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Hygiene Awareness and Educational Measures on Seasonal Epidemics: Case study of 2020 Dengue Fever Outbreak in Singapore

Jiayi Chen

United World College South East Asia, Singapore

chen134939@gapps.uwcsea.edu.sg

Abstract:

Since early 2008, dengue – a tropical infectious disease with vector Aedes mosquitoes – was thought to be fully controlled in Singapore. However, cases of dengue infection suddenly accumulated in 2020, as the result of several interweaving factors. This review emphasizes on a rarely-mentioned aspect in the 2020 dengue epidemic – social awareness. The impact of government propaganda is analyzed through the statistics of National Center for Infectious Disease (NCID) Dengue Articles during the Covid-19 pandemic (2017-2021). The trend is further analyzed with a statistical model established on Covid-19 propaganda to study the link on hygiene awareness, between Covid-19 and dengue. In addition, to further quantify the concept of "social awareness", a Knowledge, Attitude and Practice (KAP) survey is established on dengue knowledge and awareness across 3 communities in Tampines, Singapore. The results are studied and compared with a similar 2022 cross-sectional study to identify areas of achievement and improvement. With this new aspect, the effectiveness of dengue education and social support can be extensively promoted in Singapore. For future success, Singaporean citizens should regain their knowledge and alertness of dengue infection. Besides more frequent family and school education, the application of interactive, updated means (i.e. online educational platforms) should also be encouraged. Additionally, education and social support should also focus on the elderly, as KAP survey suggest they score comparably less in hygiene AKP than younger generations.

Keywords: Dengue; propaganda; hygiene awareness; education.

1. Introduction

Dengue Fever (DF) is a seasonal epidemic transmitted by the Aedes mosquito [1]. Globally, there is a ten-fold increase of DF incidence in the past 20 years, from 505,430 cases in 2000 to over 5.2 million cases in 2019 [1]. Locally, DF remains the most common mosquito-borne fever in South-east Asia [2]. Singapore, especially, has a historical role in the combat against DF. Since 1960s, large DF epidemics occurred almost every year [3]. Yet, after the massive hygiene campaign ("Keep Our City Clean") was put in place in 1968, it immediately incorporated source reduction, health education, and law enforcement [4]. The dengue incidence decreased from 42.2 per 100,000 population in 1969 to 8 cases per 100,000 population for the next thirty years [5]. Consequently, since 2008, the disease was thought to be fully controlled in Singapore.

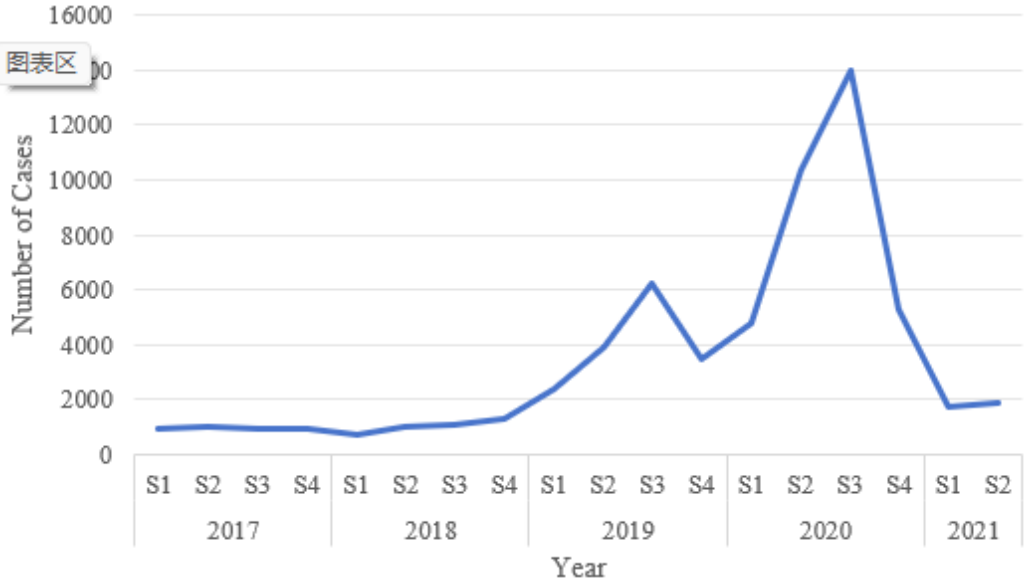

Fig. 1 Dengue incidence rate (2017-2021) (picture credit: original).

