

Current COVID-19 in Tokyo-Japan, Hanoi-Vietnam and Ho Chi Minh-Vietnam-1

COVID-19 in the 23 Wards of Tokyo from April 6th to June 14th, 2020

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Novel coronavirus SARS-CoV-2 disease (COVID-19) has been spreading worldwide after the outbreak in Wuhan, China since December in 2019, and it caused pandemic. As of 15th, June in 2020, in Southeast Asia, the infection of 334 people and none of the death in Vietnam, and in East Asia, 17,439 people were infected and the death of 929 in Japan. In Tokyo, 5,619 (32.2% of all Japan) and 316 people have been infected and dead by COVID-19, respectively. We focused on infection of the virus in Tokyo's 23 wards in Tokyo metropolitan area from April 6th to June 14th. The peak of the infection in the 23 wards of Tokyo was confirmed in the third week in April in 2020, and then the number of the coronavirus infections decreased. The 23 wards can be separated clearly such as Zone 1, 2 and 3 by infectious incidence: Zone 1 downtown, Zone 2 inside of JR-Yamanote Line, and Zone 3 residential areas. The infection was markedly higher in Minato-ku and Shinjuku-ku, at the downtown of Tokyo. On the other hand, the number of infections were higher among young generation and lower among elder generation in the fourth week in April, hereafter the profile has been changed as elder aged infections increased in a V-shaped curve. The initial increase of male infected with the virus in April was due to infection of business commuters of 20s to 70s. After the Tokyo Metropolitan Government declared a state of emergency, the number of people infected decreased, being different for each ward in Tokyo. When bars and clubs were closed, the number of the infected people in Minato-ku at downtown and residential areas was decreased. These results suggest that working persons infected with the novel coronavirus spread the virus at home and social area. Therefore, social distance is required for protection of the infection spreading.

Introduction

Novel coronavirus SARS-CoV-2 disease (COVID-19) has been spreading worldwide after its outbreak in Wuhan, China since December in 2019, and it caused pandemic¹. As of 15th, June in 2020, 8,034,279 people infected with the virus and 436,848 died in the world. On the other hand, in Japan 17,439 people were infected and the 929 deaths were confirmed. In Southeast Asia, the World Health Organization (WHO) reported the infection of 3,135 people and 58 deaths in Thailand and the infection of 334 people and no

death in Vietnam.

In Tokyo, 5,619 people were infected and 316 died with COVID-19. In Tokyo, daily changes in the number were reported about new patients with the COVID-19². Clusters of coronavirus disease in various communities in Japan was reported^{3,4}. In addition, the high-risk places for COVID-19 infection were revealed. Outbreaks occurred specifically in the night restaurants, bars with the reception, the indoor sports gyms or live music houses. It was reported that Tokyo Metropolitan Government (TMG) carried out group inspection in downtown Shinjuku⁵. We focused on infection of the virus in Tokyo's 23 wards regarding venue, age, gender, time and other infection risks for understanding of current status.

Methods

For the data of infected people in each of the 23 wards in Tokyo, we used the press release issued by TMG. For the number of infected people in Tokyo and PCR tests, the data of TMG was used². Figures except Fig. 3 and Fig. 4 are the data of the 23 wards reported by TMG Office. Data in Fig. 3 and Fig. 4 were taken from the whole Tokyo area information of TMG; the number of patients was reported on that single day, not the cumulative total. However, for each ward, it is reported daily as a cumulative total and the correction was added all at once on May 11th. The population of Tokyo is based on the statistics of Tokyo⁶. And the number of restaurants, bars and clubs is based on the data of TMG in 2016⁷.

