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PUBLIC EXPENDITURE AND INTENTIONAL VIOLENT DEATHS: AN ANALYSIS OF BRAZILIAN STATES BETWEEN 2011 AND 2023

DESPESAS PÚBLICAS E MORTES VIOLENTAS INTENCIONAIS: UMA ANÁLISE SOBRE ESTADOS BRASILEIROS ENTRE OS ANOS DE 2011 E 2023

GASTO PÚBLICO Y MUERTES VIOLENTAS INTENCIONALES: UN ANÁLISIS DE LOS ESTADOS BRASILEÑOS ENTRE 2011 Y 2023

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ABSTRACT

This article proposes to analyze the budgetary impacts of public spending on social assistance, sanitation, and public safety in Brazilian states in relation to intentional violent deaths that occurred in their respective territories between 2011 and 2023. The theoretical framework for the research was essentially technical texts addressing the public budget and some of its aspects, such as public expenditure. The methodology used was quantitative, and secondary data were collected in the research from the Brazilian Public Security Forum and transparency portals of Brazilian states. Increasing public spending on social assistance can contribute to reducing intentional violent deaths in Brazilian states.

Keywords: Expenditure. Violent Deaths. Public Safety.

RESUMO

O presente artigo apresentou a proposta de analisar impactos orçamentários das despesas públicas em assistência social, saneamento e segurança pública em estados brasileiros em relação às mortes violentas intencionais ocorridas nos seus respectivos territórios no período entre 2011 e 2023. O referencial teórico para a pesquisa essencialmente foram textos técnicos que tratam sobre o orçamento público e algumas de suas vertentes, como a despesa pública. A metodologia empregada foi de caráter quantitativo e os dados secundários coletados na pesquisa no Fórum Brasileiro de Segurança Pública e nos portais da transparência de estados da federação. O incremento em despesas públicas na área de assistência social pode contribuir para a redução das mortes violentas intencionais em estados brasileiros.

Palavras-chave: Despesas. Mortes Violentas. Segurança Pública.

RESUMEN

Este artículo propone analizar el impacto presupuestario del gasto público en asistencia social, saneamiento y seguridad pública en los estados brasileños en relación con las muertes violentas intencionales ocurridas en sus respectivos territorios entre 2011 y 2023. El marco teórico de la investigación se basó principalmente en textos técnicos que abordan

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el presupuesto público y algunos de sus aspectos, como el gasto público. La metodología empleada fue cuantitativa, y se recopilaron datos secundarios en la investigación del Foro Brasileño de Seguridad Pública y los portales de transparencia de los estados brasileños. El aumento del gasto público en asistencia social puede contribuir a la reducción de las muertes violentas intencionales en los estados brasileños.

Palabras clave: Gasto. Muertes Violentas. Seguridad Pública.

1 INTRODUCTION

The public budget can be considered one of the main instruments of a government, through which public policies aimed at the whole of society are embodied (Abreu and Câmara, 2015). From its conception, decision-makers establish priorities, define the way in which resources will be allocated according to diversity and social needs, which guides budgetary decisions on the main demands of a democratic order exemplified by institutes such as representation and accountability (Loureiro and Abrúcio, 2004).

From another perspective, the annual budget is characterized as a short-term instrument that systematizes medium-term sectoral and regional programs that comply with the framework set by the national plans in which the objectives and goals are defined at the macro level, in addition to the strategic projects and basic policies (Giacomoni, 2002). There are different sources that endorse the legal provision on the public budget in Brazil, and we can preliminarily cite the Federal Constitution of 1988, which provides for the Multi-Year Plan - PPA, the Budget Guidelines Law - LDO and the Annual Budget Law - LOA (Brasil, 2016).

Law 4320/1964, on the other hand, outlines the preparation and control of the budget, as well as establishes some important principles, such as annuality and universality (Brasil, 1964). In this context, another relevant norm is the Fiscal Responsibility Law (LRF), which, among some references, addresses the Budget Programming Decree (DPO), responsible for establishing criteria and limitations for the approval of budgetary and financial quotas directed to the bodies of each state of the federation (Sacramento, 2005).

Public finances, in general, express some directions on a government's policies. As a rule, each federated entity has its own autonomous form of management over its resources, which includes an estimate of revenue collection in a certain period, as well as the allocation of resources for certain expenses, as provided for in the Magna Carta (Brasil, 2016).

The compatibility between the efficient execution of public expenditures and the production of results resulting from it are some of the guidelines that permeate the public policies implemented in each segment (Peres *et al.*, 2024). It should be noted that public expenditures, such as those directed to social assistance, sanitation and public security, have been presented by some Brazilian states through transparency portals. Some information is made available, such as revenues and expenses during each fiscal year (Brasil, 1964; CN, 2024).

On this basis, in order to seek a broader understanding of the public expenditures made in the strands previously listed, an analysis limited to the states of Amazonas (AM),

Ceará (CE), Minas Gerais (MG), Santa Catarina (SC) and São Paulo (SP) was proposed. The phenomenology of revenue collection and the execution of expenses of the indicated federated entities have been heterogeneous over the years. At this point, a gap was perceived for the study of some relationships between budget management and the evolution of violence, specifically in events resulting in death.

