Research on COVID-19 prevention and control strategies, and the effect of home quarantine in Shenzhen, China, 2020

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Research Article

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Abstract

Abstract

Background: To study the prevention and control strategies of coronavirus disease 2019 (COVID-19), and to analyze the infection of the home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms in the three incubations after Wuhan closure in Shenzhen.

Methods: The sample size was 2,004 individuals based on multistage sampling during the pre-investigation. Based on the results of the pre-investigation, the formal investigation expanded the sample size to 57,012 individuals. A single throat swab was collected from each individual for nucleic acid testing (NAT) by reverse transcription-polymerase chain reaction (RT-PCR). NAT was performed by a third-party institution, BGI. We collected information related to demographics, disease history, travel history, and personal protective measures before home quarantine, and monitored close-contact histories using the We Chat questionnaire.

Results: The total infection rate of home-quarantined individuals was 0.11% (95% CI: 0.05%–0.24%) out of the total sample size of 59,016. The detection period for seven confirmed cases was primarily concentrated between February 8 and 18, 2020, which was during the second incubation period after Wuhan's closure. The home quarantined individuals with epidemic histories (came from Hubei and any other affected regions) were considered the high risk population during the first two incubations after Wuhan’s closure. No positive cases were detected from February 25 to present (the third incubation after Wuhan’s closure). The number of newly-confirmed cases per day was 0 for 8 days from February 22 to 29 in Shenzhen. Thus, the strategies of prevention and control were effective.

Conclusions: The strategies and policies were effective for the prevention and control of COVID-19. Additionally, the strategy of implementing NAT during the first two incubations for home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms, facilitated early detection, early reporting, early diagnosis, early quarantining, and early treatment. However, our findings do not support NAT for home quarantined persons during the third incubation after Wuhan’s closure to present.

Background

Since December 2019, a cluster of patients with coronavirus disease 2019 (COVID-19) have been identified in Wuhan, a large city of 11 million people in central China [1-4]. The first four cases reported were linked to the Huanan Seafood Wholesale Market, and were identified by local hospitals using a surveillance mechanism for “pneumonia of unknown etiology” that was established in the wake of the 2003 Severe Acute Respiratory Syndrome (SARS) outbreak. The surveillance mechanism was established with the aim of allowing the identification of novel pathogens such as SARS-CoV-2 in a timely manner [5]. SARS-CoV-2, which causes severe acute respiratory disease, is related, but distinct from the severe acute

respiratory syndrome (SARS) coronavirus and Middle East Respiratory Syndrome (MERS) coronavirus [6]. However, compared to SARS and MERS, COVID-19 resulted in a much lower case-fatality rate (about 2.67%) among confirmed cases [7]. Infection via respiratory droplets or secretions from infected individuals are thought to be the predominant mode of human-to-human transmission. SARS-CoV-2 can also be detected in the gastrointestinal tract, saliva, and urine, and these routes of potential transmission remain to be investigated [8-11].

The mean incubation period of COVID-19 was 5.2 days (95% confidence interval [CI], 4.1 to 7.0 days), with the 95th percentile of the distribution at 12.5 days [12]. The World Health Organization (WHO) stated that most estimates of the incubation period ranged from 1 to 14 days, and interpersonal transmission in China was due to home outbreaks (78%-85%) [13]. The basic reproductive number was estimated to be 2.2 (95% CI, 1.4 to 3.9) [12]. So one incubation in our article is 14 days.

Wuhan is an important transportation hub in China and COVID-19 appeared 1 month before the Spring Festival. Thus, infected individuals could travel to all parts of the country causing the outbreak due to convenient transportation during the festival, and in particular, the cities with close relationships with Wuhan. Thirty-one provinces in China initiated the level-1 public health emergency response to prevent and control the epidemic [14], and in particular, to prevent and control home outbreaks. COVID-19 was included as a notifiable disease in the Infectious Disease Law, and the Health and Quarantine Law on January 20. Lockdown was initiated in Wuhan on January 23 to prevent the spread of COVID-19, and China established the Central Leading Group to respond to the COVID-19 outbreak on January 25 (Figure 1). China also implemented the joint prevention and control mechanism among multiple departments, and the classification management as four categories of areas like case-free areas prevented the import of cases by establishing transport hub quarantine stations, temperature surveillance, strengthening appointment triage, and a fever clinic was activated to maintain the economy. The sporadic-case area reduced imported cases, prevented transmission, and provided medical treatment. The community-aggregation case area prevented transmission, prevented exporting cases, and strengthened medical treatment. The community-transmission area implemented the strictest prevention and control strategies to prevent the movement of people, and strengthen public health and medical treatment.