In 2019-2020, however, Singapore experienced its highest number of dengue cases in the past decade. As shown in Fig 1, at the peak of the epidemic, there is a documented total of 35,315 cases, and 32 reported deaths [6]. Concerning as it is, this unusual peak in dengue incidence provides us with valuable insights on the current dengue control system and its possible flaws. While vector control remains the primary method of mitigating dengue cases in Singapore, several key factors have fueled the rise in DF in recent years and possibly limited the effectiveness of local vector control methods [1]. One of the most overlooked factors is hygiene awareness. During the 2019-2020, there was a recorded decrease in dengue awareness in both the government and the general public. Consequently, Singapore showed unusual venerability to DF [5]. This study aims to quantitatively evaluate the effect of hygiene awareness on dengue incidence during the 2019-2020 Dengue outbreak, including the aspects of government propaganda and public understanding. The insights will provide opportunities to further refine the hygiene education systems and social support structures for dengue infection.

2. Hygiene Awareness

2.1 Official Propaganda

In this study, the amount of National Center of Infectious Disease (NCID) Dengue Articles is calculated to quantify the government propaganda during dengue outbreaks. As the primary reporting headquarter for infectious disease, NCID plays a pivotal role in establishing dengue incidence rate by collecting first-hand statistics from hospitals, clinics, healthcare centers around the country [7].

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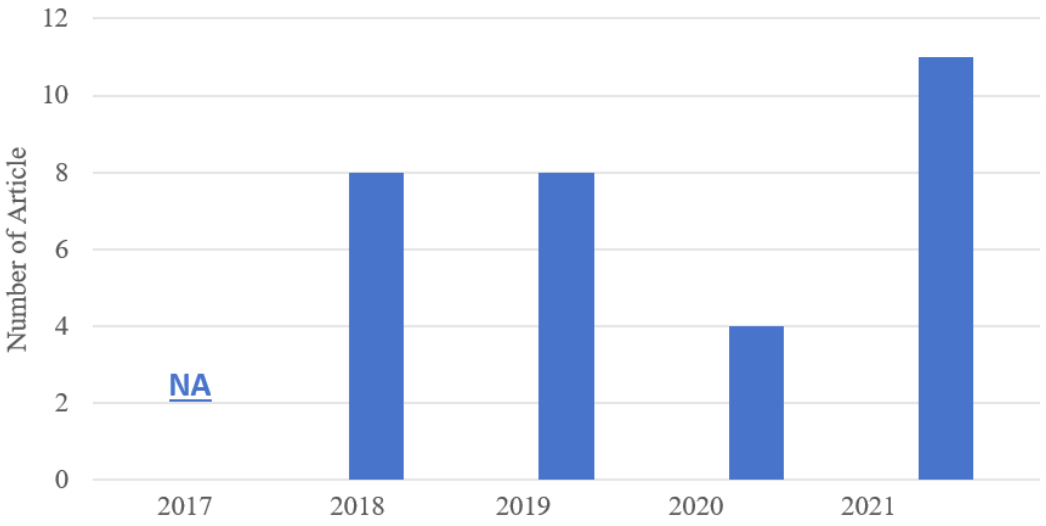

Fig. 2 NCID Dengue articles (2017-2021) (picture credit: original).

As shown in Fig 2, there is a notable shift in the number of NCID dengue warnings issued from 2017 to 2021. While the number of dengue articles remained stable at 8 in 2018-2019, in 2020 there was a marked decrease by 50%, down to only 4 warnings. However, in the following year, the NCID warnings rose back to 11, reaching a historic high [8]. The sudden shift in the number of NCID dengue warnings coincides with a reported peak in dengue cases during this period, indicating a potential negative correlation between government propaganda and the disease's prevalence. Specifically, an increase in government propaganda should lead to an increase in the overall dengue awareness of citizens, which in turn should decrease the prevalence of the disease.

With its profound experience of dengue monitoring, Singaporean government should be well-informed with the timing and intensity of every public propaganda. However, the 2020 dengue outbreak suggests otherwise. One possible explanation for this phenomenon lies in the fact that 2020 was marked by the COVID-19 pandemic, which undoubtedly diverted significant attention and resources from other infectious diseases, including dengue.

