

Trends

in Psychiatry and Psychotherapy

JOURNAL ARTICLE PRE-PROOF (as accepted)

Original Article

Impact Analysis of the Brazilian Suicide Prevention Campaign "Yellow September": an Ecological Study

Walter Gabriel Neves Cruz, Thiago Aguiar Jesuino, Hercules Fernandes Moreno, Lara Garrido Santos, Amanda Galvão de Almeida

<http://doi.org/10.47626/2237-6089-2022-0564>

Original submitted Date: 29-Sep-2022

Accepted Date: 16-Mar-2023

This is a preliminary, unedited version of a manuscript that has been accepted for publication in Trends in Psychiatry and Psychotherapy. As a service to our readers, we are providing this early version of the manuscript. The manuscript will still undergo copyediting, typesetting, and review of the resulting proof before it is published in final form on the SciELO database (www.scielo.br/trends). The final version may present slight differences in relation to the present version.

Analysis of the Impact of the Brazilian Suicide Prevention Campaign "Yellow September": an Ecological Study

Walter Gabriel Neves Cruz^a, Thiago Aguiar Jesuino^{b*}, Hercules Fernandes Moreno^c, Lara Garrido Santos^d and Amanda Galvão de Almeida^e

^a*Undergraduate medical student at Universidade Federal da Bahia, Salvador Brazil; e-mail: walter.cruz@ufba.br, ORCID ID: <https://orcid.org/0000-0001-9146-7471>*

^b*Undergraduate medical student at Universidade Federal da Bahia, Salvador Brazil; e-mail jesuinothiago@gmail.com ORCID ID: <https://orcid.org/0000-0003-4519-0541>;*

^c*Undergraduate medical student at Universidade Federal da Bahia, Salvador Brazil; e-mail: herculesfm@ufba.br, ORCID ID: <https://orcid.org/0000-0003-0872-1008>*

^d*Undergraduate medical student at Universidade Federal da Bahia, Salvador Brazil; de-mail: lara.garrido@ufba.br, ORCID ID: <https://orcid.org/0000-0002-5941-350>*

^e*Department of Neurosciences and Mental Health of the Faculty of Medicine of Bahia, Federal University of Bahia, Salvador, Brazil e-mail: amanda.galvao@ebserh.gov.br, ORCID ID: <https://orcid.org/0000-0001-5400-2966>*

This study was conducted without financial support

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Total number of words: 2796

Last literature review done in 13/06/2022

Corresponding author: Thiago Aguiar Jesuino, telephone number (55 71) 996539458, fax number (55 71) 33465443, e-mail: jesuinothiago@gmail.com, postal address: Rua Machado Neto, 267 apt 701 Pituba, Salvador, Bahia Brazil CEP: 41830510.

ABSTRACT

Introduction: Yellow September (YS) is a Brazilian suicide prevention campaign implemented in 2015, however, its effectiveness in reducing mortality is still unknown. **Materials and Methods:** This is an ecologically interrupted time series study that analyses the evolution of suicide rates in Brazil between 2011 and 2019 and its association with the implementation of YS at a national level. Data was provided by the Mortality Information System. A segmented interrupted series regression analysis was performed, using a generalized linear Poisson model, with correction for seasonal trends. **Results:** There was an increase in the annual rates of suicide deaths between 2011 and 2019, with 4.99 and 6.41 suicides per 100,000 inhabitants, respectively. The null hypothesis, that the YS did not change the historical trend of growth in suicides in Brazil after its implementation, was affirmed. However, there was an eventual significant increase of 6.2% in the risk of mortality in 2017 and of 8.6% in 2019. **Discussion:** The results are consistent with the literature, which proposes that campaigns focused solely on publications through the media generate unsound findings regarding the effective reduction in the number of deaths by suicide. **Conclusions:** The lack of initiative in multisectoral actions may explain the failure of YS on changing deaths by suicide, therefore the development of new lines of action focused on training professionals and expanding the care network **could** make it an effective instrument in reducing mortality from suicide.

Keywords: Suicide; Brazil; Mental Health; Preventive Psychiatry; Mass Media.