Shenzhen implemented the trinity cooperation community mode based on the joint prevention and control mechanism. The trinity cooperation community control and prevention mode, included medical staff from community health service centers, community workers, and community police to prevent home outbreaks, imported cases, and inner cases spread. The government implemented four categories of classification management for individuals according to the Prevention and Control Plan for Coronavirus Disease 2019 (the Third Edition). Individuals without epidemic histories (came Hubei and any other affected regions) were instructed to wear masks, assess temperatures twice per day, and enhance self-protection. Individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms were instructed to undergo 14 days of home quarantine by the support from community. Individuals with close contact with confirmed and suspected cases were required to undergo centralized quarantine in one of the 75 centralized medical observation facilities throughout Shenzhen.

Patients with symptoms, such as fever, cough, breath with difficulty were required to attend fever clinics and designated hospitals, such as the Third People's Hospital of Shenzhen.

As of March 5, the number of confirmed cases was 418, including one overseas input case, four severe cases, three critical cases, three fatalities, and 358 people were cured and released from hospitals in Shenzhen. The first reported case in Shenzhen was the imported case from Hubei on 19 January 2020, and the number of confirmed cases related to Hubei was 41 (~96.49%) on 27 January (Figure 2). The number of confirmed cases related to Hubei has been 304 (about 72.9%) since February 18. According to research from the China Medical Treatment Expert Group for COVID-19, fever was present in 43.8% of the patients on admission, but developed in 88.7% of individuals during hospitalization. The second most common symptom was cough (67.8%), while nausea or vomiting (5.0%) and diarrhea (3.8%) were uncommon [15]. The absence of fever in SARS-CoV-2 was more frequent than in SARS-CoV (1%) and MERS-CoV infections (2%) [16]; thus, afebrile patients may be missed if the surveillance case definitions focus on fever detection [17]. Home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms were considered the high risk population. Therefore, research was performed to understand the effects of the prevention and control measures for home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms in the three incubations after Wuhan's closure.

Methods

This was a descriptive research, supported and funded by Shenzhen government based on the policies. The government designed the questionnaire and shared the data with us, so our data was the secondary and public data, and can be referenced. The pre-investigation period was during the first incubation after the closure of Wuhan (14 days after Wuhan's closure, between January 31 and February 11). The formal investigation was divided into two parts by the date of Guangdong province turned down to the level-2 public health emergency response on 24 February(between February 12 and 24). Part 1 was between February 12 and 24 (the second incubation after Wuhan closure) and part 2 was between February 25 and March 5 (the third incubation after Wuhan closure). The respondents were home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions), but without symptom in Shenzhen, according to the Prevention and Control Plan for Coronavirus Disease 2019 (the Fourth Edition) outlined by the National Health Commission (NHC). The COVID-19 infection rate (P) was 5%, = 10%, and $\alpha = 0.05$. The calculated sample size was 1,825, but the actual sample size was 2,004 due to multistage sampling. The first stage included two streets from 10 districts in Shenzhen, with completely random sampling. The second stage included two neighborhood committees from the selected streets with completely random sampling. If the total number of home quarantined individuals in the neighborhood committee was less than 50, neighboring committees were merged to ensure that the total number of home quarantined individuals in the sampling unit was more than 50. The third stage was a selection of 50 home quarantined individuals from each neighborhood committee (or the merged neighborhood committees) by simple random sampling. A single throat swab was collected from each individual for nucleic acid testing (NAT) by reverse transcription-polymerase chain reaction (RT-PCR). NAT

was performed by a third-party institution, BGI (The Beijing Genomics Institute). We collected information related to demographics, disease history, travel history, personal protective measures before home quarantine, and close contact history using the We Chat questionnaire.

$$n = \left(\frac{Z_{\alpha/2}}{P \cdot \delta}\right)^2 P(1-P)$$

Results

The pre-investigation (between January 31 and February 11)

Of the 2,004 individuals tested, COVID-19 was detected in three patients, including a father and his daughter living in Yantian district, and one patient living in Nanshan district. All such individuals had been to Hubei and had different initial symptoms. The father and his daughter had dry cough for 2 weeks. The third patient had a single temperature reading above 37.3°C, but presented with a normal temperature and was asymptomatic during the other assessment times as of the date to get NAT on 8 February. The three patients never contacted other suspicious people during the period in Hubei. The infection rate of home quarantined individuals was 1.5% (95% CI: 0.31%–4.37%) based on the results of the pre-investigation. The period of pre-investigation was conducted (between January 31 and February 11) during the first incubation after Wuhan was placed on lockdown. The home quarantine individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms remained as the high risk population. The pre-investigation implemented the policy of “early detection, early report, early diagnosis, early quarantine and early treatment” for the high risk population to control and prevent the spread of COVID-19.