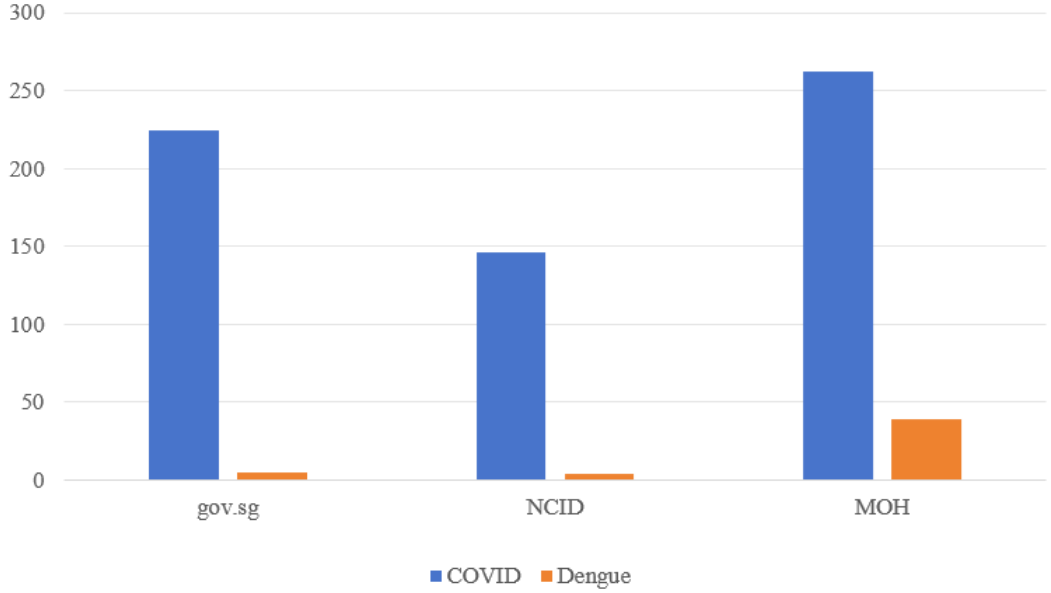

Fig 3. Infectious disease propaganda (2017-2021) (picture credit: original).

As shown in Fig 3, the propaganda for Covid-19 is highly intense. Specifically, the number of related articles exceeds all other infectious diseases combined. Even for NCID, when the dengue infection reaches its peak in July, the office has only issued 4 dengue articles; meantime, however, it has released over 140 Covid-19 warnings to the public [9-11]. As the world grappled with the spread of COVID-19, public health discourse and resources were

largely focused on containing and mitigating the impact of this novel virus. This shift in focus likely led to a decrease in the public propaganda on dengue, as well as a reduction in the resources allocated to surveillance and prevention programs.

2.2 Public Dynamic

In this study, the public dynamic of dengue awareness is analyzed with Knowledge, Attitude and Practice (KAP) survey. With reference to a similar 2022 cross-sectional study, the survey includes 5 multiple choice questions to assess the transmission and pathogen recognition (knowledge), hygiene awareness (attitude) and daily behaviors (practice) of the interviewee [12]. For the convenience of later comparison, the survey is based in the same location of the 2022-study, in 3 HDB communities in Tampines.