Results

Infection with COVID-19 was analyzed in the 23 wards of Tokyo from April 6th to June 14th. The peak of the infection in the 23 wards of Tokyo was confirmed in the second week of April in 2020, and then the number of infections decreased (Fig. 1). The estimated infection was higher than 20 persons/100,000 population in two wards such as downtown such as Minato-ku and Shinjuku-ku (Fig. 2a: ●). On the contrary, number of the infection in 10 wards in residential areas were below 10 persons/100,000 population

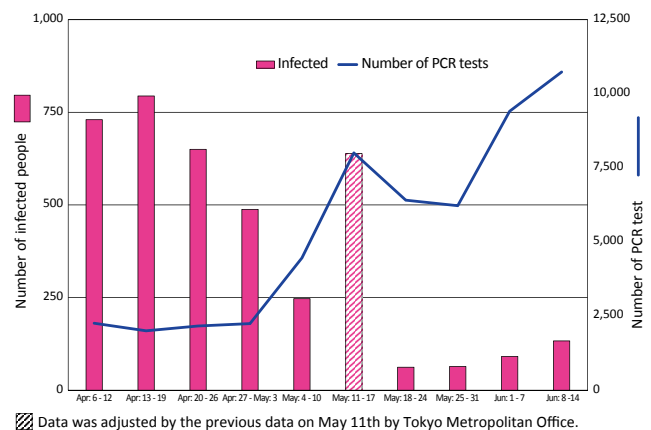


Figure 1. Time course of weekly infection of SARS-CoV-2 people and PCR tests in the 23 wards of Tokyo.

throughout all the survey period. Most of these wards are close to borders with neighboring prefectures and classified into Zone 3 on a map of the 23 wards of Tokyo (Figs. 2b, c). The 23 wards can be separated clearly such as Zone 1, 2 and 3 by infectious incidence: Zone 1 downtown, Zone 2 inside of JR-Yamanote Line, and Zone 3 residential areas (Fig. 2c). Wards in Zone 3 were lower than 10 infection people per 10,000 populations (Fig. 2d) and comparison of the infection in typical area between Zone 1: Minato-ku and Shinjuku-ku and Zone 3: Setagaya-ku and Itabashi-ku was shown in Fig. 2e.

Age group and gender in people with the infection were analyzed. Fig. 3 shows the differences in the number of the infection with COVID-19 according to age groups, <10, 10s, 20s, 30s, 40s, 50s, 60s, 70s, 80s and >90. The infection in young generation was higher and in elder generation was lower in the fourth week of April, hereafter the profile has been changed to a status in which the elder aged people increased in a V-shaped curve (Fig. 3).

On the other hand, changes in the number of infections separated by gender over time on a weekly basis were summarized in Fig. 4a and 4b. Initially, the infection was higher in male than in female, although no difference has been found between gender after April 20th, 2020 (Fig. 4a). The initial increase in male infections in April was due to those of age groups between 20s and 70s (Upper panel), but the infection increased in 20s female in the later period from May 11th to 17th (Fig. 4b).

Relative rate to 1st week infection between Shinjuku-ku and Minato-ku and residential areas were shown in Figure 5. Figs. 5b and c show the number of infected by weighting the number of restaurants and the number of bars and clubs. The profiles of the infection treated for closure in restaurants were like not-treated profile as “None” (Fig. 5b). After bars and clubs were closed due to the request from the prefectural government, the profiles of the infected people decreased than that in “None” (Fig. 5c, red arrow). And the profiles of residential areas, Setagaya-ku and Itabashi-ku, decreased due to closure of both “Restaurants” and “Bar and Clubs” (Figs. 5b and c green arrows).

Discussion

The peak of the infection with COVID-19 in the 23 wards of Tokyo was observed in the second and third week of April in 2020. This peak is mainly attributed to males in their 20s to 70s who probably commute for business to Zone 1. At the end of April, all generations were infected. However, generation shift was observed after the end of April. In addition, it may be suggested that the

infection in age of 80s and >90 may increase when young business commuters spread infection at their homes and/or at some homes for elderly people.

We may suggest that venue of the infection with COVID-19 in the 23 wards of Tokyo may have shifted depending on time as follows: 1) working places, 2) at home, and 3) at bars and clubs (Fig. 6). Thus, working persons infected with the novel coronavirus may spread infection at home and at bars and clubs during social activities⁴). Therefore, social distance is required for protection from the infection spreading⁸).

