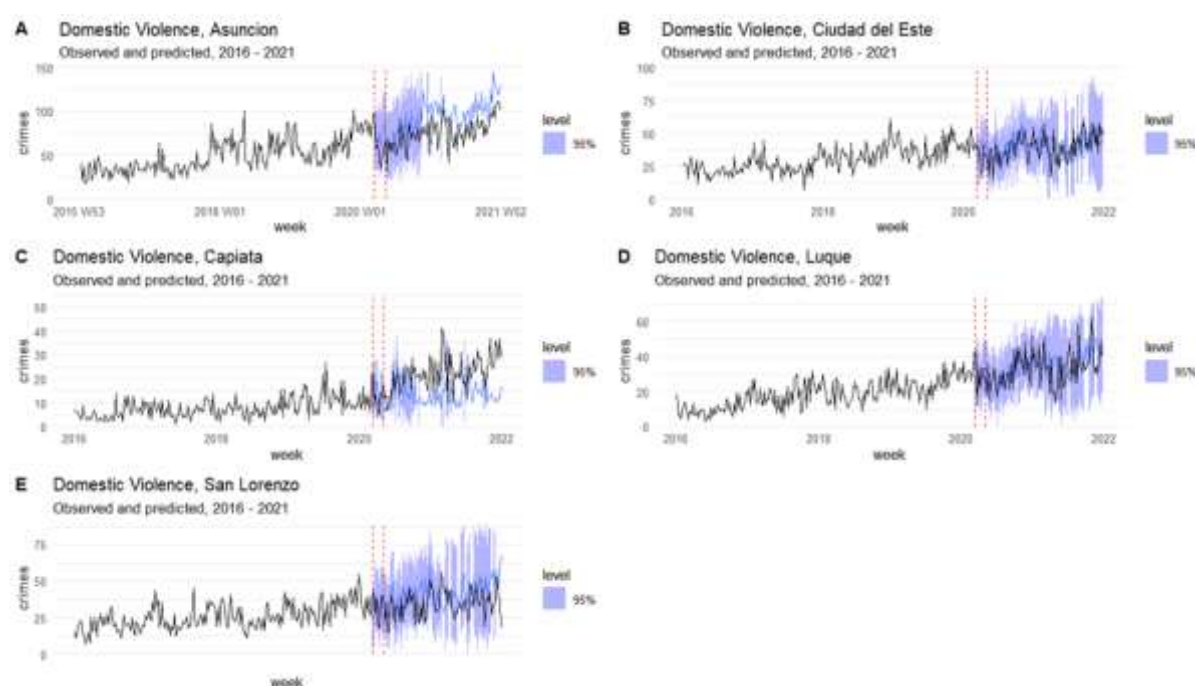
Table 2. Summary table of ARIMA model results

Model results with ARIMA specification for all cities									
City	Model	MASE	LJ-Box	Pulse	Step	Step2	Ramp	Avg_temp	Holiday
Asuncion	(2,1,1)(0,1,0)[52]	.556	.772	7.50	-36.70***	-19.10**	.15	1.28***	-3.84**
Ciudad del Este	(1,1,2)(0,1,0)[52]	.694	.860	-8.35	-1.30	-7.30**	.059	.80***	-2.39**
Capiata	(0,1,3)(0,1,0)[52]	.720	.730	14.10**	-14.40**	5.20**	.14***	.20***	-.37
Luque	(1,1,3)(0,1,0)[52]	.708	.995	17.00**	-17.50**	-.87	.13*	.59***	-.29
San Lorenzo	(2,1,1)(0,1,0)[52]	.774	.380	7.92	-9.80	-.60	.03	.70***	.16

Own elaboration with data from the Public Ministry. MASE = Mean absolute scaled error; LJ-Box = Ljung-Box test (p-values).

signif. p-values: *** < .001, ** < .05, * < .1.