Based on the premises indicated, among the numerous demands of Brazilian society, the theme related to violent deaths stands out, which, according to Miranda and Pita (2011) is linked to the public security system. In the same sense, the theme in question is related to social assistance, according to Costa *et al.* (2017), in the sense that policies of the indicated nature can contribute to the prevention of such events. In addition to the aforementioned aspects, violence is also a factor that may be linked to the precariousness of basic sanitation, according to Figueiredo *et al.* (2024).

Another concept considers intentional violent deaths (MVIs) corresponding to the sum of victims of intentional homicide, robbery, bodily injury followed by death, and deaths by police intervention on or off duty (FBSP, 2024). The problem in question can be a thermometer on the conduct of public spending, especially with regard to some state actions (Ferreira *et al.*, 2018).

Based on the chronology so far, which may have impacts on budgetary, financial, public security, or other management segments in Brazilian states, the following research problem is proposed: to what extent did spending on social assistance, sanitation, and public security impact intentional violent deaths in Brazilian states between 2011 and 2023? The objective of this article is to analyze the budgetary impacts of expenditures on social assistance, sanitation, and public security in Brazilian states on intentional violent deaths that occurred in their respective territories in the period of 2011 and 2023.

From this perspective, it is intended to present some theoretical bases on the literature on the subject. The methodology will follow, specifying the paths taken to search for the data used in the research, and the form of treatment used, which will be followed by the analysis and discussion of the results. Therefore, the final considerations and references conclude the anatomy of this study.

2 THEORETICAL FRAMEWORK

The Multi-Year Plan (PPA) presents itself as a relevant planning instrument, brought by the Federal Constitution of 1988, which is developed to the present day, so that the government guidelines for action are defined. The constitutional text brings together the national, regional and sectoral plans and programs contained in the Magna Carta, which will have their wording harmonized with the multi-year plan upon consideration by the National Congress (Giacomini, 2002).

There is an order of positive norms and guidelines so that the PPA can be supported by current legal bases. The PPA brings the function of "planning" in a very present way, in different areas, such as public security. Through this instrument, it is also possible to have a degree of transparency in the actions developed by a government (Carneiro *et al.*, 2023).

There is a need for such a device to be able to provide proposals and activities aimed at mitigating or solving emerging social demands, although there are numerous restrictions to serve as a basis for better direction. In this sense, decision-making, according to the rational model, is seen as an act oriented to objectives and a behavior of choice regulated by norms and routines, so that the organization, or the federated state entity, can act in a procedural and intentionally rational manner (Choo, 2003).

Based on these premises, public expenditure is presented as a guiding parameter for public managers' decisions. According to federal law no. 4320/64, such reference is classified as institutional, functional (or by function), by programs, and according to nature (Giacomoni, 2002).

The functional classification subsidizes the bases for describing data regarding public expenditures in the prominent segments where the organizations of the state apparatus operate, such as a synthetic budget. The classification by programs is intended to present the final result of the government to society, in order to allow the fulfillment of new functions of the budget, especially the work program. Finally, the classification, according to nature, is related to the adequacy of the categories and accounting accounts of the economic classifications and by elements (Giacomoni, 2002; Costa, 2008; Bezerra *et al.*, 2018).

Regarding its phases, public expenditure can be divided as follows: commitment, which is the act emanating from a competent authority that creates an obligation for the State to pay pending or not implementing a condition; liquidation, which covers the verification of the right acquired by the creditor based on the titles and documents proving the respective credit; and payment, which is characterized as the order issued by a competent authority,

determining that the expense be paid (Brasil, 1964). It can be said that public expenditure refers to the sum of all expenditures made by the State to meet the needs of society in general. One of these demands is related to public security, which is presented as a duty of the State, a right and responsibility of all (Brasil, 2016).

In such a context, crime appears as a strand available in various parts of the world, including the Brazilian territory, represented by its federated entities, such as the states. There are several crimes provided for in specific legislation that impact the national public order, including homicide, which, when consummated, unfolds in the result of death (Brasil, 1940). To this end, one way to verify the scope of the category of intentional violent deaths (MVI) is through the representativeness of the total number of victims of violent deaths with defined intentionality in a given territory (FBSP, 2024).

Impacts of public expenditures directed to the security of the population in general can promote deterrent effects against crime, with the possibility of gauging the breadth of the apparatus employed and as a direct and accessible mechanism for governments to control crime, in addition to being an opportunity to evaluate the effectiveness of public expenditures to reduce its occurrence (Gomes, 2019). It is based on the premise that the increase in security spending provides an increase in the capacity to prevent and confront crimes, especially violent ones, which can cause deaths (Gomes, 2019).

In the same vein, the limitation of public investments in essential segments, such as public security, can lead to an increase in economic and social inequalities, impacting people's well-being and causing crime to advance (Silva Filho and Silva, 2024). On the other hand, Bonifácio da Silva and Barbosa (2024) point out that the allocative function of spending on public security is inefficient for fighting crime, which requires the adoption of public policies to combat crime.

For the strand that works on the binomial social assistance and crime, Costa *et al.* (2017) state that families in cities with high homicide rates more frequently manifested that they did not have contact with any social support. Marino (2002) reinforces that in the social welfare society, the problem linked to crime is more linked to the social aspect, lacking the promotion of opportunities, as in the case of Brazil.