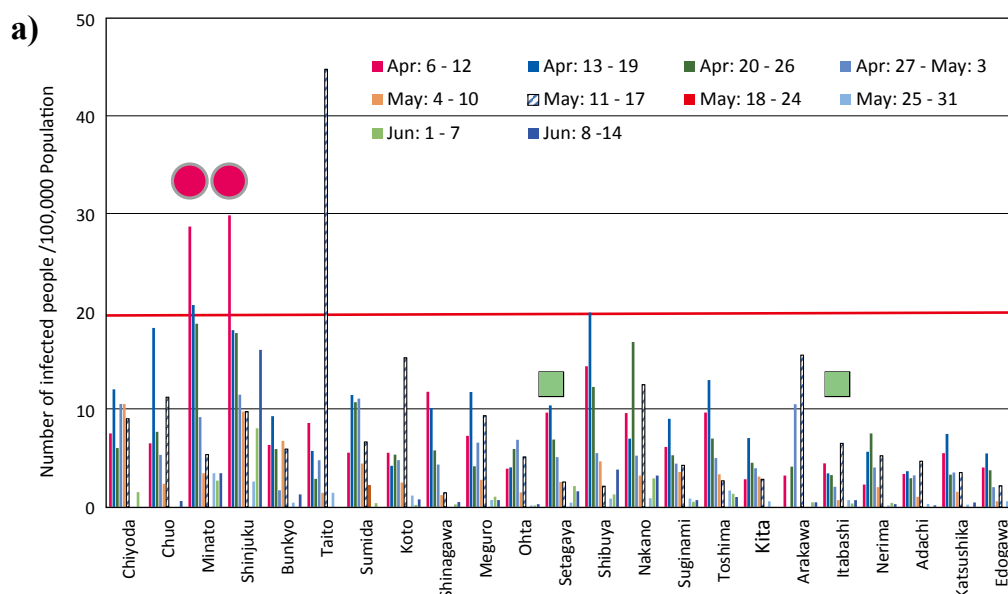
Finally, information from Vietnam regarding a change and measures of the situation of the number of the infected people in Hanoi City⁹, and Ho Chi Minh City will be documented¹⁰).

Conflict of interests

There is no conflict of interest.