The formal investigation – Part 1 (between February 12 and 24)

The formal investigation was divided into two parts by the date of Guangdong province turned down to the level-2 public health emergency response on 24 February. Part 1 was between February 12 and 24 (the second incubation after Wuhan closure) and part 2 was between February 25 and March 5 (the third incubation after Wuhan closure). Part 1 expanded the sample size to 44,021 based on the results of the pre-investigation. Figure 3 is the sampling and detection distribution among the 11 districts (including the Shenshan special cooperation zone) in Shenzhen by ARCGIS10.2. There were five positive cases detected from the sample of 44,021 individuals. The 4 of the 5 positive cases including two patients living in Longgang district, two patients living in Futian district. The fifth positive case in Nanshan is asymptomatic and hasn’t incidence so far, so we excluded this case considering the sensitivity of NAT. Thus, the infection rate of home quarantined individuals was 0.09% (95% CI: 0.03%–0.22%) based on the results of part 1 of the formal investigation. The median age of the respondents was 34 years (range, 0 to 95 years), and 57.1% were male (Figure 4). The proportion of children under 15-years-old was 11.83%, while the proportion of individuals aged over 60-years-old was 3.28%. Among the overall population, 8.4%

had at least one coexisting illness (e.g., cardiovascular and cerebrovascular disease, hypertension, chronic obstructive pulmonary disease diabetes, liver disease, blood disease, or malignant tumors).

A total of 40% of individuals had an epidemic history (came from Hubei and any other affected regions) and the remaining 60% were their family members. Among the epidemic histories, 93.21% had been to Hubei province, including 21.68% that visited Huanggang, 16.85% that visited Jingzhou, and 11.41% that visited Xianning. The dates of return to Shenzhen were mainly concentrated between January 23 and February 26 (Figure 5). There were two peaks in figure 5, the first of which concentrated on January 25, which indicated that many people left Hubei for Shenzhen after the Wuhan closure on January 23; those individuals are the high risk group and were required to undergo immediate quarantine observation. The second peak concentrated on February 24, which Guangdong turn down to the level-2 public health emergency response. This showed that prevention and control strategies were effective to control the epidemic in the early stage. Meanwhile, Shenzhen started to work on February 9. Many people returned to Shenzhen to begin working after COVID-19 was effectively controlled.

Considering the epidemic histories, 97.32% of individuals stayed in Hubei less than 100 days, and the mean duration was 0.37 days. A total of 2.18% lived in Hubei (more than 1 year), and 6.31% stayed in Hubei less than 24 hours as they were passing through or in transit. There were two peaks in Figure 6, the first one concentrated on 4 days, and the second one concentrated on 34 days. The most common mode of transportation was driving a private vehicle (86.58%). The advantages of private vehicles include reducing the number of close contacts and the risk of transmission. The second most common mode of transportation included riding high-speed trains/bullet trains/other types of trains (10.32%). The third most common mode of transportation was plane (1.99%), and the fourth most common mode was taking long-distance buses (0.21%). Only 0.6% of individuals had been exposed to individuals with fever and respiratory symptoms, 0.37% were exposed to confirmed cases, mild cases or asymptomatic cases, and 0.61% were exposed to suspected cases, confirmed cases or fever patients who were their family, friends and colleagues.

Thirty-one provinces initiated level-1 public health emergency responses to overcome the COVID-19 outbreak. To protect vulnerable populations, prevent transmission, and prevent and control the epidemic, the government advocated to everyone to undergo home quarantine, wear masks outdoors, wash hands frequently, leave homes less frequently, cancel parties, dinners, and other visits, and cover the mouth and nose with paper or towels when sneezing or coughing. The government strengthened public health surveillance and public hygiene knowledge to improve public health awareness and behavior. The results of our research explained that the awareness level of health self-protection among home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions) was high (Table 1).