INTRODUCTION

Suicide is classically defined as "death resulting directly or indirectly from a positive or negative act of the victim himself, which he knows will produce this result" and is a complex and multifactorial phenomenon.¹ Among the various risk factors associated with suicide, there is usually the presence of a mental disorder and previous suicidal behavior. Hopelessness, impulsivity, access to more lethal means, and family history also play a significant role in determining suicide risk.^{2,3} Conversely, a well-established support network, religious and cultural insertion, good socialization, and access to mental health support services are configured as protective factors concerning suicidal behaviors, although there are still limited data to support these effects.^{3,4}

Because it is a global health problem, several countries, under the guidance of the World Health Organization (WHO), are developing actions related to suicide prevention.⁵ It is known that more than 800,000 people die every year by suicide worldwide, and this already represents one of the three leading causes of death among young people in Brazil. It is believed that the numbers, although significant, are underreported, mainly due to social stigma, which can cause many cases to be reported as accidents, for example.^{5,6} When analyzing the data regarding suicide attempts, the situation becomes even more worrying, given the scarcity of data regarding suicidal behavior and the estimate that for each consummated suicide, there are about 20 attempts.^{7,8}

As a manifestation of the human experience, suicidal behavior usually produces a broad impact, and the most commonly affected sphere is the social one, the one that encompasses the family, friends, and acquaintances of the individual who has committed or attempted suicide. From this perspective, grief has profound psychological consequences for survivors bereaved by suicide.⁹⁻¹¹

Around the world, numerous campaigns have been developed to reduce the number of deaths by suicide and suicide attempts, as well as minimize their consequences. Most of these projects have been based on universal strategies, i.e., have the general population as their target audience, although actions at the selective level (concerning risk groups) and indicated level (focused on people with suicidal behavior) are also shown to be important.¹²⁻¹⁵ The scarce studies regarding the impacts of suicide prevention companions are inconsistent, limited in their designs, or inconclusive, and it is not possible to infer which strategy is the most effective and whether the actions currently used have helped to address this problem.^{8,12,15-17} It is known, however, that talking about the topic and promoting awareness actions make it possible to decrease stigma and reduce anxiety associated with the subject.^{8,12}

In Brazil, even before the law establishing the National Policy for the Prevention of Self-harm and Suicide was implemented in 2019,¹⁸ the *Centro de Valorização à Vida* - CVV (Life Appreciation Center), together with the Brazilian Association of Psychiatry (ABP - *Associação Brasileira de Psiquiatria*) and The Brazilian Federal Council of Medicine (CFM - *Conselho Federal de Medicina*), has promoted a national campaign of an informative nature baptized Yellow September (YS) since 2015.¹⁴ The campaign promotes actions at various levels, such as walks, lectures, and lighting of public

monuments in yellow color to raise awareness about the relevance of the discussion; making free material available online, not only to raise awareness of health professionals but also for civil society in general. In addition, it develops educational actions with the media to guide and clarify the need to talk about the issue responsibly, due to the possibility of the reverse effect, meaning that the dissemination of data on suicides in an inappropriate way encourages the occurrence of more deaths by suicide. However, contrary to what was expected, but following the trend in other countries, the number of suicides does not seem to have decreased in Brazil.^{14,19}

Considering that the implementation of the YS campaign took place at a national level, it was a "natural experiment" that allows this study to analyze the impact of this initiative on the number of suicide deaths in the country, taking into account its specificities and convergences with other communication measures about suicide.

MATERIALS AND METHODS

This is an ecological analytical study of the interrupted time series type that analyzes the evolution of suicide rates in Brazil between 2011 and 2019 and its association with the Yellow September (YS) campaign.

The monthly death count was obtained through secondary data provided by the Mortality Information System (SIM - *Sistema de Informações Sobre Mortalidade*), managed by the Informatics Department of the Brazilian National Health System (DATASUS - *Departamento de Informática do Sistema Único de Saúde*), using codes X60 to X84 of the International Classification of Diseases (ICD-10), which include all the causes of death defined as suicide²⁰. We also obtained the monthly number of deaths according to the filters of age group and sex to analyze these subgroups.

Demographic data were obtained from the monthly population projections fixed on the 15th of each month and from the annual population projections by sex and age bracket, both made by the Brazilian Institute of Geography and Statistics (IBGE - *Instituto Brasileiro de Geografia e Estatística*).²¹ Since the monthly projections indicated only the general population, without detailing by sex or age group, it was necessary to calculate the monthly population of these groups by multiplying the national monthly data by the proportions of the subgroups of the annual estimate, thus

obtaining the monthly distribution of sex and age groups. This data was used to calculate the suicide rates (no. of deaths per 100,000 inhabitants).

In the exploratory analysis, the average suicide rates for the pre-YS, post-YS, and full periods were calculated, as well as the percentage change between the initial and final rates for these periods.