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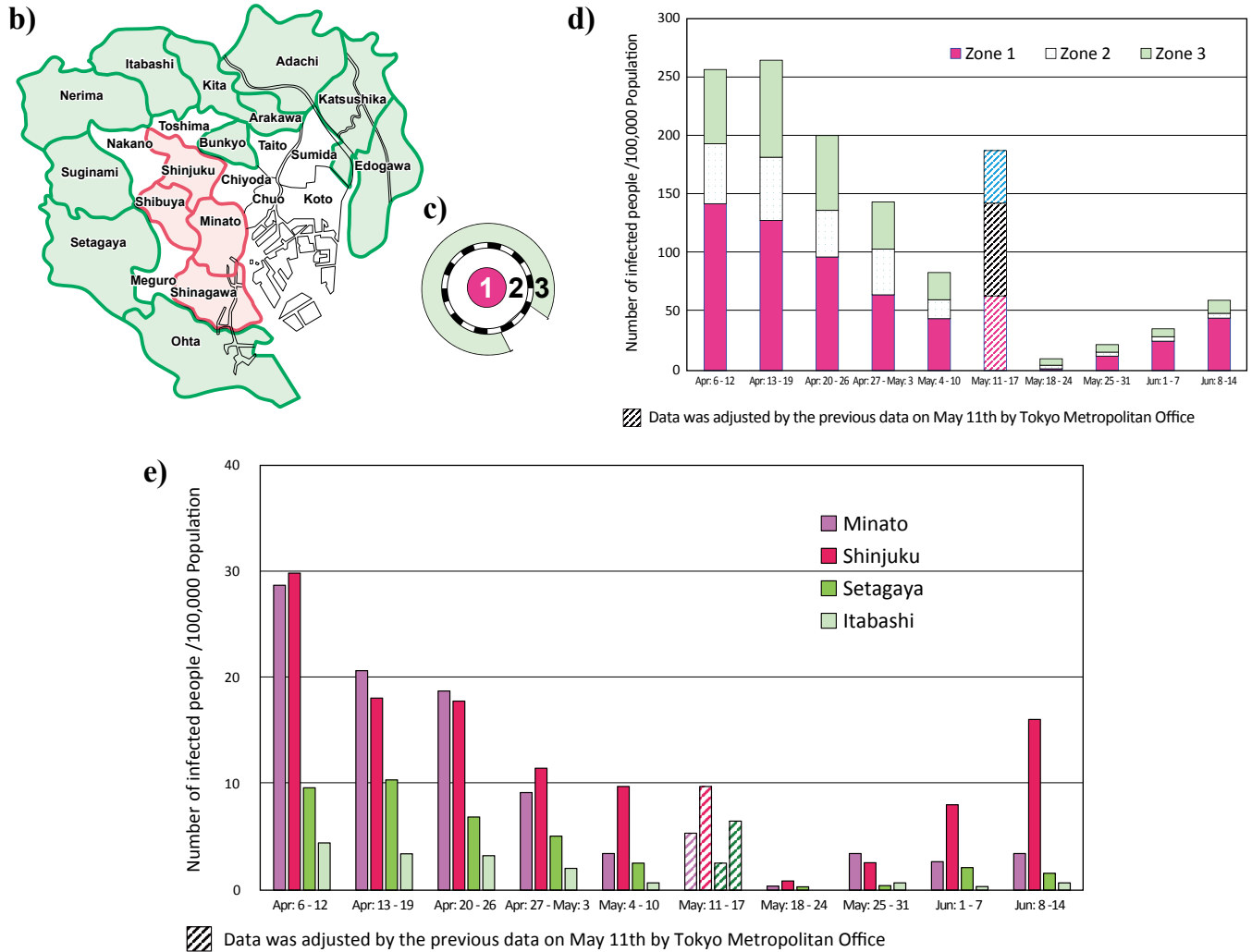


Figure 2. Change of the number of the infection from April 6th to June 14th, 2020 among the 23 wards of Tokyo. a) Differences in the infection among the 23 wards of Tokyo. Location of the 23 wards of Tokyo. b) Location of 23 wards of Tokyo. c) The Pattern Diagram of Zone 1, 2 and 3. b) and c): Zone 1 downtown (red) inside of JR Yamanote-line (○), Zone 2 (white) inside of JR Yamanote-line, Zone 3 residential area (green).