Table 1 Proportion of home-quarantined individuals employing self-protection measures

Sex	Wearing mask outside	Wash your hands frequently	Going out less frequently	Cancel parties, dinners, and visits	Cover your mouth and nose with a tissue or towel when you cough / sneeze
Male-%	91.4	87.2	84.7	87.5	85.3
Female-%	93.3	90.8	87.5	89.5	87.9

The formal investigation - Part 2 (between February 25 and March 5)

No positive cases were detected in the 12,991 individuals tested during part 2 (the third incubation). The total sample size for this investigation (including the pre-investigation, and parts 1 and 2 of the formal investigation) was 59,016 individuals. Of which seven cases were confirmed positive. Therefore, the infection rate of home-quarantined individuals was 0.11% (95% CI: 0.05%-0.24%). There are seven confirmed cases age from 13 to 66, which included a father (Case 1) and his daughter (Case 2) who had visited Hubei before Shenzhen (Figure 7). There were four patients with different initial symptoms, including Case 3 who had a temperature higher than 37.3°C once, but exhibited a normal temperature and was asymptomatic during the other assessments as of the date to get NAT on 8 February (Table 2). Case 1 and Case 2 had dry coughs for 2 weeks, six patients did not exhibit fever, and three patients were asymptomatic. The seven patients received medical treatment in the Third People's Hospital of Shenzhen (designated hospitals) immediately following positive NAT results. The seven confirmed cases were mostly detected between February 8 and 18, which was during the second incubation period after Wuhan closure, and the home-quarantine individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms were at high risk of infection and transmission. Shenzhen started to work on February 9 which means businesses began to reopen, and more people returned to Shenzhen during this time. We still needs to be vigilant to prevent and control COVID-19.

During the third incubation, the number of new positive cases of COVID-19 based on NAT was 0 from February 18 to present. Additionally, the number of new confirmed cases per day was 0 for 8 consecutive days from February 22 to 29 in Shenzhen. Thus, the measures taken to close Wuhan, as well as the national joint prevention and control mechanisms were effective at controlling the epidemic during the early stage. Fever observation stations were established everywhere in communities, subway stations, supermarkets, airports, and other public areas to surveil individuals' temperatures. Classification management provided medical treatment to patients in a timely manner, provide the close contacts centralized quarantine effectively, and control the high risk population by home quarantine accurately. The health education provided by the government and media also improved self-protection and health-related knowledge. These policies improved health self-protection and reduced the infection rate of home-quarantined individuals in Shenzhen. Guangdong then implemented the level-2 public health emergency response on February 24.

Table 2 Epidemiological characteristics of the seven patients

Number	Gender	The interval between initial symptom and NAT (Days)	Initial symptom
Case 1	M	14	Dry cough occasionally
Case 2	F	14	Dry cough occasionally
Case 3	M	9	Only had 37.4°Conce and normal temperature frequently
Case 4	F	-	-
Case 5	M	-	-
Case 6	F	-	-
Case 7	M	5	Runny nose

Discussion

COVID-19 appeared 1 month before the Spring Festival in Wuhan, China. The predominant route of human-to-human transmission is respiration [9,18]. The WHO stated that transmission was predominantly interpersonal in home outbreaks (about 78%-85%) [13]. Because there is no medication for the treatment of COVID-19 patients, there is an urgent need to prevent and control the disease. China established the Central Leading Group on responding and implement the joint prevention and control mechanism by multiple department to face COVID-19 like source control, cut off transmission, prevention of spread by emergency response activating, closing Wholesale Market, and identifying the pathogen. The main aim for Hubei is to prevent exporting cases, strengthen medical treatments, and prevent importing cases from other regions. NHC notified COVID-19 to the WHO and relevant countries and regions on January 3.

The China Center for Disease Control and Prevention (CDC) publicly shared the gene sequence of the novel coronavirus, the development of the diagnostic PCR reagents and test, issued medical treatment, surveillance, and epidemiological investigations, and shared close-contact management and laboratory examination plans on January 10. COVID-19 was added as a Category B infectious disease and managed as a Category A infectious disease in the Laws of the People's Republic of China for the Prevention and Treatment of Infectious Diseases on January 20. Strengthen close contacts and high risk case management based on big data analyses and artificial intelligence. The government established policies surrounding medical insurance payments, and the settlement of medical expenses in different districts with financial support for the patients. Wuhan, Hubei, and other affected regions received national counterpart support to control COVID-19. Wuhan was under lockdown beginning January 23 due to the cumulative confirmed cases in other provinces, which was positively correlated with the migration index derived from Hubei province, also in Wuhan and other cities in Hubei, with correlation coefficients of 0.84, 0.84, and 0.81[19,20].

