The Impact of Misinformation Promoted by the Brazilian Government on Social Mobility during the COVID-19 Pandemic

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Abstract. The circulation of misinformation during the COVID-19 pandemic was extremely detrimental to the control of disease spread in society, especially when such misinformation is propagated by state leaders. Therefore, this study aims to evaluate how a particular statement by the President of Brazil impacted the social mobility of the country. The analysis was conducted by comparing data from Google Mobility Trends before and after the selected event, resulting in the finding of a decrease in the social isolation index after the period in question.

Resumo. A circulação de desinformação durante a pandemia da COVID-19 foi extramente prejudicial ao controle da propagação da doença na sociedade,sendo ainda mais grave quando o discurso desinformativo é propagado por líderes estatais. Nesse sentido, este trabalho visa avaliar como, no caso do Governo Brasileiro, determinado pronunciamento do Presidente da República impactou na mobilidade social do país. A análise foi feita a partir da comparação dos dados proveniente do Google Mobility Trends antes e depois do evento selecionado, tendo como resultado a constatação de uma diminuição no índice de isolamento social após o período em questão.

1. Introduction

One of the challenges faced during the Covid-19 pandemic was the dissemination of false information, which hindered the efforts to combat and contain the disease on a global scale. Among the misinformation were reports about the use of drugs whose efficacy had not been verified, downplaying Covid-19 as a non-fatal disease, and statements made by high-ranking officials from countries such as the United States, the United Kingdom, and Brazil, which failed to encourage the public to adopt the Covid-19 containment policies recommended by the World Health Organization (WHO), among other factors.

This study aims to analyze the impact of state leaders' speeches during the Covid-19 pandemic, focusing on the analysis of urban mobility among Brazilians who use the Android operating system. Such data is made available through Google Mobility Trends and was processed by Our World in Data [Mathieu et al. 2020].

In this article, we examine the speech made by former President Jair Messias Bolsonaro on March 24, 2020, in which he portrayed Covid-19 as a flu-like illness that poses no harm to humans [Uol 2020]. Our objective is to demonstrate the impact this speech had on the Brazilian population by analyzing urban mobility data, in order to assess the extent to which a speech that runs counter to the consensus of leading global health organizations can cause harm. Our findings indicate an increase in the number of cases of individuals who disregarded the government's containment measures.

To summarize, our objective is to investigate the following research questions:

RQ1: What is the impact of the misinformation promoted by former president Jair Messias Bolsonaro's speech on March 24, 2022, on social mobility during the COVID-19 pandemic?

RQ2: Which are the main environments that showed the greatest variation in social mobility promoted by the former president's speech?

To address these research questions, we explored the graphs provided by [Mathieu et al. 2020] and the variation measure Δ (Delta), which shows the variation in social mobility from the current day compared to the previous day. This variation is important to analyze the projection of daily values, as it allows us to measure whether there was a reduction or increase in that index. The results show that there was an impact from the speech given by former president Jair Bolsonaro on March 24, 2020, resulting in an increase in the circulation of people in public and private spaces, such as supermarkets, parks, and public transportation, among others. Furthermore, we discovered that the largest variation in Delta occurred in the public transportation segment and in people going to work.

This paper is structured as follows: Section 2 presents the methodology adopted in this work and its definitions, Section 3 presents the information obtained from the case study, and in the Conclusion and Future Work section (4), we present the main findings of our research and outline future research directions.

2. Methodology

This study takes into account the methodology presented by [Lisboa et al. 2020], in which several case studies were selected to verify how misinformation propagated by state leaders influenced Google search for terms used in selected speeches. Thus, the objects selected here were one of the cases from the cited work, with the analysis of social mobility before and after the specified dates.

2.1. Definition of Disinformation

The work of [Lisboa et al. 2020] utilizes the definition presented by [Posetti and Bontcheva 2020], which was adopted by the United Nations Educational, Scientific and Cultural Organization (UNESCO). According to this definition, misinformation refers to content that contains false or manipulated information, which has the potential to cause negative impacts on society. In this regard, the authors identify around nine types of COVID-19-related misinformation, which are:

1. **Origin and Spread of the Disease:** These involve conspiracy theories about the origin of the virus or the use of xenophobic nomenclature to refer to the disease;

2. **False or Misleading Statistics:** These are related to the incidence or mortality rate of the disease;
3. **Economic Impacts:** These attempts to associate that social isolation is not economically viable;
4. **Discrediting the Press:** These attempt to discredit news outlets with dubious accusations;
5. **Symptoms, Diagnosis, and Treatment:** These pertain to any symptom, diagnosis, or treatment that lacks scientific backing;
6. **Impacts on Society and the Environment:** These relate to panic messages involving the supply of personal inputs, the lockdown of cities, or environmental issues;
7. **Partisanization of the Disease:** These associate some stance or problem involving the pandemic with a certain party or ideological current;
8. **Financial Scams:** These allude to the theft of people's private data;
9. **Celebrities with Covid-19:** These link false stories about celebrities with the diagnosis of the disease.