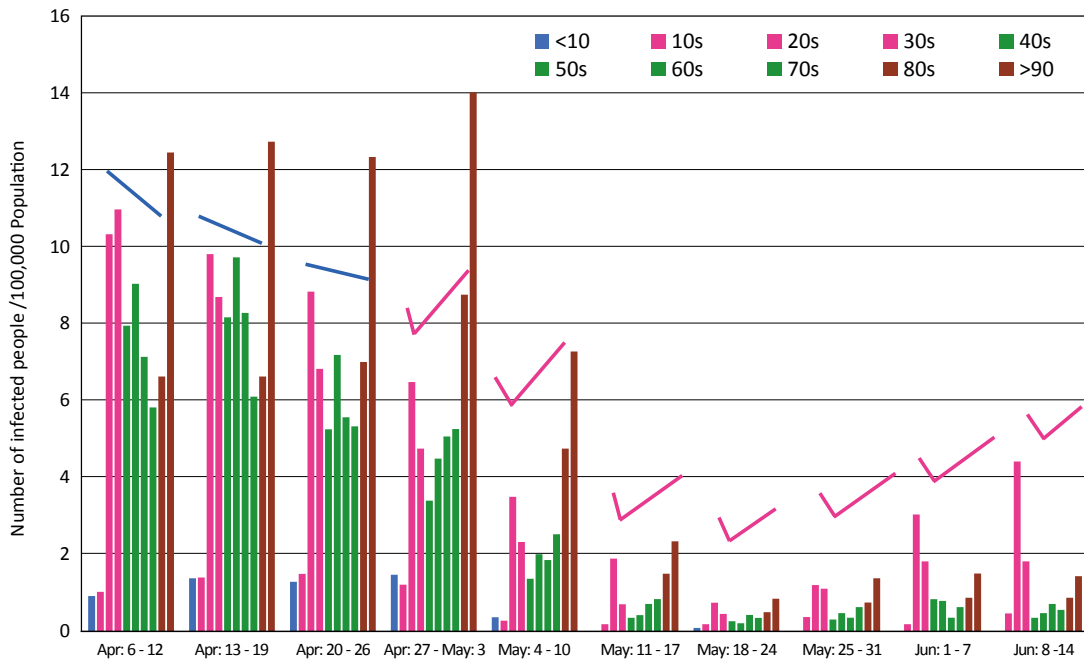


Figure 3. Time course of the infection in 100,000 population by age groups. Blue bars above graph bars indicate profiles of the infection among generations in earlier four weeks. V-shape profile indicates a decrease in the infection of working generation and an increase in the infection of elderly people over 70s.