In an interrupted series study, a variable is used to determine a historical trend, which is affected by an intervention at a certain point in time. Theoretically, if the intervention is not applied, the pre-existing historical trend continues to determine the values, which makes it possible to compare this counterfactual with the post-intervention reality. Compatible with this goal, we performed a segmented interrupted-series regression using a generalized linear Poisson model, ideal for studies in which the variable is a count. Because there was overdispersion in the count data (variance > average), a relaxation of the model was necessary, switching to a quasi-Poisson model, making it possible to analyze changes in the level and slope of the regression from temporal interventions with adjustment for underlying historical tendencies. To correct for seasonal patterns, 4-pair Fourier time-harmonic functions were added to the model. The 95% confidence interval (95% CI) of the model was also calculated. In this way, it was possible to detect any series of occurrences that deviate from an expected curve corrected for historical trends (linear growth) and seasonal trends (harmonic functions).²²

The ratios of incidence rates (IR) between the period after and before the intervention, as well as their respective 95% confidence intervals (95% CI), were estimated from the exponentiation of the coefficients of the intervention factor applied in the different temporal models that analyzed both the general population and the sex and age bracket subgroups. The counterfactual of the model, that is, the estimate of the number of deaths without the intervention was calculated through the ratio between the number of deaths predicted by the model and the IR of the intervention.

As for the interventions, two scenarios were studied: a) influence of the YS campaigns considering an annual effect, with the aggregate intervention factor defined as positive in all months after September 2015 and the annually independent intervention factors as positive only in each appropriate year; and b) influence of the YS campaigns considering a temporary effect restricted only to September, October, November, and December of each year, with the aggregate intervention factor defined

as positive in all these specific months from 2015 onwards and the annually independent intervention factors as positive only in the last four months of each year.

The null hypothesis that the interventions did not change the historical and seasonal tendency of the evolution of suicide rates in Brazil could be refuted in the significance level of $\alpha \leq 5\%$. All analysis were performed on Stata v16.0 software.

RESULTS

From 2011 to 2019, 102,718 suicides were recorded in Brazil. The annual rates were increasing, jumping from 4.99 to 6.41 suicides per 100,000 inhabitants, representing a growth of 28.5% in this period. Most of the individuals were male ($n = 80,808$; 78.7%), with a mortality ratio of 3.86 for the female sex. As for the age groups, the highest average mortality rate for the period was in the 30 to 59 age group (7.60 per 100,000 inhabitants), while the lowest was in the age group under 14 years (0.32 per 100,000 inhabitants). Chart 1 describes the average rates according to subgroups and the variations in the period.]

Chart 1: Mean suicide rates and their percentage changes between pre and post-intervention (1st YS: Sep/2015), according to subgroup.

Group	2011-2019		Pre-YS: 2011-2014		Post-YS: 2015-2019	
	ASR ^a	$\Delta\%$ ASR ^b	ASR ^a	$\Delta\%$ ASR ^b	ASR ^a	$\Delta\%$ ASR ^b
Country	5.58	28.5%	5.17	8.1%	5.91	21.0%
Male	8.97	28.1%	8.31	5.8%	9.50	17.0%
Female	2.33	30.6%	2.16	4.1%	2.47	17.9%
≤ 14 years	0.32	86.1%	0.27	37.9%	0.37	44.7%
15 - 29 years	6.03	35.1%	5.56	-1.7%	6.40	35.1%
30 - 59 years	7.60	19.2%	7.23	6.0%	7.90	9.9%
60 - 79 years	7.59	17.8%	7.05	-0.8%	8.03	4.9%
≥ 80 years	7.36	-10.8%	7.61	5.2%	7.16	-17.8%

^a Average annual suicide rate for the period

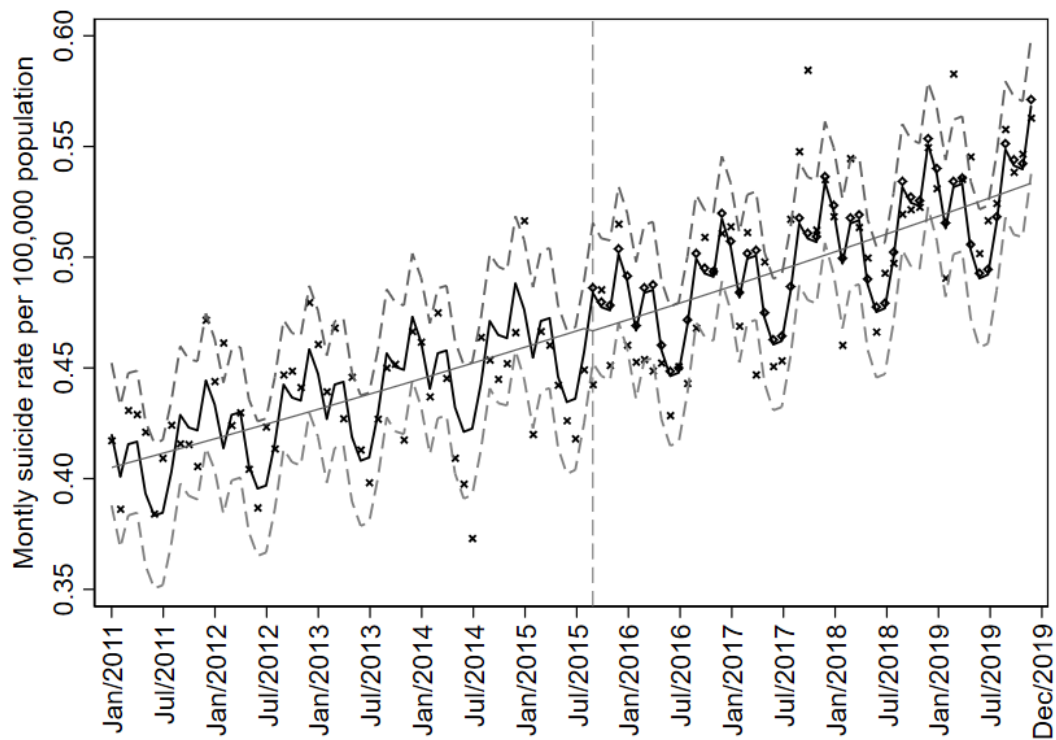
^b Percentage change in the suicide rate for the period