2.2. Selected Country

One of the cases identified by [Lisboa et al. 2020] was selected for this study. This case concerns the statement made by the former president of Brazil, Jair Bolsonaro, on March 24, 2020, as reported by [Uol 2020]. This case was selected because it involves a high-level state leader in a country that experienced a high number of COVID-19 cases. Furthermore, the absence of a national social isolation plan resulted in the adoption of restrictive measures by the states and municipalities.

These factors were also highlighted in the study conducted by [Ventura and Reis 2021], which analyzed 3049 regulations issued by the Brazilian state regarding COVID-19. The authors selected three areas for analysis: federal regulatory acts obstructing measures taken by state and municipal governments, and official propaganda. The statement made by the former president falls under the last category.

2.3. Google Mobility Trends

The main database used in this study was **Google Mobility Trends**, made available by **Our World in Data** [Mathieu et al. 2020]. It is a database about social mobility provided by Google, which records the movement values of Android users over time. Six parameters are used: retail and leisure, grocery and pharmacy, parks, public transport stations, workplaces, and residential areas. The values are described as a percentage and can be positive or negative, with the percentage compared to the average value of comparative movement with the corresponding pre-pandemic periods from 03/01/2020 to 06/02/2020.

This database was chosen due to the high popularity of the Android operating system and the data being made available by Google during the pandemic. The observation window was selected considering the variation of daily values about the previous day, evaluating the seven days before and seven days after the speech.

Another point of choosing this database is its use in the literature to assess the effects of restrictive measures, such as in [Sun et al. 2021] and [Martinez-Valle 2021].

The former evaluated such measures in the context of the United States, while the latter analyzed some Latin American countries such as Argentina, Brazil, Chile, Colombia, Mexico, and Peru. In this line, the work of [Chagas et al. 2021] stands out, which used such a database to evaluate how social mobility impacts the spread of the COVID-19 virus in Brazil, finding a strong influence and proposing hypothetical scenarios in which more restrictive measures had been adopted.

3. Results and discussion

The speech delivered by former Brazilian President Jair Bolsonaro on March 24, 2020, in which he compared COVID-19 to mild flu that causes no significant harm to humans, was selected for analysis [Uol 2020]. This type of statement is classified as types 3 and 5 misinformation according to the classification proposed by [Posetti and Bontcheva 2020], as pointed out by [Lisboa et al. 2020].

In this section, we will analyze the time period described, in which the Δ (Delta) was analyzed. The Δ is the variation in social mobility from the current day compared to the previous day. This variation is important to assess the projection of daily values, as it enables us to measure whether there has been a decrease or increase in that index. For example, if there is a rate of 20% on one day and 21% on the following day, there is a positive Δ value of 1%.

To determine the trend before and after the speech, the seven days prior and seven days after the speech were selected to evaluate the Δ. Figure 1 shows the variance in the Δ between the pre-and post-speech days. It is observed that before the speech, the number of people staying at home increased, approaching a 3% variation compared to the previous day. However, after the speech, the rate began to decline, with the variation tending towards -1%.

Figure 1 provides a visual representation of the trend analysis for the Δ between the pre-and post-speech periods.
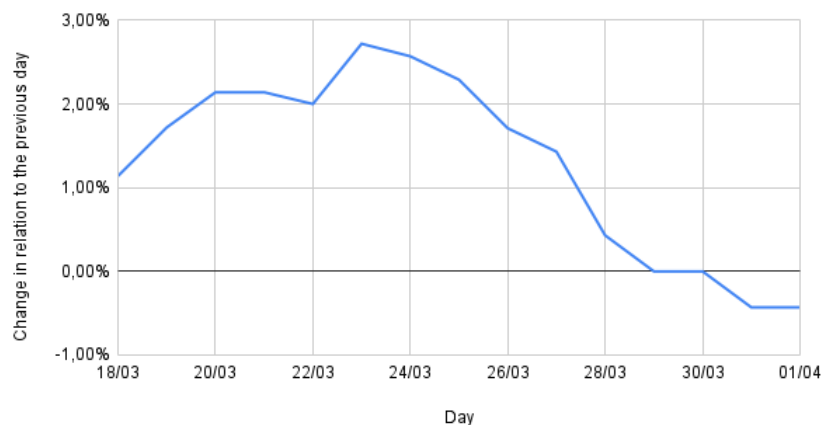