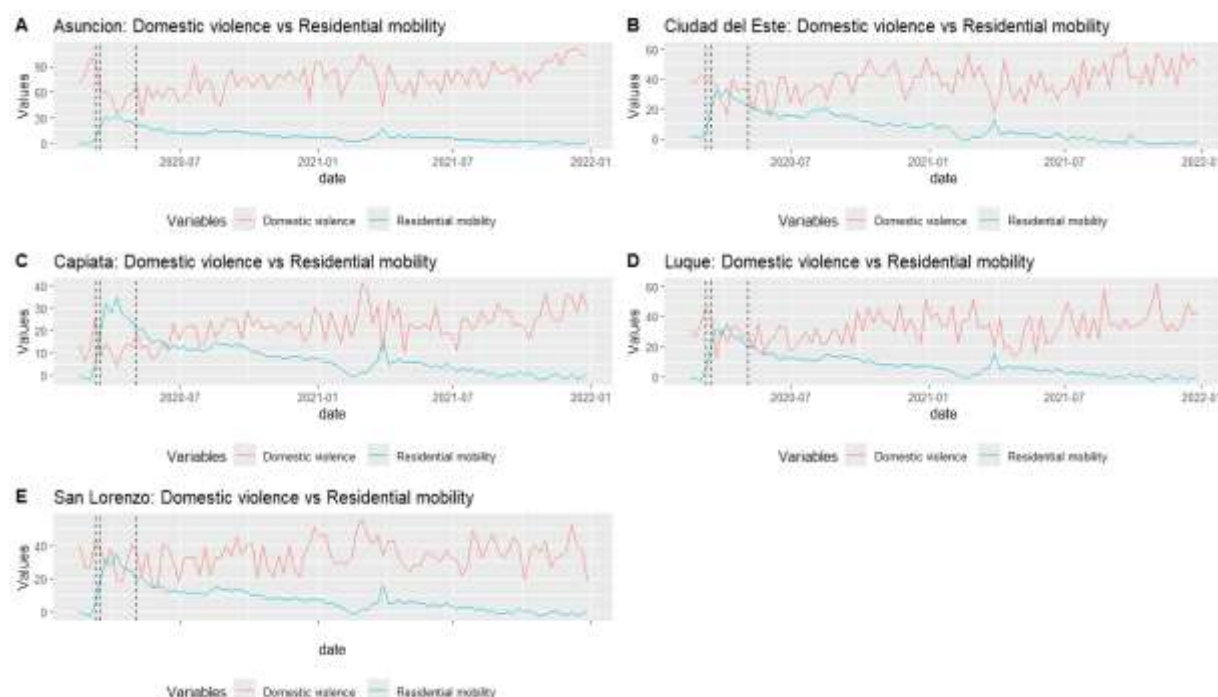
Note. Model coefficients for AR() and MA() terms are not shown. Own elaboration (2026)

Figure 3. Counterfactual plots

Note. Observed counts (black line) and predictions with 95% CI. Own elaboration (2026).

The counterfactual plots for each city (Figure 3) indicate what would have been the evolution of domestic violence if the pandemic would not have been occurred. In general, results are mixed and each city depicts a different pattern. While domestic violence in Asuncion has recorded a clear decrease, indicated by the black line, domestic violence in Capiata shows the opposite pattern. The results do not change when the frequency changed to monthly data.

The following Figure 4 shows visual evidence, in line with Berniell et al. (2021), that reports of domestic violence are decreasing, while potential victims and perpetrators are spending more time at home, in particular in the first half of the total lockdown. This indicates that potential victims may not have had the opportunity to seek help unnoticed, contributing this way to underreporting of official case numbers. The reason why reported cases, in general, increase in the second half of the quarantine might be that the intensity of compliance with stay-at-home orders has decreased, which gave victims the opportunity to seek help and present official complaints.

Figure 4. *Domestic violence vs Residential mobility.*

Note. Own elaboration (2026). The area between the first two dashed lines indicates the pre-lockdown period. The area between the second and third dashed lines indicates the lockdown.

DISCUSSION

The nationwide public policy of stay-at-home orders to reduce the spread of the coronavirus showed a clear pattern during the lockdown on the impact on domestic violence crime reports. The impact was demonstrated with data from the five largest cities in Paraguay. Prior to the pandemic, domestic violence incidents in Paraguay's major cities demonstrated consistent upward trajectories, with reported cases increasing, on average, 19% annually between 2016 and 2021. Cities such as Asunción, Ciudad del Este, and Luque exhibited particularly pronounced pre-pandemic momentum in reported incidents.