Source: own preparation based on SIM data.

1st scenario: analysis of the annual campaign effects after September 2015

Considering the Yellow September campaigns conducted as a single intervention factor at the national level, we detected a small drop in the level of the regression after the implementation of the first campaign (2015), with a statistically insignificant reduction of 0.47% in the risk of deaths **compared to the counterfactual**

(RR=0.995; 95% CI=0.959-1.032; p=0.797), affirming the null hypothesis that this intervention did not modify the historical tendency of growth of suicides in Brazil in the period after its implementation (Figure 1). From this hypothesis, subgroup analysis by sex and age group also suggested no significant effect on suicide rates (Chart 2).



Graph 1: Interrupted time series for monthly suicide rates in Brazil (2011-2019). The intervention is represented by the vertical dashed line, the first Yellow September campaign in 2015. The black line represents the values calculated by Poisson regression with harmonic adjustment for seasonality and historical trend, while the gray dashed lines represent the 95%CI bounds of this model. The solid gray line represents the regression without seasonality adjustment. The observed suicide rate is illustrated by the x's, while the rate projected by the regression disregarding the intervention is represented by the hollow diamonds.

Source: own preparation based on SIM data.

Chart 2: Pre- and post-intervention risk ratio considering the annual effects of the campaigns independently and in aggregate, with adjustments for long-term trends and seasonality, from 2015 to 2019.

Group	2015		2016		2017		2018		2019		2015-2019	
	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value
Country	0.996 (0.946 - 1.049)	0.875	0.999 (0.960 - 1.040)	0.967	1.062 (1.013 - 1.112)	0.012	1.051 (0.996 - 1.110)	0.067	1.086 (1.020 - 1.155)	0.009	0.995 (0.959 - 1.032)	0.797
Male	1.004 (0.952 - 1.059)	0.881	1.005 (0.964 - 1.047)	0.800	1.060 (1.011 - 1.113)	0.017	1.049 (0.992 - 1.109)	0.095	1.080 (1.013 - 1.152)	0.017	1.002 (0.966 - 1.040)	0.897
Female	0.966 (0.876 - 1.065)	0.484	0.976 (0.906 - 1.052)	0.527	1.064 (0.976 - 1.160)	0.158	1.061 (0.960 - 1.173)	0.246	1.105 (0.985 - 1.239)	0.088	0.968 (0.907 - 1.034)	0.344
≤ 14 years	0.860 (0.600 - 1.232)	0.410	0.936 (0.702 - 1.247)	0.650	1.057 (0.760 - 1.471)	0.741	0.896 (0.606 - 1.324)	0.581	0.945 (0.604 - 1.478)	0.805	0.952 (0.748 - 1.210)	0.687
15 - 29 years	0.946 (0.872 - 1.026)	0.184	1.008 (0.947 - 1.073)	0.794	1.117 (1.040 - 1.200)	0.002	1.168 (1.074 - 1.269)	0.001	1.333 (1.213 - 1.465)	0.001	0.948 (0.885 - 1.015)	0.128
30 - 59 years	1.001 (0.940 - 1.066)	0.971	0.989 (0.942 - 1.039)	0.656	1.034 (0.977 - 1.094)	0.252	1.008 (0.943 - 1.077)	0.820	1.020 (0.946 - 1.101)	0.597	0.998 (0.957 - 1.042)	0.956
60 - 79 years	1.069 (0.965 - 1.184)	0.199	1.041 (0.960 - 1.128)	0.329	1.105 (1.006 - 1.214)	0.037	1.085 (0.972 - 1.210)	0.146	1.054 (0.929 - 1.196)	0.417	1.069 (0.998 - 1.145)	0.056
≥ 80 years	1.112 (0.886 - 1.398)	0.357	0.956 (0.799 - 1.144)	0.627	0.9714 (0.789 - 1.196)	0.785	0.967 (0.760 - 1.230)	0.785	0.844 (0.639 - 1.116)	0.235	0.945 (0.811 - 1.102)	0.627

Source: own preparation based on SIM data.