In another sphere of analysis, Rocha *et al.* (2025) state that precarious housing conditions are characterized by the scarcity of basic infrastructure, which emphasizes the high inequality and poverty in Brazil, putting a portion of society at a disadvantage, due to various aspects, such as high homicide rates or the scarcity of basic sanitation. In a similar

vein, Figueiredo *et al.* (2024) propose that the precariousness of social conditions and basic sanitation, among other factors, in addition to the impacts of crime and violence in a given territory, require the implementation of certain social and public security public policies.

Finally, there are numerous approaches that study the relationship between aspects related to social assistance, sanitation and public security with crime and violence. This proposal makes it possible to open a window for the discussion present in this study.

3 METHODOLOGY

The objective of this study is to analyze the budgetary impacts of social assistance, sanitation and public security expenditures in the Brazilian states of Amazonas, Ceará, Minas Gerais, Santa Catarina and São Paulo on intentional violent deaths in their respective territories.

The path was made through a quantitative approach, with the use of descriptive statistical treatment and with the aid of regression analysis. The time lapse chosen in this investigation is indicated between the years 2011 and 2023. The period in question was delimited due to the contemporaneity between the information related to intentional violent deaths (MVIs) and the public expenditures researched, which was convenient and sufficient for the purpose of the present study.

Regarding the data on intentional violent deaths, the collection was carried out by the Brazilian Yearbook of Public Security (FBSP, 2024). On the other hand, expenses related to social assistance, sanitation and public security within the scope of Brazilian states, in the respective transparency portals. To this end, the environments consulted with the data obtained for this study were the following:

Table 1

Transparency portals researched

State	Email address	Collection period used
AM	https:// www.transparencia.am.gov.br/	2011 to 2023
EC	https://cearatransparente.ce.gov.br/	
MG	https:// www.transparencia.mg.gov.br/	
SC	https:// www.transparencia.sc.gov.br/	
SP	https://www.transparencia.sp.gov.br/	

Source: Prepared by the author (2025).

It is recorded that the accesses through the *Internet* took place publicly and without any type of restriction. The literature used in this study essentially alludes to technical texts in the area of budget management and public governance, in addition to other complementary texts searched on the *Google Scholar platform* (Bensman, 2011; GOGP, 2024).

Despite the breakdown of expenses in the researched portals, the selection of data for this study was directed to the committed ones, which, in general terms, try to indicate a portion of the budget to cover a given expense. The theoretical bases researched in the present investigation suggest some relationships between crime and public expenditures, which provided the opportunity to propose an interface between the incidence of intentional violent deaths and some public segments. In this sense, the study hypotheses were proposed as follows:

Table 2

Hypotheses and study variables - Dependent Variable - Intentional Violent Deaths - MVI

Concepts	Chance	Description/Variables	References
Crime and Social Assistance Expenditures	H1	MVIs reduce with the increase in public investment in social assistance	Marino (2002) Costa *et al.* (2017)
Crime and Sanitation Expenses	H2	MVIs reduce with the increase in public investment in sanitation	Rocha *et al.* (2025) Flowers *et al.* (2024)

Crime and Public Security Expenditures	H3	MVIs reduce with the increase in public investment in public security	Gomes (2019) Silva Filho e Silva (2024)
	H4	MVIs do not reduce with the increase in public investment in public security	Bonifácio da Silva e Barbosa (2024)

Source: Prepared by the author (2025).
Legend(s): VI - Independent Variable; DV - Dependent Variable.

The proposal of this research also highlights the existence of a dependent variable, represented by intentional violent deaths - MVI, and three independent variables, illustrated by public expenditures on social assistance, sanitation and public security corresponding to the states surveyed.

Based on the researched literature, these parameters, in theory, can impact the behavior of the MVI in the states surveyed in relation to the researched expenses, and therefore a descriptive analysis was carried out using the multiple linear regression method, with the proposition of a statistical modeling to understand the variables under study (Chein, 2019).

The *Gnu Regression Econometrics and Time-Series Library* - Gretl - was used for the application of regression, to process the model proposed in this study by the ordinary least squares method - OQL, for robustness tests (collinearity, normality of residuals, autocorrelation and heteroscedasticity), in addition to other analyses (Gujarati and Porter, 2011). Finally, the results and analyses will be scored on the secondary data collected, which will be outlined below.

4 RESULTS AND DISCUSSION

The objective of this section was to analyze the information from the survey of secondary data collected during the study, in order to verify possible intersections with the researched literature.

In the period between 2011 and 2023, a total of 13 (thirteen) notes for total revenues and 13 (thirteen) notes for committed expenses were collected on official pages and documents about the selected Brazilian states (AM, CE, MG, SC, and SP). In this sense, initially a provision was proposed on the data collected:

Table 3

Total Revenues and Total Committed Expenditures – States – 2011/2023

Year	RT/AM	DET/AM	RT/EC	DET/CE	RT/MG	DET/MG	RT/SC	DET/SC	RT/SP	DET/SP
2011	10,604	10,616	17,896*	14,139*	54,844	54,693	21,066	12,721	159,225	159,949
2012	12,964	12,159	25,062*	15,100	65,248	63,172	23,817	15,739	172,886	173,106
2013	14,532	14,569	18,798	16,673	70,958	71,906	26,982	16,517	196,875	197,870
2014	15,545	15,565	20,941	19,852	73,347	75,512	29,004	18,226	209,486	209,842
2015	14,251	14,477	21,169	19,315	76,154	85,119	30,500	19,749	218,966	220,506
2016	15,440	14,997	24,101	20,953	83,965	88,129	32,457	20,744	218,622	219,266
2017	15,578	15,324	25,115	22,205	88,623	98,391	34,374	21,614	232,822	231,982
2018	18,018	17,630	26,121	24,321	91,753	102,986	35,447	22,805	242,941	242,037
2019	19,932	19,301	27,881	24,950	99,548	108,180	38,893	23,865	257,443	257,997
2020	22,878	21,576	30,381	25,756	104,254	107,107	40,837	23,917	266,182	258,458
2021	25,652	24,878	32,584	29,972	128,995	128,891	47,147	29,191	305,164	299,233
2022	29,362	29,110	34,077	30,995	118,715	116,489	57,641	37,799	356,633	347,319
2023	30,621	32,601	35,402	34,189	110,708	110,408	62,134	36,779	361,144	328,315
Total	245,397	242,803	339,528	298,42	1167,112	1210,983	480,299	299,686	3198,389	3145,880

Source: Brazilian Security Yearbook (2024) Public and Transparency Portals (2025). Note 1: the values were approximated in two centesimal places (R$ billion).
*Note 2: amounts collected in the Fiscal Restructuring and Adjustment Program of the State of Ceará (https:// www.sefaz.ce.gov.br/wp-content/uploads/sites/61/2018/12/programa-de-reestrutura%C3%A7%C3%A3o -e-ajuste-fiscal-2014-2016.pdf;
https:// www.sefaz.ce.gov.br/wp-content/uploads/sites/61/2018/12/programa-de-reestrutura%C3%A7%C3%A3o- e-ajuste-fiscal-2014-2016.pdf; and
https:// www.seplag.ce.gov.br/wp-content/uploads/sites/14/2012/08/LOA-2017-Anexos-de-Lei.pdf).
Legend:RT– Total Revenues (Collected); DET – Total Committed Expenses.

For the period considered in this study, Table 1 shows that from 2011 onwards, the amounts of revenue collection practically doubled, taking the year 2023 as the upper limit. It can be said, albeit preliminarily, that the states studied have a fiscal capacity, with the ability to obtain revenues to finance the provision of public goods (Brasil, 2016; Brazil, 1964; CN, 2024; Rocha, 2020). The state of Santa Catarina stands out in the data arrangement of Table 1 for presenting in 2023 almost three times the amount collected in 2011.

In another spectrum of evaluation, it can be seen that the values of revenues are relatively close to the expenses committed, with the exception of the state of Santa Catarina,

which is farther from this standard of "collecting and spending", as some studies propose, and the research by Silva *et al.* (2010).

Continuing, Table 4 establishes some analyses that confront the binomial revenues (total) and expenses (committed):

Table 4

Representations of the Budget Result – States – 2011/2023

Year	I want Anti-Mage	Status AM	WANT TO BE EC	Status CE	WANT MG	Status MG	Want Stalker	Status SC	WANT TO PLAY	Status
2011	0,998	Deficit	1,265	Surplus	1,002	Surplus	1,656	Surplus	0,995	Deficit
2012	1,066	Surplus	1,659	Surplus	1,032	Surplus	1,513	Surplus	0,998	Deficit
2013	0,997	Deficit	1,127	Surplus	0,986	Deficit	1,633	Surplus	0,994	Deficit
2014	0,998	Deficit	1,054	Surplus	0,971	Deficit	1,591	Surplus	0,998	Deficit
2015	0,984	Deficit	1,095	Surplus	0,894	Deficit	1,544	Surplus	0,993	Deficit
2016	1,029	Surplus	1,150	Surplus	0,952	Deficit	1,564	Surplus	0,997	Deficit
2017	1,016	Surplus	1,131	Surplus	0,900	Deficit	1,590	Surplus	1,003	Surplus
2018	1,022	Surplus	1,074	Surplus	0,890	Deficit	1,544	Surplus	1,003	Surplus
2019	1,032	Surplus	1,117	Surplus	0,920	Deficit	1,564	Surplus	0,997	Deficit
2020	1,031	Surplus	1,179	Surplus	0,973	Deficit	1,590	Surplus	1,029	Surplus
2021	1,031	Surplus	1,087	Surplus	1,000	Surplus	1,554	Surplus	1,019	Surplus
2022	1,008	Surplus	1,099	Surplus	1,019	Surplus	1,629	Surplus	1,026	Surplus
2023	0,939	Deficit	1,035	Surplus	1,002	Surplus	1,707	Surplus	1,099	Surplus
Total	1,010	Surplus	1,137	Surplus	0,963	Deficit	1,615	Surplus	1,016	Surplus

Source: prepared by the author (2025).
Legend: QRO - Quotient of the Budget Result.

Among some theoretical bases that allude to the quotient of the budget result (revenues/expenses), as well as the status between surplus and deficit, when the variables revenues collected and expenses committed are disposed, Kohama (1999) states the following: '= 1", balance; "> 1", surplus"; and "< 1", deficit.