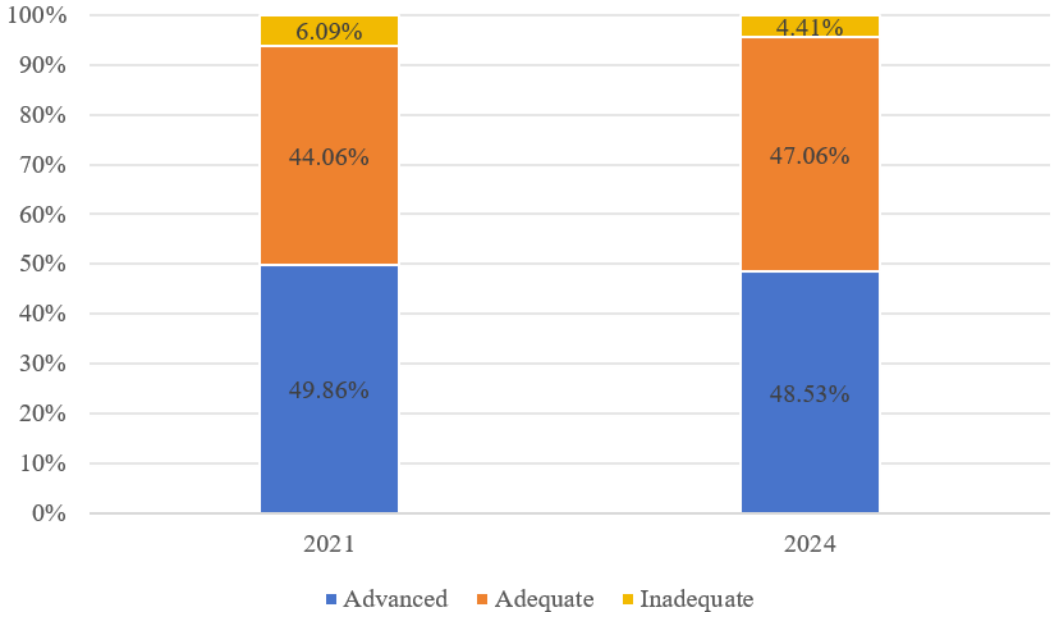

Fig. 4 Comparison of resident dengue awareness (picture credit: original).

During the survey, 70 questionnaires are issued with 68 valid responses. As shown in Fig 4, there has been a noticeable shift in public awareness in Singapore. Current data indicates that 4.41% of residents fall under the inadequate category, leading to a 1.68 percentage point decrease in the dengue illiteracy of the public. Another 47.06% of residents exhibit adequate dengue awareness, an increase of 3 percentage point compared to 2021 [12]. However, only 48.53% of residents have advanced dengue awareness, meaning they possess a comprehensive understanding of dengue symptoms, transmission, and prevention measures. This further highlights the need for continued education and outreach efforts.

When comparing the current study results with 2021 dengue awareness statistics, it is evident that public knowledge about dengue has improved. However, as signified by the slight decrease in advanced-level population, there are still significant gaps in attitudes and practices in Singaporean residents. Therefore, a common theme in both the 2021 study and recent statistics is the importance of education and outreach efforts in enhancing dengue prevention practices. The finding that higher dengue knowledge is associated with better prevention practices underscores the need for targeted interventions aimed at improving KAP, particularly among high-risk groups. Moreover, the similarities in knowledge levels between in 2021 suggest that public education campaigns have been effective in disseminating information about dengue symptoms and mosquito preventive measures across the population. However, to further reduce dengue incidence, it is also crucial to address the disparities in attitudes and practices.

3. Solution

3.1 Strengthen Family Education

Strengthening family education is a crucial step towards increasing dengue awareness among Singaporeans, as it plays a pivotal role in shaping individuals' understanding and behavior towards health-related issues. By empowering families with knowledge and skills, we can effectively mitigate the spread of this disease and protect our community's well-being. Family education are especially important at a young age, where parents and caregivers serve as the first line of defense against dengue. They can educate

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preschool children about the importance of maintaining cleanliness and hygiene through little stories or picture books. By involving children in these activities, they learn valuable lessons about personal responsibility and the impact of their actions on public health [13].

In addition, the knowledge of parents is also essential for good family education. Therefore, caregivers should be educated regularly about the symptoms of dengue fever, which include high fever, severe headache, joint pain, etc. When the young children are infected, this knowledge is crucial for early detection and prompt medical attention, significantly reducing the risk of complications and death.

As the children grow, family as a whole should be involved in dengue education programs. To enhance these efforts, healthcare providers can collaborate to develop educational materials and programs, aiming to engage all family members. For instance, interactive workshops, with special activities for different age groups and learning styles, can be used to make learning more accessible and enjoyable [14]. Families can also be encouraged to participate in community-wide dengue prevention initiatives, such as the National Environment Agency's (NEA) "Clean and Green Singapore" campaign. These initiatives not only promote environmental stewardship but also foster a sense of community engagement and ownership in dengue control efforts. By working together, families can create a safer and healthier living environment for themselves and their neighbors.

3.2 Strengthen School Education

Incorporating an online "hygiene awareness" education platform into school education is a powerful way to increase dengue awareness among Singaporeans, particularly among the younger generation [15]. With the increasing prevalence of digital tools and the internet, leveraging these platforms can make health education more accessible, engaging, and effective. Schools are natural hubs for promoting hygiene awareness, as they are where children spend a significant portion of their time and are at a formative stage of their lives. By integrating an online hygiene awareness education platform into the curriculum, schools can ensure that students receive comprehensive and up-to-date information about dengue and its prevention.