Considering the different campaigns that occurred in the last 5 years as independent interventions, it was possible to evaluate the annual impact of each one of them, as shown in Chart 2. In no year was there a significant association between the campaign and the reduction in the death rate, on the contrary: in 2017, there was a 6.2% increase in mortality risk, with a relevant effect in the male group ($p=0.017$), in the age group from 15 to 29 years ($p=0.002$) and 60 to 79 years ($p=0.037$); however, there was no impact in the female gender or the other age groups. Similarly, in 2019, there was an 8.6% increase in risk, with a significant impact only in males ($p=0.017$) and the age group from 15 to 29 years ($p<0.001$). It is worth noting that in 2018, even though at the national level the risk ratio was not changed by the intervention, there was a 16.8% increase in suicide risk for the 15 to 29 age group ($p<0.001$).

2nd scenario: analysis of temporary effects only in September to December, starting in 2015

Considering only September and the subsequent three months of the 5-year campaign as a single intervention factor, a statistically insignificant 1.2% increase in

national suicide risk was found during these periods, even adjusting for seasonality effects (RR=1.012; 95% CI=0.977-1.048; p=0.503).

As for the year-specific analyses, there was a statistically significant 6.7% increase in suicide risk in the context of the September campaign and subsequent months of 2017 (Chart 3), with subgroup analysis demonstrating effect only in the male population (p=0.004) and in the 30 to 59 age group (p=0.027), affirming null hypothesis for females and other age groups. It is worth noting that the highest monthly suicide rate from 2011 to 2019 was found precisely in this timeframe, being 0.58 suicides/100,000 population in October 2017.

Chart 3: Pre- and post-intervention risk ratio considering the temporary effects (September to December) of the campaigns independently and in aggregate, with adjustments for long-term trends and seasonality, from 2015 to 2019.

Group	2015		2016		2017		2018		2019		2015-2019	
	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value	RR (CI 95%)	P-value
Country	0.983 (0.933 - 1.035)	0.518	0.998 (0.948 - 1.051)	0.961	1.066 (1.013 - 1.122)	0.013	1.004 (0.952 - 1.059)	0.873	1.018 (0.964 - 1.074)	0.519	1.012 (0.977 - 1.048)	0.503
Male	0.997 (0.947 - 1.050)	0.934	1.017 (0.966 - 1.071)	0.511	1.078 (1.024 - 1.134)	0.004	1.011 (0.959 - 1.067)	0.667	1.031 (0.976 - 1.089)	0.263	1.002 (1.002 - 1.002)	0.160
Female	0.930 (0.844 - 1.025)	0.147	0.931 (0.844 - 1.026)	0.150	1.025 (0.932 - 1.127)	0.604	0.977 (0.886 - 1.078)	0.656	0.970 (0.877 - 1.073)	0.564	1.002 (1.002 - 1.003)	0.258
≤ 14 years	0.936 (0.661 - 1.326)	0.713	1.124 (0.812 - 1.556)	0.480	1.219 (0.885 - 1.679)	0.225	1.112 (0.795 - 1.555)	0.533	1.057 (0.746 - 1.497)	0.754	1.083 (0.864 - 1.359)	0.487
15 - 29 years	0.910 (0.825 - 1.002)	0.057	0.963 (0.875 - 1.060)	0.448	1.079 (0.983 - 1.185)	0.108	1.070 (0.972 - 1.178)	0.162	1.145 (1.040 - 1.262)	0.006	1.015 (0.949 - 1.086)	0.652
30 - 59 years	1.000 (0.942 - 1.061)	0.988	1.013 (0.954 - 1.075)	0.668	1.068 (1.007 - 1.133)	0.027	0.976 (0.917 - 1.038)	0.444	0.987 (0.927 - 1.052)	0.706	1.011 (0.970 - 1.053)	0.590
60 - 79 years	1.031 (0.932 - 1.140)	0.545	0.994 (0.898 - 1.100)	0.916	1.053 (0.953 - 1.164)	0.304	0.988 (0.891 - 1.095)	0.821	0.955(0.859 - 1.062)	0.400	1.009 (0.942 - 1.080)	0.794
≥ 80 years	1.091 (0.876 - 1.358)	0.435	0.907 (0.716 - 1.149)	0.419	0.836 (0.653 - 1.068)	0.153	0.990 (0.783 - 1.253)	0.939	0.852(0.662 - 1.096)	0.214	0.945 (0.811 - 1.101)	0.472

Source: own preparation based on SIM data.