Here we provide research about the prevention and control measures for COVID-19, and the effects of home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms during the three incubations after Wuhan closure. The infection rate of home-quarantined individuals was 1.5% (95% CI: 0.31%-4.37%) based on the results of the pre-investigation (between January 31 and February 11; the first incubation after Wuhan closure). The infection rate of home-quarantined individuals was 0.09% (95% CI: 0.03%–0.22%) based on the results of part 1 of the formal investigation (between February 12 and 24; the second incubation after Wuhan closure), which was lower than the results of the pre-investigation. The detection of the seven confirmed cases was mostly concentrated between February 8 and 18, which was during the second incubation period after Wuhan's closure. Home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions) were considered the high risk population in the first two incubations. Shenzhen started to work on February 9 which means businesses reopened, and more people returned to Shenzhen during this time. Our research can implement the policies of "early detection, early report, early diagnosis, early quarantine and early treatment", and "concentrate patients, concentrate experts, concentrate resources,

concentrate treatment” (5 early and 4 concentrate policy) in the high risk population to control and prevent the spread of COVID-19.

There were no positive cases detected within the cohort of 12,991 individuals in part 2 (between February 25 and March 5; the third incubation after Wuhan’s closure). The number of newly-confirmed case per day was 0 for eight consecutive days from February 22 to 29 in Shenzhen. The total infection rate of home-quarantined individuals was 0.11% (95% CI: 0.05%–0.24%) from a total sample size of 59,016 individuals. Thus, the activation of level-1 public health emergency responses throughout the country was effective, as was the establishment of joint prevention and control mechanisms by multiple departments. Strategies for the observation/registration of close-contact or suspicious individuals, home quarantine and temperature surveillance, traffic control, congregation prevention, and prolonging the Spring Festival holiday were effective in the early stage[21]. The government also ensured the supply of medical and living resources in accordance with the law under the jurisdiction, coordinate resources timely to maintain social stability. The health education and notification of cases by government and media also improved the effect of health self-protection and knowledge [22, 23]. Guangdong implemented the level-2 public health emergency response on February 24 due to COVID-19, which has been controlled since then. We advocate the trinity cooperation community control and prevention mode in Shenzhen, which included medical staff from community health service centers, community workers, and community police. This mode was effective at preventing imported cases and inner cases spread based on the national policy. As of February 1, there were 75 streets (include Sino-British Street Authority) and 660 communities that established the trinity cooperation control and prevention groups. Everyone who visits Shenzhen was required to submit a self-health declaration. Everyone who visits Shenzhen shall also be managed based on the four classifications detailed in the Prevention and Control Plan for COVID-19 (the Third Edition). Classification management can provide the patient with timely medical treatment, provide their close contacts with centralized quarantine measures, and control the high risk population by implementing home quarantine. Shenzhen launched "Shenzhen I you-independent declaration platform" to help prevent and control COVID-19.The main function is to register the contact information, residence property, round trip, symptom and other information of the five classifications of people, for example:Non-local residence: The individuals come from other places after January 1, 2020 stay in hotels or friends and relatives. Return to Shenzhen: The local residents return to Shenzhen after January 1, 2020. Self-conscious discomfort: The individuals haven't left Shenzhen after January 1, 2020, but feel unwell. Home quarantine: The individuals need home quarantine observers confirmed by relevant departments, and within the observation period. Contact history: The individuals may have contact with confirmed cases or suspected diseases. The five classifications of people can use WeChat to search " Shenzhen I you-independent declaration platform ", and fill in the relevant information according to the prompts on the page. The main strategies for other regions include preparations for school and work starts orderly to maintain normal function of society comprehensively in this period.

Conclusions

Our research confirmed that strategies such as the joint prevention and control mechanism of multiple departments, as well as five early and four concentrated policies are effectively preventing and controlling COVID-19. The strategy for home-quarantined individuals with epidemic histories (came from Hubei and any other affected regions), but without symptoms to take the NAT in the first two incubations can implement the policy of early detection, early report, early diagnosis, early quarantine and early treatment, and it is effective to control COVID-19. But it is not advocating for home quarantine person to take the NAT from the third incubation to the present. Home-quarantined individuals should undergo syndrome surveillance (temperature surveillance) as the first step from the third incubation to the present. Such individuals should undergo NAT twice, at least 1 day apart. However, our research implemented NAT only a single time in each home-quarantined individual. NAT also has multiple limitations, including a high false negative rate[24]. The IgM or IgG combined assay has better utility and sensitivity than single IgM or IgG tests. It can be used for the rapid screening of symptomatic or asymptomatic SARS-CoV-2 carriers in hospitals, clinics, and test laboratories [4, 24].