In this sense, Leal Filho and Barbosa (2018), among some aspects, point out that growing deficits have been a reality in recent years in states such as Minas Gerais, Rio de Janeiro and Rio Grande do Sul (QRO MG = 0.963, considered the period between 2011 and 2025). In this perspective, the understanding of Quaresma and Mendes (2011) is highlighted, who expose that the LOA authorizes the expenses of the government entity, in accordance with the forecast of revenues collected, however, allowing the realization of expenses above the limit determined by law, which depends on the submission of a bill made by the Executive Branch to the Legislative Branch, requesting the inclusion of additional credit.

Santa Catarina, on the other hand, has shown greater stability, with a low unemployment rate and attraction of investments, despite the challenges derived from the

national economic crisis and the pandemic, the entity presented consecutive budget surpluses (Backes and Rochemback, 2024).

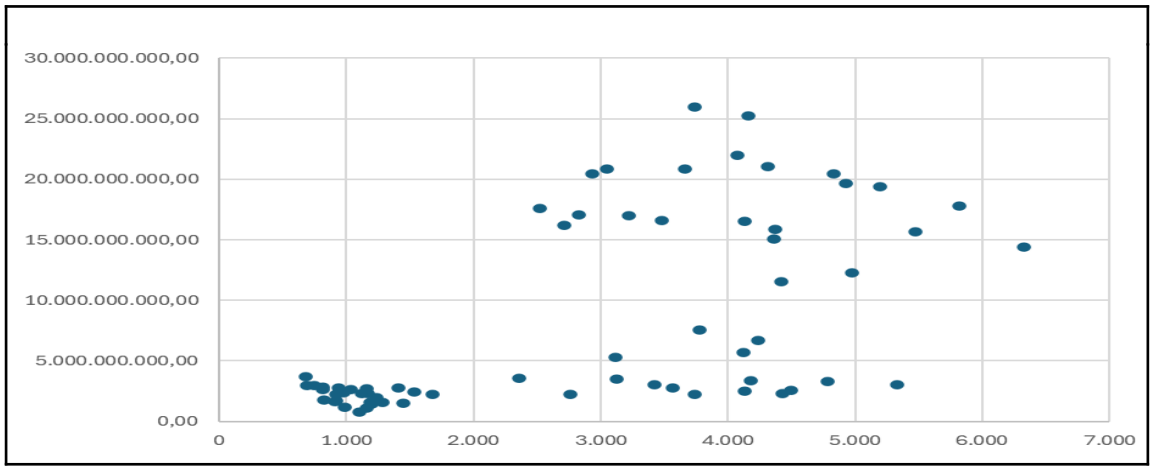
According to Kohama (1999), the states of Amazonas and São Paulo, also in surplus, presented results closer to equilibrium, with QROs, on average, of 1.010 and 1.016, respectively. Ceará, in turn, presented a surplus (with an average QRO of around 1.137, throughout the historical series, which projects it in a prominent way to the forefront of others in the federation, suggesting good fiscal management practice and sustainability in public investments (Uchoa, 2022).

In this context, the budget balance aims to establish in a very simple way that expenditures should not exceed the revenues forecast for the financial year, the balance must be followed, especially in the medium and long term, considering that it constitutes a means of limiting the growth of government spending and the consequent public debt (Lima *et al.*, 2010).

After the delineation of some guidelines on budget, revenues, expenses and fiscal balance, a cut will be proposed, in order to contextualize the parameter brought by intentional violent deaths (MVIs) and some committed public expenditures. Initially, Figure 1 shows the 65 (sixty-five) points of intersection that confront the MVIs and the expenditures committed to public security in the Brazilian states surveyed:

Figure 1

*MVIs and Expenditures Committed to Public Security - 2011/2023**



Source: Prepared by the author (2025).
*Note: AM, CE, MG, SC and SP.

It can be seen a concentration of 26 (twenty-six) notes in the range of amounts less than R$5 billion directed to expenses committed to public security, where numbers between

500 (five hundred) and 2000 (two thousand) intentional violent deaths are located. Such an issue contradicts the approach brought by Gomes (2019) Silva Filho and Silva (2024), however, to a certain extent, it is related to the approach of Bonifácio da Silva and Barbosa (2024). In the same direction, a total of 12 (twelve) notes in the range of amounts less than R$ 5 billion directed to expenses committed to public security congregate, in a less concentrated way, between 2000 (two thousand) and 6000 (six thousand) MVIs, and which is also close to the perspective of Bonifácio da Silva and Barbosa (2024).