Figure 1. Brasil: Delta spent at home

Figure 2 demonstrates that the number of people circulating in grocery stores and pharmacies was clearly decreasing until the day of the speech. One day after the speech, it

is observed that the rate of variation began to increase, reaching 2%. This is an interesting fact since the rate of variation had approached -6%.
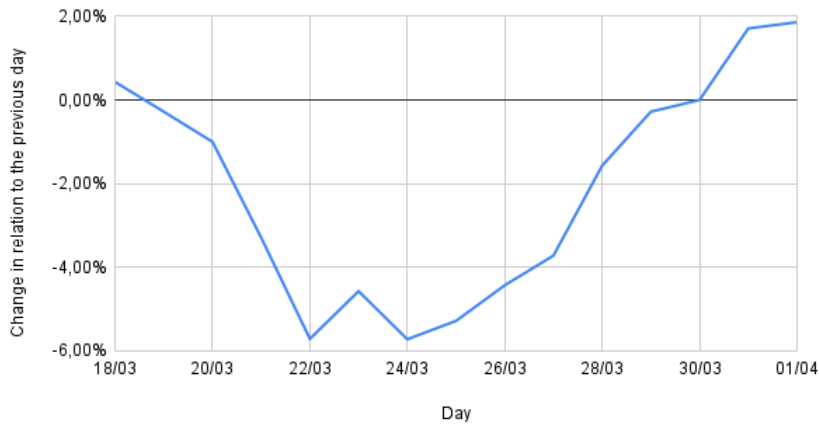

Figure 2. Brasil: Delta Grocery and Pharmacy

The variation in people's mobility within parks and open areas can be analyzed through the graph presented in Figure 3. Analogous to Figure 2, the curve depicting the variation in mobility exhibited a downward trend, approaching -8%. However, following the speech, there was a noticeable upward trend in the curve, approaching 2%.
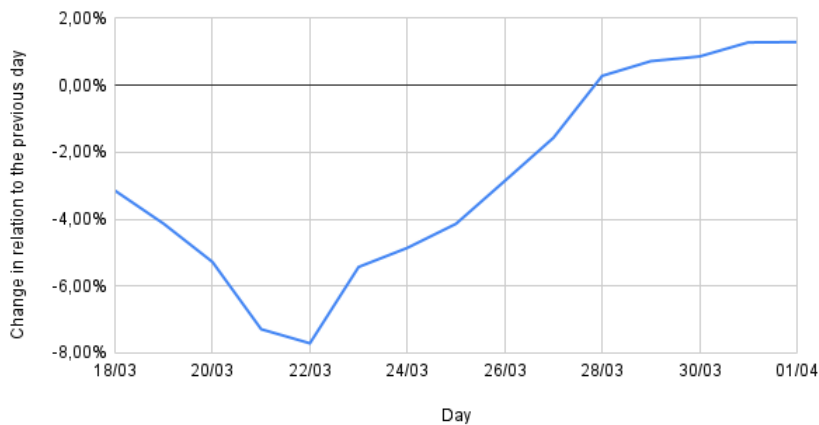

Figure 3. Brasil: Delta Parks and Outdoor Spaces

Figure 4 illustrates an increase in the Delta variation, indicating a rise in the number of people circulating in the streets following the speech delivered by former president Jair Bolsonaro. Specifically, on the day of the speech, the Delta variation was -7.5%, while in the subsequent days, there was a positive increase in the Delta variation, reaching over 1% after seven days.