Although the 2019 campaign showed no effect on the historical and seasonal trend (p=0.525) in the national number of deaths, a statistically significant 14.6% increase in suicide risk was detected for the 15-29 age group subgroup (p=0.006), with no effect when analyzing the other age groups or gender subgroups.

There were no significant findings in the analyses of the other years and their subgroups, affirming the null hypothesis for all these unmentioned situations.

DISCUSSION

The descriptive results presented in Chart 1, regarding the increase in the number of suicides in recent years, are in line with a national trend of worsening this public health problem.^{23,24} The higher mortality rate among adult and male subjects is consistent with findings in the literature related to the topic.²⁵

As shown in both scenarios, the reduction in the number of suicides with the introduction of the campaign in 2015 was statistically insignificant. A similar study that analyzed the prevalence of suicide notifications in Brazil before and after the implementation of the YS,¹⁹ corroborates this finding; it even expresses evidence that suicide rates increased after the institution of the campaign, with emphasis on the months of the second semester. In the same vein, an ecological time-series study on suicides occurring in the Brazilian state of Ceará also found no statistically significant difference between the years before and those after the implementation of the campaign.¹⁴

We had theorized that there would be differences between the campaigns because in each year the diffusion and communicative impact on the population would be unique. Therefore, the quality of the campaign presumably could tend towards additive improvement, where a new issue could build on past experiences. However, this was not observed: if the implementation of the YS was not able to reduce the number of deaths, neither can it be said that its effect was harmless, given the statistically significant findings that indicated an increase in suicides in specific annual campaigns.

In the first scenario, the 2017 and 2019 campaigns were especially problematic, with increases in both general populations, and in the male and 15-29 age group subgroups. In 2018, an effect was also detected in this age group alone. In the second scenario, on the other hand, there was an increase in suicide rates after the 2017 campaign, with an emphasis on males and the 30 to 59 age group. In 2019, there was a negative effect only in the 15 to 29-year-old subgroup.

Despite the above, it is unlikely that the YS campaign is directly responsible for the growth in deaths. Rather, what can be surmised is that its effect was insufficient to reduce suicides during the period, while also failing to maintain a certain level of stability.

Such data are in line with the literature in proposing that campaigns focused solely on publications through the media generate unsound findings regarding the effective reduction of the number of deaths by suicide, as they do not convert into health care or modification of psychosocial situations that are risk factors for the lethal outcome.^{13,17,26} However, these actions seem to be important in the sense of increasing the degree of information of the common society about the theme, decreasing the stigma, and increasing the demand for services focused on mental health.¹⁵ Moreover, although campaigns of this type can promote an increase in the demand for specialized help, there is not always an increase in the supply of services, which, in Brazil, are mainly represented by the Psychosocial Care Centers (CAPS - *Centros de Atenção Psicossocial*).¹⁷

Another important point to raise is the hypothesis supported by Chart 2, that Yellow September, by not changing the trend of suicide growth in Brazil, caused deleterious results, which could be explained by the *Werther* effect.²⁷

In this context, campaigns that develop broad and multi-pronged actions tend to have more promising results, as supported by a systematic review with meta-analysis, finding more significant effects in multilevel campaigns.¹² Take for example the work that demonstrated significant decreases in the number of suicides with the implementation of the Nuremberg Alliance Against Depression (NAD) and the "Zero Suicide" campaign.^{28, 29} These campaigns have, as some of their purposes, to act in a permanent way toward: a) training physicians to screen suicidal patients and manage these cases in a systematic and evidence-based manner; b) reducing access to means; c) developing selective and indicated strategies; and d) promote longitudinal follow-up of patients presenting suicidal behavior. Another systematic review,³⁰ while attesting to the effectiveness of withdrawing means, maintaining longitudinal follow-up, and setting up centers focused on emergency care, failed to validate the effectiveness of training physicians and applying information campaigns in suicide prevention.

In the context of medical education, the findings of interventional studies suggest that specific training on suicide risk management for physicians, especially in the context of primary care, can generate positive impacts in reducing cases of death by suicide.^{31,32} However, even while the 2014 National Curriculum Guidelines (NCGs) contain sections highlighting the importance and mandatory inclusion of topics related

to mental health and medical emergencies, only a small portion of Brazil's federal medical schools address this topic in their curriculum.³³

From this perspective, the fact that YS is a one-off action that does not emphasize training for physicians and other professionals in Primary Health Care (PHC) and emergency room settings may be one reason why the findings of this study were not as expected.^{34,35}

For comparison purposes, suicide mortality rates have decreased globally from 2010 to 2019.³⁶ Suicide mortality rate has decreased 4,7% on the American continent when compared with the average suicide rate between the 2010-2014 and 2015-2019 period, while in southern cone the comparison between the same periods has shown a 2,0% decrease.^{37, 38} Our study has shown a 14,3% increase when comparing the average suicide rate from 2011-2014 and 2015-2019 period, which means it is unlikely that international or regional tendencies could influence our conclusions regarding YS effectivity.