Abbreviations

Center for Disease Control and Prevention, CDC.

Corona Virus Disease 2019, COVID-19.

Middle East Respiratory Syndrome (MERS).

Nucleic Acid Testing (NAT).

National Health Commission (NHC).

Reverse Transcription-Polymerase Chain Reaction (RT-PCR).

Severe Acute Respiratory Syndrome (SARS).

World Health Organization (WHO).

Declarations

-Ethics approval and consent to participate

The study was approved by the Ethics Committee of Shenzhen Center for Disease Control and Prevention [2020, code (039A)]

The statement indicated that the need for consent was waived by approving ethics committee.

Our research was supported by the policy “Nucleic acid testing was carried out for the home quarantine individuals in Shenzhen” from Shenzhen Municipal Health Commission (MHC). Everyone in Shenzhen knew and complied with this requirement to prevent and control the COVID-19, and it is also the duty of

every citizen. The policy “Nucleic acid testing was carried out for the home quarantine individuals in Shenzhen” therefore was the “statement on participant consent”.

-Consent for publication

Not applicable

-Availability of data and materials

The datasets used and analysed during the study are available from Shenzhen Municipal Health Commission.

-Competing interests

The authors declare that they have no competing interests

-Funding

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-Authors’ contributions

XZQ participated in data analysis and drafted the manuscript. WJZ and HJF participated in the data collection. ZX participated in liaison and coordination with government. LJH and HJF conceived of the design and coordination of the study. WHR, WB, SLX, LMM and FXY performed the statistical analysis. YYC, XHX and ZYD guided the statistical analysis and revisions of the manuscript. All authors read and approved the final manuscript.

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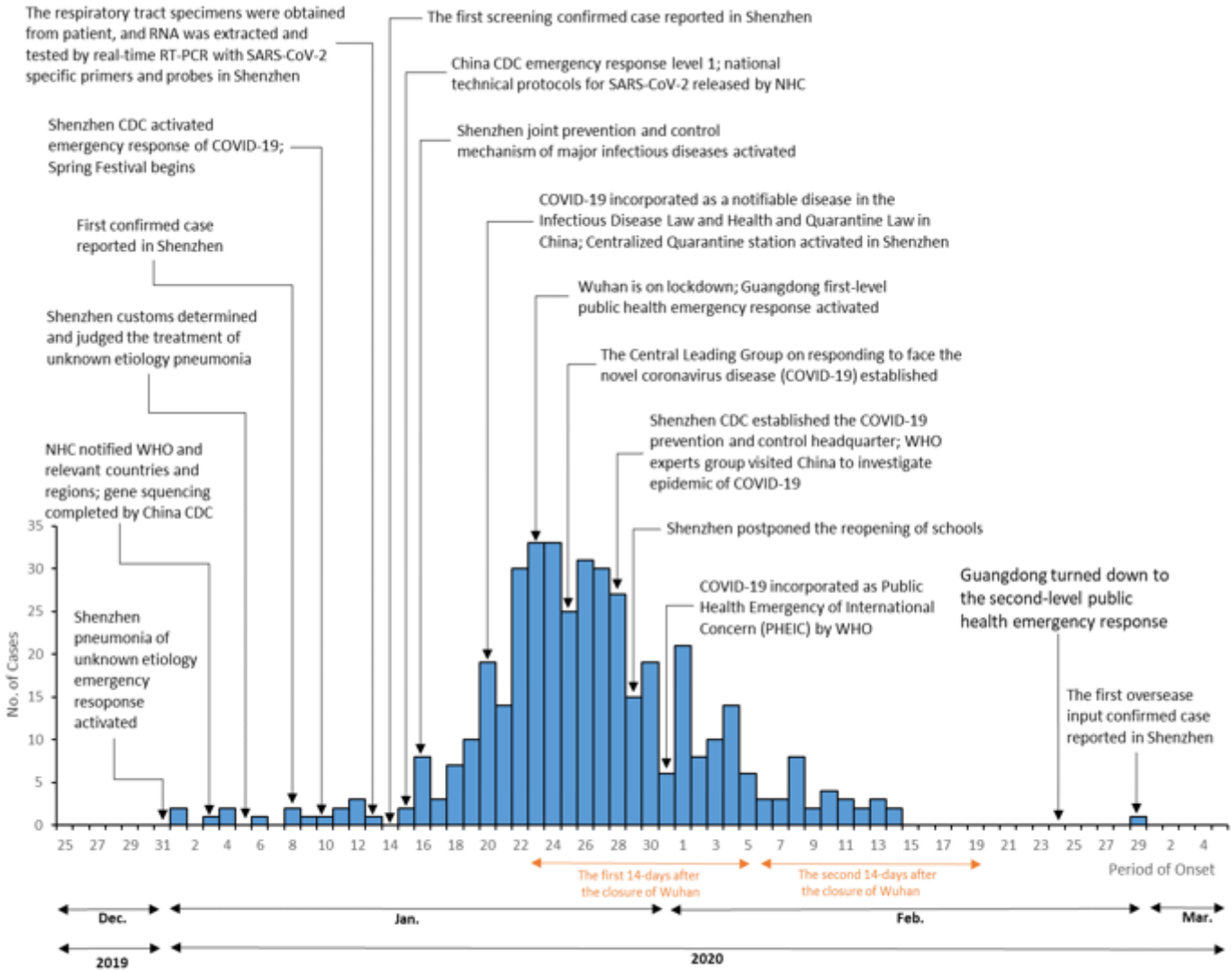
Figures