Contrary to widespread expectations of increased domestic violence during lockdowns, statistical analysis revealed a counterintuitive pattern: all five cities showed negative coefficients for domestic violence reporting during the lockdown period, indicating a decrease in officially reported cases. This reduction was statistically significant in three of the five cities examined. Notably, this effect persisted for one week following the end of lockdown measures in all cities except Capiatá. All models showed a positive trend in the post-pandemic period, two were statistically significant. This pattern is likely due to underreporting.

The post-pandemic period revealed a return to positive reporting trends across all cities, though at levels below pre-pandemic momentum. Two cities showed statistically significant increases in this recovery phase. This pattern indicates a gradual adjustment process with a substantial temporal lag, which, if left unattended, can lead to significant social problems.

Temperature emerged as a highly significant variable across all model specifications. It is known that higher temperatures cause people to spend more time outdoors. Following the routine activity theory, this might lead to more criminal behavior due to more opportunities. The restricted access to alcohol during lockdowns may have contributed to reduced incident rates (Chalfin et al., 2021), as alcohol and drug consumption is strongly associated with lowered inhibition thresholds for violent behavior. This point can be proven with a time series

decomposition. Peaks in domestic violence occur in most cities in the warmest months (December and January).

Most studies infer increases in domestic violence due to increases in calls to hotlines (Bhalotra et al., 2026; Mohler et al., 2020). While victims may hesitate to file official complaints due to fear of retaliation when confined with perpetrators, hotline calls—which typically trigger police responses—may not accurately represent actual incident rates. This discrepancy may reflect fundamental differences between formal reporting mechanisms. It could also be that this increase in calls was not all directly related to domestic violence or a lower tolerance for domestic violence may have resulted in more calls to hotlines (Perez-Vincent & Carreras, 2022). Several contextual factors specific to Paraguay may explain the reporting patterns observed. The country's substantial informal economy and high poverty rates likely influenced both domestic violence occurrence and reporting behaviors. Additionally, reduced alcohol access during quarantine may have contributed to lower incident rates. The initial pandemic phase may have temporarily strengthened family bonds as households collaborated to navigate unprecedented global uncertainty (Barton et al., 2023).

Three findings merit particular attention. First, Capiatá was the only city to maintain higher post-pandemic momentum than pre-pandemic levels, suggesting that lockdown measures had minimal impact on its underlying upward trend. Second, Luque demonstrated a remarkable trend level shift, with momentum decreasing from 0.628 pre-pandemic to 0.277 post-pandemic. Third, since social distancing and stay-at-home orders are associated with social and economic costs (Reluga, 2010), it is likely that the willingness to comply with such measures has decreased. This is especially true for people who cover their basic living needs through their daily earnings or working in the informal sector (Bargain & Aminjonov, 2021; Schneider, 2024). As shown in Figure 4, the comparison of domestic violence incidents and residential mobility during the lockdown provides indicative evidence of a possible relaxation of health measures. This differential compliance may have created reporting opportunities that were previously unavailable.

This analysis suggests that lockdown measures did not directly increase domestic violence levels in the immediate pandemic period, despite increased cohabitation between potential victims and perpetrators. However, the deteriorating social and economic conditions in many Paraguayan households likely exacerbated existing vulnerabilities, particularly in homes with histories of domestic violence. These findings align with research by Morgan & Boxlay (2020) and Campedelli et al. (2021).

Even though this study analyzed a longer period into the pandemic, the author acknowledges that the study has limitations. The study only extends to December 2021, providing insufficient time to observe longer-term effects. Domestic violence impacts from economic stress, social isolation, and trauma may manifest months or even years later. A look at the time series (Figure 2) might suggest this. Focusing only on the five largest cities excludes rural areas where domestic violence patterns, reporting behaviors, and pandemic impacts may differ significantly. Rural victims often face additional barriers to reporting. In addition, results from Paraguay's five largest cities may not generalize to other Latin American countries. However, the limitations of the study do not undermine its impact, but rather point to the importance of public policy analysis on a local level.

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