When considering the findings and considerations of this study, it is important to point out the following limitations: a) the data were from a secondary base (SIM-DATASUS) and may contain filling errors and underreporting of deaths; b) as this is an ecological study that evaluated the impact of a national campaign, the conclusions are drawn only for the aggregate population and have neither the pretension nor the ability to discuss the cases individually; c) although the statistical model controlled for variations due to increasing historical trend and seasonality, other variables potentially correlated with national suicide rates, such as unemployment level and proportion of single people, were not considered.

CONCLUSIONS

This study demonstrated that YS implementation was unable to reduce the historical trend of an increase in the suicide rate in Brazil. Despite its propositions to disseminate valuable information on mental health, reduce stigma and encourage the search of individuals for professional assistance, the campaign lacks initiative in multisectoral actions, such as development of the assistance network, longitudinal strategies for monitoring risk groups, training, and professional development, which may explain the failure. The development of new programs focused on these

questions, in order to improve the campaign, **could make** it an effective instrument for reducing suicide mortality.

ACKNOWLEDGMENTS

The authors would like to thank Kevin Boyd Machado Campos and Ana Carolina do Espírito Santo Melo for the general support, and English language proof-reading of this article. We would also like to thank the *Liga Acadêmica de Psiquiatria da Universidade Federal da Bahia* for being an innovative study group that encourages scientific research.

This study did not receive financial support and the authors declare no conflict of interest.

REFERENCES

1. Durkheim E. Suicide. Spaulding LA, Simpson G, translators. Glencoe (IL, USA): Free Press. 1951.
2. Brådvik L. Suicide risk and mental disorders. *Int J Environ Res Public Health*. 2018;15(9).
3. Moscicki EK. Identification of suicide risk factors using epidemiologic studies. *Psychiatr Clin North Am*. 1997;20(3):499–517.
4. Holman MS, Williams MN. Suicide Risk and Protective Factors: A Network Approach. *Arch Suicide Res*. 2020;26(1):1–18.
5. World Health Organization. Preventing Suicide: A global imperative. Geneva, WHO. 2014.
6. Ministério da Saúde. Mortalidade por suicídio e notificações de lesões autoprovocadas no Brasil. *Boletim epidemiológico*. 2021;52(33):1-10.
7. Bachmann S. Epidemiology of suicide and the psychiatric perspective. *Int J Environ Res Public Health*. 2018;15(7).
8. Platt S, Arensman E, Rezaeian M. National Suicide Prevention Strategies - Progress and Challenges. *Crisis*. 2019;40(2):75–82.
9. Pak K, Ferreira KE, Ghahramanlou-Holloway M. Suicide Postvention for the United States Military: Literature Review, Conceptual Model, and Recommendations. *Arch Suicide Res*. 2019;23(2):179–202.
10. Scavacini K, Cornejo ER, Cescon LF. Grupo de Apoio aos Enlutados pelo Suicídio: uma experiência de posvenção e suporte social. *Rev M Estud sobre a morte, os mortos e o morrer*. 2019;4(7):201
11. Szumilas M, Kutcher S. Post-suicide intervention programs: A systematic review. *Can J Public Heal*. 2011;102(1):18–29.