Figured 1 The timeline of COVID-19

Figure 1

The timeline of COVID-19

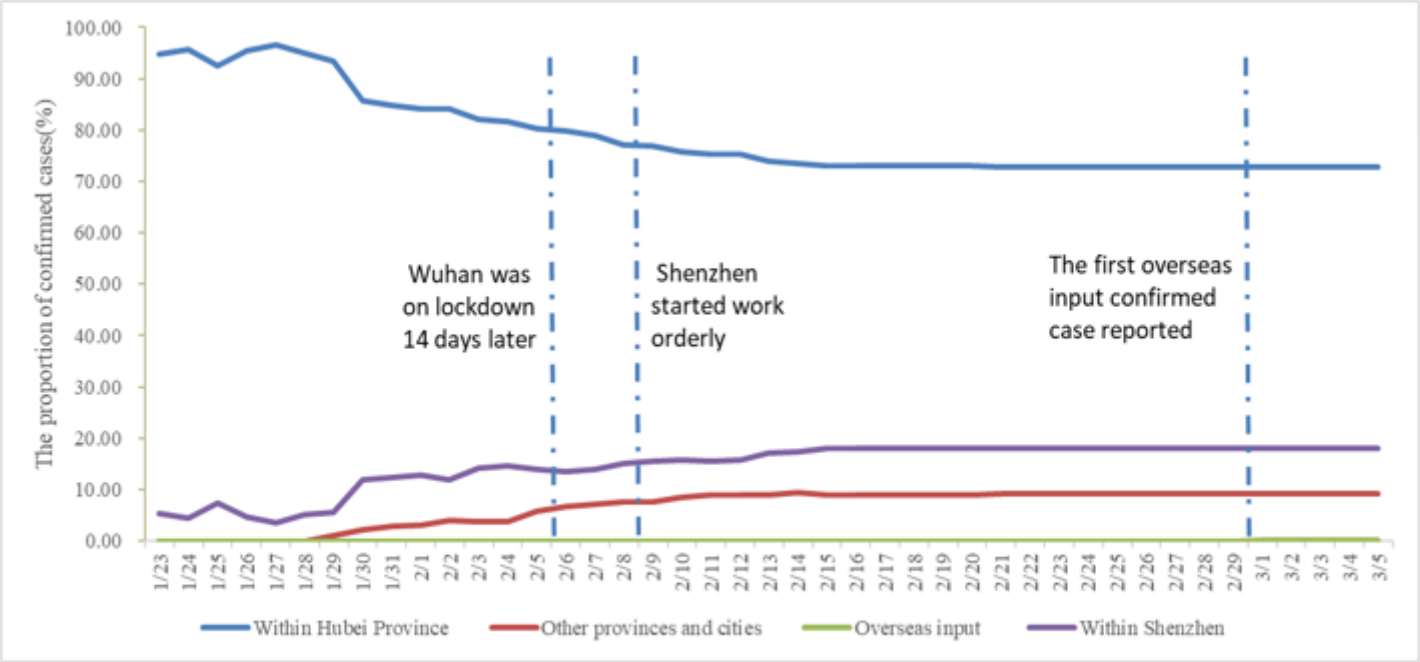


Figure 2 The proportion of 418 confirmed cases source in Shenzhen

Figure 2

The proportion of 418 confirmed cases source in Shenzhen