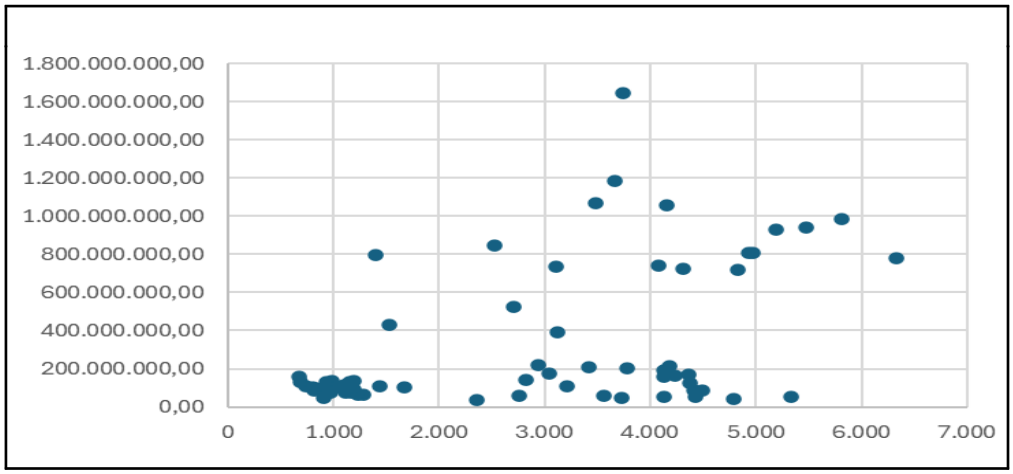
A total of 04 (four) notes are in the range between R$ 5 billion and R$ 10 billion for an interval that brings together between 2000 (two thousand) and 6000 (six thousand) violent deaths, in addition to 03 (three) notes between R$ 10 and R$ 15 billion, in a range of 4000 (four thousand) and 6500 (six thousand and five hundred) MVIs.

On the other hand, 12 (twelve) and 06 (six) annotations, respectively, are in the ranges of 2500 (two thousand and five hundred) to 6000 (six thousand) MVIs and 2500 (two thousand and five hundred) and 6000 (five thousand) MVIs, for amounts from R$ 15 to R$ 20 billion, and from R$ 20 to R$ 25 billion, which contradicts, in a way, the ideas brought by Gomes (2019) and Silva Filho e Silva (2024). Finally, there are 02 (two) notes in the range between R$ 25 and R$ 30 billion, which give rise to between 3500 (three thousand five hundred) and 4500 (four thousand and five hundred) MVIs, which indicates that a larger amount, by itself, in expenses committed to public security, does not guarantee a reduced incidence of MVIs, which also antagonizes Gomes (2019) and Silva Filho e Silva (2024).

Another aspect of the present study concerns the binomial between intentional violent deaths (MVIs) and expenditures committed to social assistance (DEAS):

Figure 2

*MVIs and Expenditures Committed to Social Assistance - 2011/2023**



Source: Prepared by the author (2025).
*Note: AM, CE, MG, SC and SP.

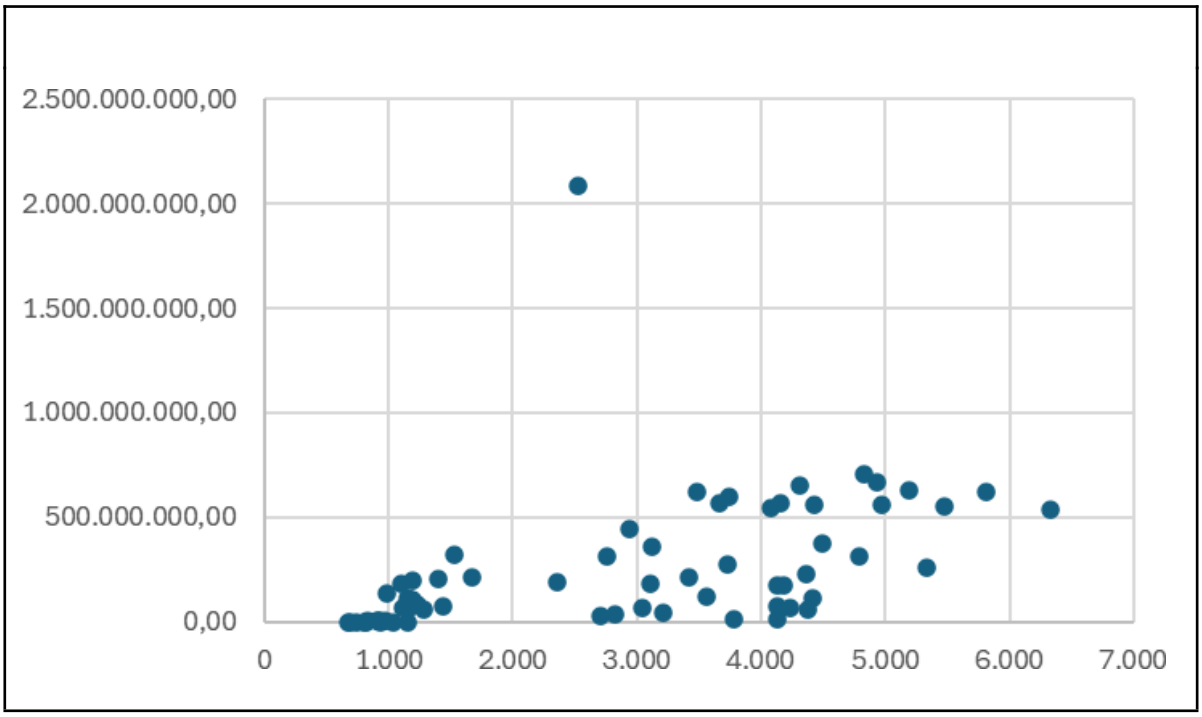
Figure 2 shows that lower DEAS values (up to R$ 200 million) may be related to lower numbers of MVIs (between 500 and 2000), as in 25 (twenty-five) notes, which contradicts Marino (2002) and Costa *et al*. (2017). On the other hand, they may contribute to the occurrence of more expressive numbers of MVI (between 2000 and 5500), as in 22 (twenty-two) annotations, which harmonizes with the understanding of Marino (2002) and Costa *et al.* (2017).