12. Hofstra E, van Nieuwenhuizen C, Bakker M, Özgül D, Elfeddali I, de Jong SJ, et al. Effectiveness of suicide prevention interventions: A systematic review and meta-analysis. *Gen Hosp Psychiatry*. 2020;63:127–40.
13. Oexle N, Niederkrotenthaler T, Deleo D. Emerging trends in suicide prevention research. *Curr Opin Psychiatry*. 2019;32(4):336–41.
14. Lima DPA, Brandão CB. 5 anos de Campanha Setembro Amarelo: Estamos conseguindo prevenir suicídios? *Res Soc Dev*. 2021;10(7):e16210716312.
15. van der Burgt MCA, Beekman ATF, Hoogendoorn AW, Berkelmans G, Franx G, Gilissen R. The impact of a suicide prevention awareness campaign on stigma, taboo and attitudes towards professional help-seeking. *J Affect Disord*. 2021;279:730–6.
16. Platt S, Niederkrotenthaler T. Suicide Prevention Programs: Evidence Base and Best Practice. *Crisis*. 2020;41:S99–124.
17. Torok M, Caelear A, Shand F, Christensen H. A Systematic Review of Mass Media Campaigns for Suicide Prevention: Understanding Their Efficacy and the Mechanisms Needed for Successful Behavioral and Literacy Change. *Suicide Life-Threatening Behav*. 2017;47(6):672–87.
18. Brazil. Law nº 13.819, on 26 april 2019. Establishes the National Policy for the Prevention of Self-Mutilation and Suicide. *Official Diary of the Union* 2019; 26 april.
19. Oliveira MEC, Gomes KA, Nóbrega WFS, Gusmão ECR, Santos RD, Franklin RG. Série temporal do suicídio no Brasil: o que mudou após o Setembro Amarelo? *Rev Eletrônica Acervo Saúde*. 2020;(48):e3191.
20. Brazil. Ministry of Health. Mortality Information System [Internet]. Informatics Department of the Brazilian National Health System (DATASUS); 2022 [cited on 2022 Mar 19]. Available from: <http://tabnet.datasus.gov.br/cgi/deftohtm.exe?sim/cnv/obt10uf.def>
21. Brazilian Institute of Geography and Statistics. Population Projections [Internet]. IBGE; 2018 [cited 2022 Mar 20]. Available from: <https://www.ibge.gov.br/estatisticas/sociais/populacao/9109-projecao-da-populacao.html?=&t=resultados>
22. Bernal JL, Cummins S, Gasparrini A. Interrupted time series regression for the evaluation of public health interventions: A tutorial. *Int J Epidemiol*. 2017;46(1):348–55.
23. Rodrigues CD, de Souza DS, Rodrigues HM, Konstantyner TO. Trends in suicide rates in Brazil from 1997 to 2015. *Brazilian J Psychiatry*. 2019;41(5):380–8.
24. Turecki G, Brent DA. Suicide and suicidal behaviour. *Lancet*. 2016;387(10024):1227–39.
25. Naghavi M. Global, regional, and national burden of suicide mortality 1990 to 2016: systematic analysis for the Global Burden of Disease Study 2016. *BMJ*. 2019;364:l94.
26. Dumesnil H, Verger P. Public awareness campaigns about depression and suicide: A review. *Psychiatr Serv*. 2009;60(9):1203–13.
27. Domaradzki J. The Werther Effect, the Papageno Effect or No Effect? A Literature Review. *Int J Environ Res Public Health*. 2021;18(5):1–21.

28. Hegerl U, Althaus D, Schmidtke A, Niklewski G. The alliance against depression: 2-year evaluation of a community-based intervention to reduce suicidality. *Psychol Med.* 2006;36(9):1225–33.
29. Hogan MF, Grumet JG. Suicide prevention: An emerging priority for health care. *Health Aff.* 2016;35(6):1084–90.
30. du Roscoät E, Beck F. Efficient interventions on suicide prevention: a literature review. *Rev Epidemiol Sante Publique.* 2013;61(4):363–74.
31. Roskar S, Podlesek A, Zorko M, Tavcar R, Dernovsek MZ, Groleger U, et al. Effects of training program on recognition and management of depression and suicide risk evaluation for Slovenian primary-care physicians: follow-up study. *Croat Med J.* 2010;51(3):237–42.
32. Rutz W, Knorrung L von, Wålinder J. Long-term effects of an educational program for general practitioners given by the Swedish Committee for the Prevention and Treatment of Depression. *Acta Psychiatr Scand.* 1992;85(1):83–8.
33. Aguiar Jesuino T, Camelier-Mascarenhas M, Santos Ferreira T, Barreto de Farias J, de Oliveira Lima L, Santos Oliveira IM. Suicide as a medical education curricular topic: a documentary analysis of Brazilian federal medical schools. *J Public Ment Health.* 2022;21(2):143–51.
34. Jobes DA, Gregorian MJ, Colborn VA. A stepped care approach to clinical suicide prevention. *Psychol Serv.* 2018;15(3):243–50.
35. Pitman A. Suicide prevention in England. *BMJ.* 2019;366:l5102.
36. World Health Organization. Suicide worldwide in 2019: global health estimates. WHO; 2021 [cited 2023 Jan 30]. Available from: <https://www.who.int/publications/i/item/9789240026643>
37. Pan American Health Organization. Suicide Mortality in the Americas: Regional Report 2010–2014. PAHO; 2021 [cited 2023 Jan 30]. Available from: <https://iris.paho.org/handle/10665.2/53348>
38. Pan American Health Organization. Suicide Mortality in the Americas: Regional Report 2015–2019. PAHO; 2021 [cited 2023 Jan 30]. Available from: <https://iris.paho.org/handle/10665.2/55297>