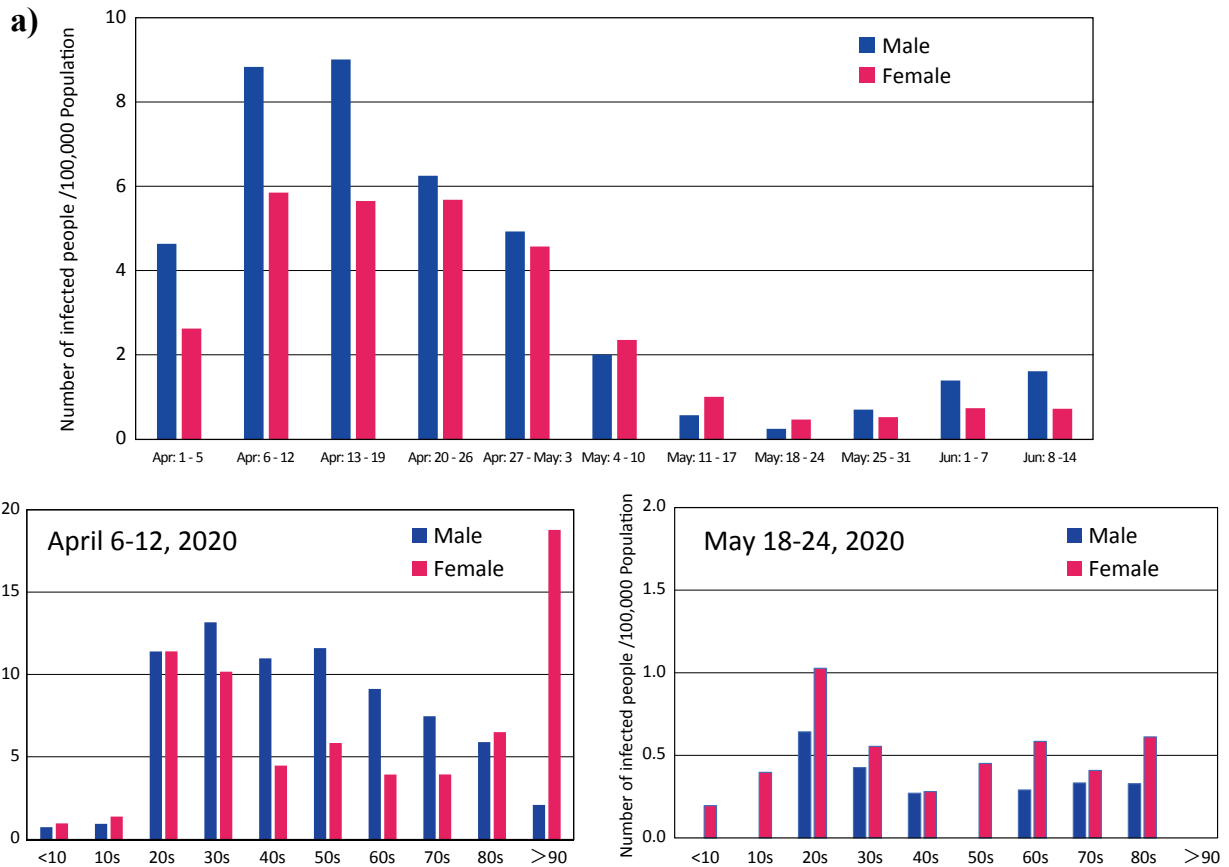


Figure 4. Difference in the infection in gender and age in all Tokyo Prefecture. a) Time course of the infection between male and female. b) Difference in the infection between April and May.

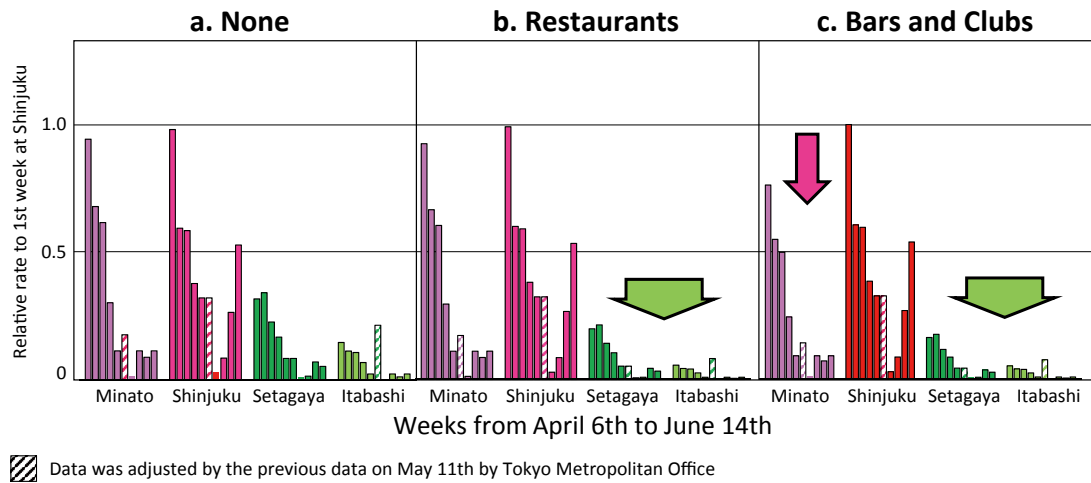


Figure 5. Profile of the number of infected people after the business hour restriction by Japanese Government in the downtown and residential Area in the 4 wards of Tokyo. The data is weighted by the number of a: None, b: Restaurants, c: Bars and Clubs.

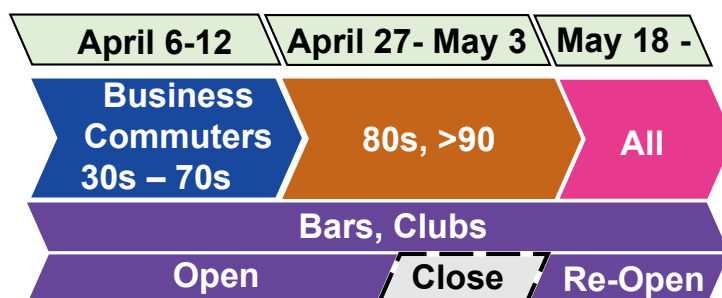


Figure 6. Profile of generation shift of the infection from 30s – 70s to aged people at home in the 23 wards of Tokyo.