On the other hand, more expressive values of DEAS, such as in 04 (four) notes, between R$ 400 million and R$ 1 billion, may contribute to a reduced number of MVIs (between one thousand and three thousand), according to Marino (2002) and Costa *et al.* (2017), or not having more notorious effects, as in 13 (thirteen) annotations, which contradicts the approaches brought by the same authors.

An annotation can be characterized as *an outlier*, which is an apparently inconsistent observation or subset compared to other records (Hawkins, 1980). This record is in the range between R$1.6 and R$1.8 billion, for an incidence close to 4000 (four thousand) MVIs, which contrasts with Marino (2002) and de Costa *et al.* (2017). Regarding the binomial intentional violent deaths and expenditures committed to sanitation (SDR), Figure 3 presented the following distribution:

Figure 3

*MVIs and Expenditures Committed to Sanitation - 2011/2023**



Source: Prepared by the author (2025).
*Note: AM, CE, MG, SC and SP.

According to Figure 3, initially, it is possible to note 26 (twenty-six) annotations between 500 (five hundred) and 2000 (two thousand) MVIs in a range of expenses committed to sanitation of up to R$ 500 million, which does not harmonize with the understanding of Rocha *et al.* (2025) and Figueiredo *et al.* (2024). In another spectrum, 24 (twenty-four) annotations are in the range of 2000 (two thousand) and 5500 (five thousand and five hundred) MVIs, with SDRs of up to R$500 million.

A total of 14 (fourteen) annotations relate to the incidence between 3000 (three thousand) and 6500 (six thousand and five hundred) MVIs, in a range of SDRs between R$500 million and R$1 billion. Such a provision contradicts, to a certain extent, the predictions of Rocha *et al.* (2025) and Figueiredo *et al.* (2024). In the analysis in question, according to Hawkins (1980), the presence of 01 (one) *outlier is also noted,* which indicates an approximate incidence of 2500 (two thousand and five hundred) MVIs for a SDR greater than R$2 billion.

Continuing, the research intended to proceed to other quantitative analyses through the treatment of the collected data, initially making a statistical description of the chosen variables, as follows:

Table 5

Statistical description of variables - States - Brazil - 2011/2023

Variables	Average	Minimum	Maximum
MVI	3044	680	6328
DEAS (R$)	133.643.477,39	35.670.000,00	1.646.908.543,8
DES (R$)	171.830.000,00	124.405,65	2.086.022.461,66
DESP (R$)	3.070.000.000,00	808.742.737,14	25.983.013.430,68

Source: Prepared by the author (2025).

Based on the information contained in Table 5, in general, the mean values are arranged as closer to the minimum values than to the maximum values. According to the minimum, average and maximum values, it can be seen that in budgetary terms, there is a prioritization of expenses committed to public security, followed by expenses committed to sanitation and, finally, expenses committed to social assistance.

In a brief comparison of the values in Table 3 and Table 1, the quotients between the averages of the respective expenditures committed to social assistance, public security and sanitation and the average of the total committed expenditures (DET), of all the states surveyed, resulted in values of 0.033% (AS), 0.043% (S) and 0.767% (SP), which follows the same idea about budget priorities previously presented.

According to the modeling elaborated regarding the regression analysis, according to Gujarati and Porter (2011), the ordinary least squares method, made available by the Gretl tool, employed 65 (sixty-five) observations for each variable:

Table 6

Ordinary Least Squares - States - Brazil - 2011/2023 - Dependent Variable - Intentional Violent Deaths (MVI)

Independent Variables	Coefficient	Standard Error	Reason t	P Value
Constant	1754,10	241,546	7,262	8,21e-010***
DESP	1.08474E-07	3.06276E-08	3,542	0,0008***
DEAS	−2.49409e-07	7.17055e-07	−0.3478	0,7292
DES	1.10494E-06	6.75571e-07	1,636	0,1071

Source: Prepared by the author (2025).
Legend: DESP - Expenses Committed to Public Security; DEAS - Expenses Committed to Social Assistance; DES - Expenses Committed to Sanitation.

Among some of the information produced, Table 6 demonstrates the statistical significance of the variables "constant" and "DESP" at 1%, as indicated by the asterisks (***),

a common record to Gretl for expansion on the results obtained, according to Perez and Lopez (2019). As for the expenditures committed to social assistance, the increase in its value implies a reduction in intentional violent deaths, a situation that harmonizes with Marino (2002) and Costa *et al.* (2017).

In cases where there is an increase in expenditures committed to public security and expenditures committed to sanitation, intentional violent deaths increase in value, which generates a counterpoint with part of the literature researched in this study, in the terms of Gomes (2019) and Silva Filho e Silva (2024), as well as Rocha *et al.* (2025) and Figueiredo *et al.* (2024). On another front, the approach brought by Bonifácio da Silva and Barbosa (2024), contemplates the result related to the MVI and DESP binomial, from the moment that this criminal parameter is not reduced when public investment in the aforementioned segment increases.