Sponsored by SGM Childcare Center (Tampines), the Wechat mini-program, Denaway, is developed. This will be a vivid example of hygiene awareness education. Designed to be interactive and engaging, the platform involves multimedia content such as videos, animations, and quizzes that capture students' attention and reinforce key concepts. The content of the platform is still practical and scientific, covering various aspects of dengue prevention, including proper disposal of trash and stagnant water, use of mosquito repellents, and wearing protective clothing during peak mosquito-biting hours. In the future, similar platform can also provide students with more opportunities to practice what they have learned through interactive simulations and real-world scenarios. For example, students can participate in virtual clean-up activities or design mosquito-proof homes in simulation games, which can help them understand the practical applications of hygiene practices.

Another advantage of an online hygiene awareness education platform is its scalability. With the ability to reach a large number of students simultaneously, this platform can help ensure that hygiene awareness becomes a widespread and deeply ingrained part of Singaporean culture.

Furthermore, the platform can also serve as a resource for parents and teachers, providing them with educational materials and guidance on how to reinforce hygiene practices at home and in the classroom. This collaborative approach can help create a consistent and supportive environment for promoting hygiene awareness and preventing dengue.

3.3 Strengthen Social Support

Strengthening social support structures is crucial in improving hygiene awareness and furthering dengue prevention among elderly people in Singapore. As the elderly often face physical and cognitive challenges, it is more challenging for them to maintain good hygiene practices and gain protection from mosquito-borne illnesses like dengue. Therefore, it is essential to provide elderly individuals with the necessary support and resources to help them stay healthy and informed [15].

One way to strengthen social support structures for the elderly is to establish home-care programs that focus on hygiene education and mosquito control. These programs can involve regular visits from healthcare professionals or volunteers who can provide personalized guidance and support to elderly individuals [16]. Regular visits can include demonstrations of proper hygiene practices, such as washing hands and cleaning living spaces, as well as tips on how to prevent mosquito bites and reduce the risk of dengue. Additionally, community-based programs can also involve organizing group activities that promote socialization and camaraderie among elderly individuals. By bringing people together, these activities can help create a sense of community and encourage elderly individuals to share their experiences and knowledge with each other. This can be particularly beneficial in spreading hygiene awareness and promoting good practices among this vulnerable group.

Furthermore, telehealth and other healthcare technology can also play a role in strengthening social support struc-

tures for the elderly [17]. These services can provide remote access to healthcare professionals who can monitor the health of elderly individuals and provide guidance on hygiene practices and dengue prevention.

4. Conclusions

In conclusion, the 2019-2020 dengue fever outbreak in Singapore serves as a poignant reminder of the ongoing challenge posed by seasonal epidemics, despite significant advancements in hygiene awareness and vector control measures. The study reveals that a decline in government propaganda and public awareness, partially due to the COVID-19 pandemic, contributed to the surge in dengue cases during this period. The shift in public health discourse and resources away from dengue and towards COVID-19 mitigation efforts underscored the need for a balanced approach to managing multiple infectious diseases concurrently. The analysis of NCID dengue articles and the public's dynamic of dengue awareness, through the KAP survey, highlights the importance of continuous and targeted educational campaigns. While there has been an improvement in public knowledge about dengue symptoms and prevention measures, significant gaps still exist in attitudes and practices, particularly among high-risk groups. This underscores the need for comprehensive hygiene education systems and social support structures that cater to diverse populations and learning styles. Strengthening family and school education emerges as a crucial strategy to mitigate the spread of dengue fever. By integrating interactive and engaging online hygiene awareness platforms into school curricula and empowering families with knowledge and skills, we can effectively foster a culture of health responsibility and community engagement. Additionally, targeting elderly individuals through homecare programs and telehealth services is essential to address the unique challenges they face in maintaining good hygiene practices. In summary, the control and prevention of dengue fever in Singapore require a multifaceted approach that combines robust vector control measures, continuous public education campaigns, and targeted interventions aimed at improving hygiene awareness and practices across all age groups. As the world continues to grapple with emerging infectious diseases, it is imperative to learn from past outbreaks and strengthen our public health systems to ensure resilience and preparedness for future challenges.

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