The variation in the circulation of people using public transportation can be analyzed in Figure 5. Before the speech, the number of people gradually decreased, approaching -8%. However, immediately following the speech, there was a noticeable increase in the variation curve, approaching 2%.
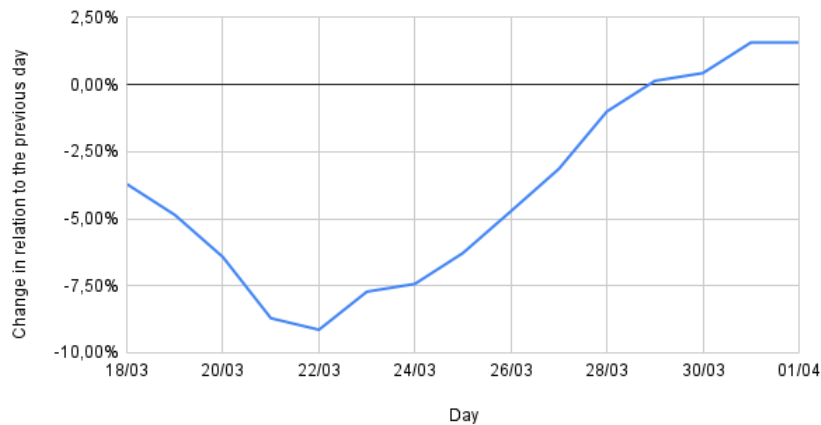
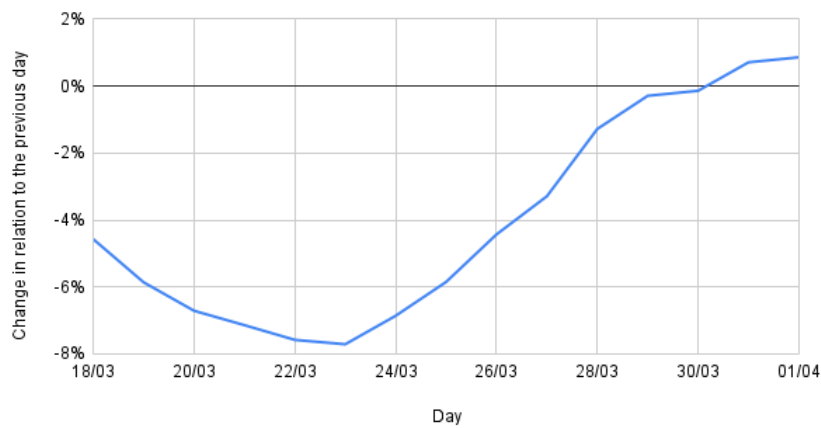**Figure 4. Brasil: Delta Retail and Recreation**

Figure 5. Brasil: Delta Public Transport

The Delta variation presented in Figure 6, when analyzed before the speech, exhibits a decrease in the number of people in the workplace. However, following the speech, there was an increase in the number of people commuting to work, which is consistent with the trend observed in Figure 5.

All analyzed cases exhibit a similar pattern, where before the speech, mobility in public spaces was gradually decreasing, while the number of people staying at home was increasing. However, this scenario is entirely reversed following the former president's speech, with people beginning to downplay the severity of the COVID-19 pandemic, leading to a reduction in safety measures established by healthcare institutions.

These findings are consistent with the results reported by [Martinez-Valle 2021], who found that until the beginning of April 2020, there was an 80% reduction in mobility due to social distancing measures. Nevertheless, after that point, the effectiveness of social distancing measures was significantly reduced.
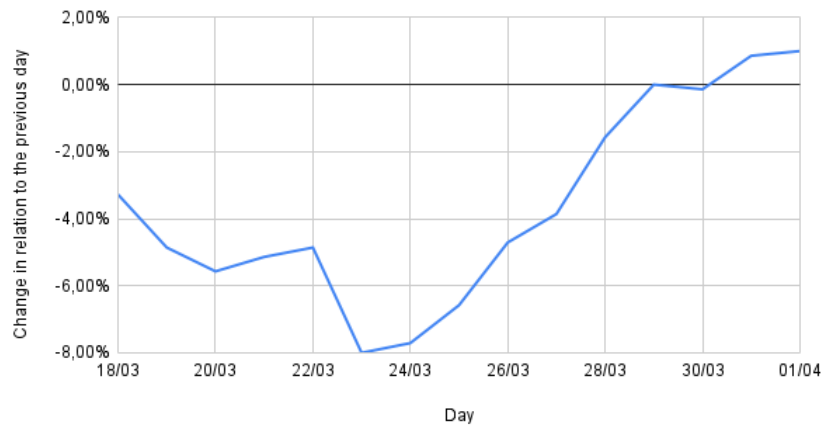
Figure 6. Brasil: Delta Worplace visitors

4. Conclusion and Future Work

It is evident that a few days after the speech, the number of people staying at home began to decrease, while in all other scenarios evaluated, it began to increase. Another relevant point to note is that on the day of the speech, the daily variation began to change, indicating that fewer people were adopting social distancing practices. Therefore, it can be inferred that the speech given by the former president had a negative impact on the population's adherence to social distancing measures.

This finding is consistent with the study presented by [Ventura and Reis 2021], which also indicated that the norms and advertisements produced by the Federal Government weakened public adherence to preventive health measures.

As future work, it is suggested to apply this methodology in other case studies to evaluate the influence of misinformation on social mobility in other locations. Additionally, the addition of more variables may contribute to the understanding of the spread of misinformation in other contexts.

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