Other results allude to some statistical parameters indicating the validity of the adopted model and the significance of its results. In this framework, the method of ordinary least squares brought the following:

Table 7

Statistical parameters - States - Brazil - 2011/2023

Parameter	Value
R – Square	0,383747
R - Square Adjusted	0,353440
P – Value	1.55e-06

Source: Prepared by the author (2025).

The regression analysis, according to Table 7, indicates by the calculation of the R – Adjusted Square, that around 35.34% of the dependent variable, which refers to intentional violent deaths in the Brazilian states, are explained by a relationship of dependence with the independent variables selected for this study. The value of the R – Square, in turn, resulted in 0.383747, which corresponds to 38.37% (Silva Filho and Silva, 2024).

Regarding the reliability of the collected data, some robustness tests were carried out, and the following results were obtained:

Table 8

Robustness Tests

Test	Parameter	Result
Normality of Waste	Null hypothesis	The error has normal distribution
Autocorrelation	Null hypothesis	No autocorrelation
Heteroscedasticity	Null hypothesis	No heteroscedasticity
Collinearity	DEAS DES DESP	2,638 1,759 2,134

Source: Prepared by the author (2025).

The residual normality and heteroscedasticity tests presented results that can be considered valid, after being processed by Gretl, from which the estimation utility of the regression employed can be inferred (Pino, 2014). The chosen modeling also demonstrated the absence of autocorrelation (Noce, 2008).

Finally, as for the last test performed, the results did not indicate collinearity problems, since all variance inflation factors (VIF) were higher than 1.0 and lower than 10.0, and there was no evidence of excessive collinearity (Mota and Silva Júnior, 2012). It is noteworthy that logarithms of the variables selected for the model proposed in the present study were added. This provision was adopted to simplify complex relationships and help interpret the results (Tereza, 2024):

Table 9

Logarithmized statistical parameters - States - Brazil - 2011/2023

Parameter	**Value**
R - Square	0,752671
R - Square Adjusted	0,740507
P - Value	1.72e-18

Source: Prepared by the author (2025).

In summary, it can be suggested that approximately 74.05% of the logarithmized intentional violent deaths variable is explained by a relationship of dependence with the DEAS, DES, and DESP variables (also logarithmized), following Tereza's (2024) proposal. Robustness tests were also applied to the aforementioned variables in Gretl, with no problems of autocorrelation, collinearity, heteroscedasticity and normality of the residuals being found (Noce, 2008; Mota and Silva Júnior, 2012; Pino, 2014).

After overcoming some of the analyses carried out and resuming the hypotheses proposed (Table 9), it is appropriate to make some notes, which were summarized as follows:

Table 10

Inferences about the hypotheses tested

Hypothesis	Description	Descriptive statistics	Regression Analysis
H1	MVI reduce when AEDs increase	Partially confirmed	Confirmed
H2	MVI reduce when DES increase	Unconfirmed	Unconfirmed
H3	MVI reduce when DESP increases	Partially confirmed	Unconfirmed
H4	MVI does not reduce when DESP increases	Partially confirmed	Confirmed

Source: Prepared by the author (2025).

Table 3 shows that intentional violent deaths in the Brazilian states selected in this study demonstrate a certain direction towards reduction, by increasing the expenditure committed to social assistance, according to Marino (2002) and Costa *et al.* (2017).

When the MVIs are compared with the expenditures committed to sanitation, the study hypothesis was not confirmed for the selected states, not harmonizing with the perspectives of Rocha *et al.* (2025) and Figueiredo *et al.* (2024).

Finally, when the hypotheses related to the binomial MVIs and expenditures committed to public security were tested, the results showed greater identity with the study proposed by Bonifácio da Silva and Barbosa (2024), than the perspectives proposed by Gomes (2019) and Silva Filho e Silva (2024), that is, that there is no reduction in this aspect of crime when there is an increase in expenditures committed to public security. This inference draws attention to the position of Peres *et al.* (2024) in the sense that public spending must occur efficiently, so that the public policies implemented can achieve satisfactory results.

5 FINAL CONSIDERATIONS

The study in question aimed to analyze the budgetary impacts of expenditures committed to social assistance, sanitation, and public security in the states of Amazonas, Ceará, Minas Gerais, Santa Catarina, and São Paulo on the incidence of intentional violent deaths in the period from 2011 to 2023.

The research showed that the selected Brazilian states had the capacity to collect between 2011 and 2023, which enabled them to direct public resources to expenses in different segments. In this direction, Ceará and Santa Catarina emerge with a more stable "fiscal health" and, on the other hand, Minas Gerais has been presenting a deficit in its public accounts in recent years.

The study showed that intentional violent deaths (MVIs) show a tendency to reduce as there are contributions in the expenses committed to social assistance. Such perception, however, did not occur when the MVIs are related to the expenses committed to sanitation.

With regard to expenditures committed to public security, even with the increase, it was noted that intentional violent deaths did not decrease in the states surveyed over the years. This perception may suggest the need for more time to implement the effects resulting from the public security policies implemented, in addition to a reflection that a contribution of resources to public security needs to be accompanied by efficient public policies.

Among some situations that may have been limiting the present study, the following can be mentioned: the restriction linked to a small number of selected states, which is justified, to a certain extent, by the unavailability or incompleteness of data in the transparency portals of some Brazilian federated entities; the choice for a limited review period between 2011 and 2023; and the possibility of inserting other variables or indicators to integrate other statistical models.

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