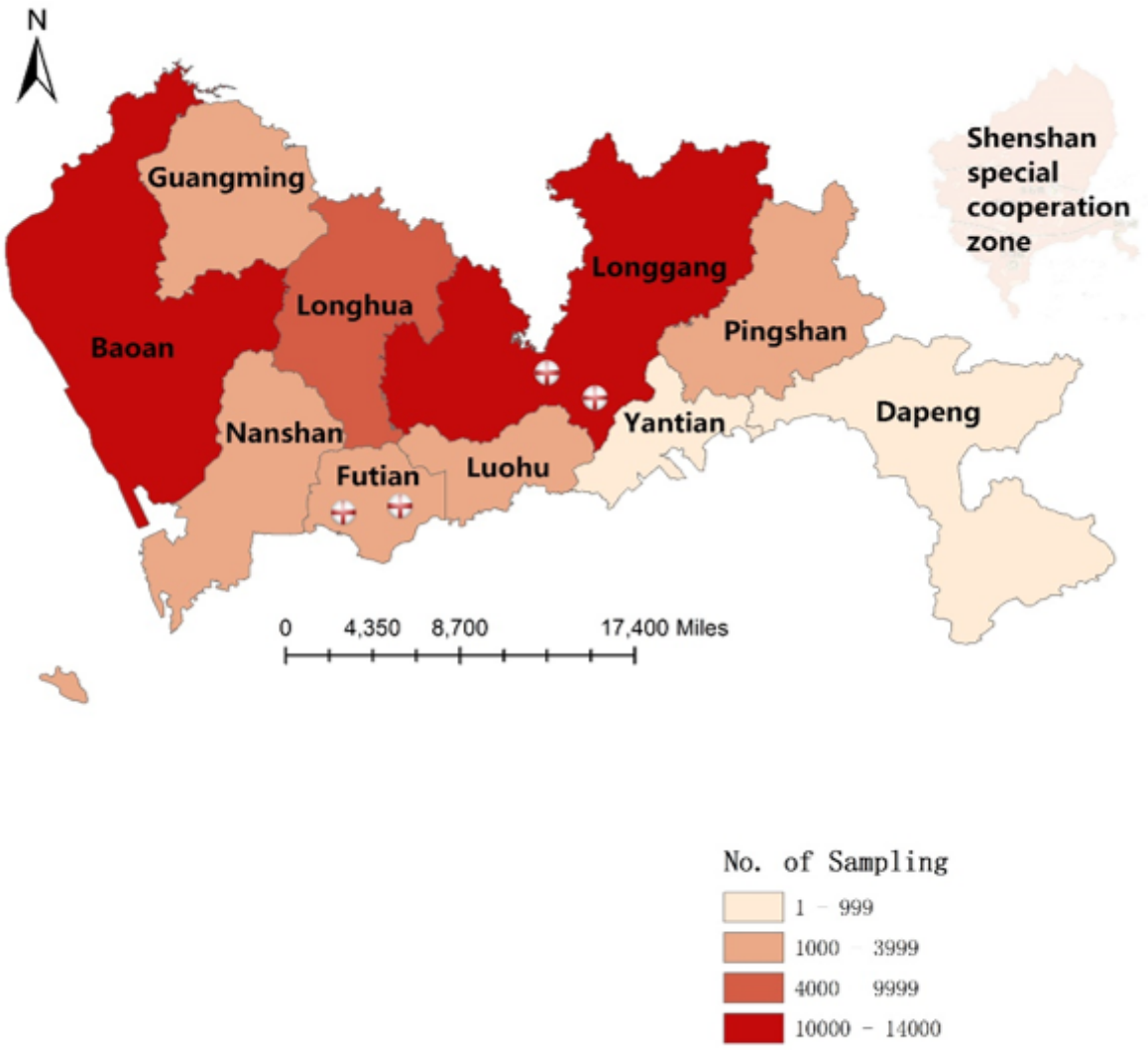


Figure 3 Sampling and detecting confirmed cases distribution.

Figure 3

Sampling and detecting confirmed cases distribution. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

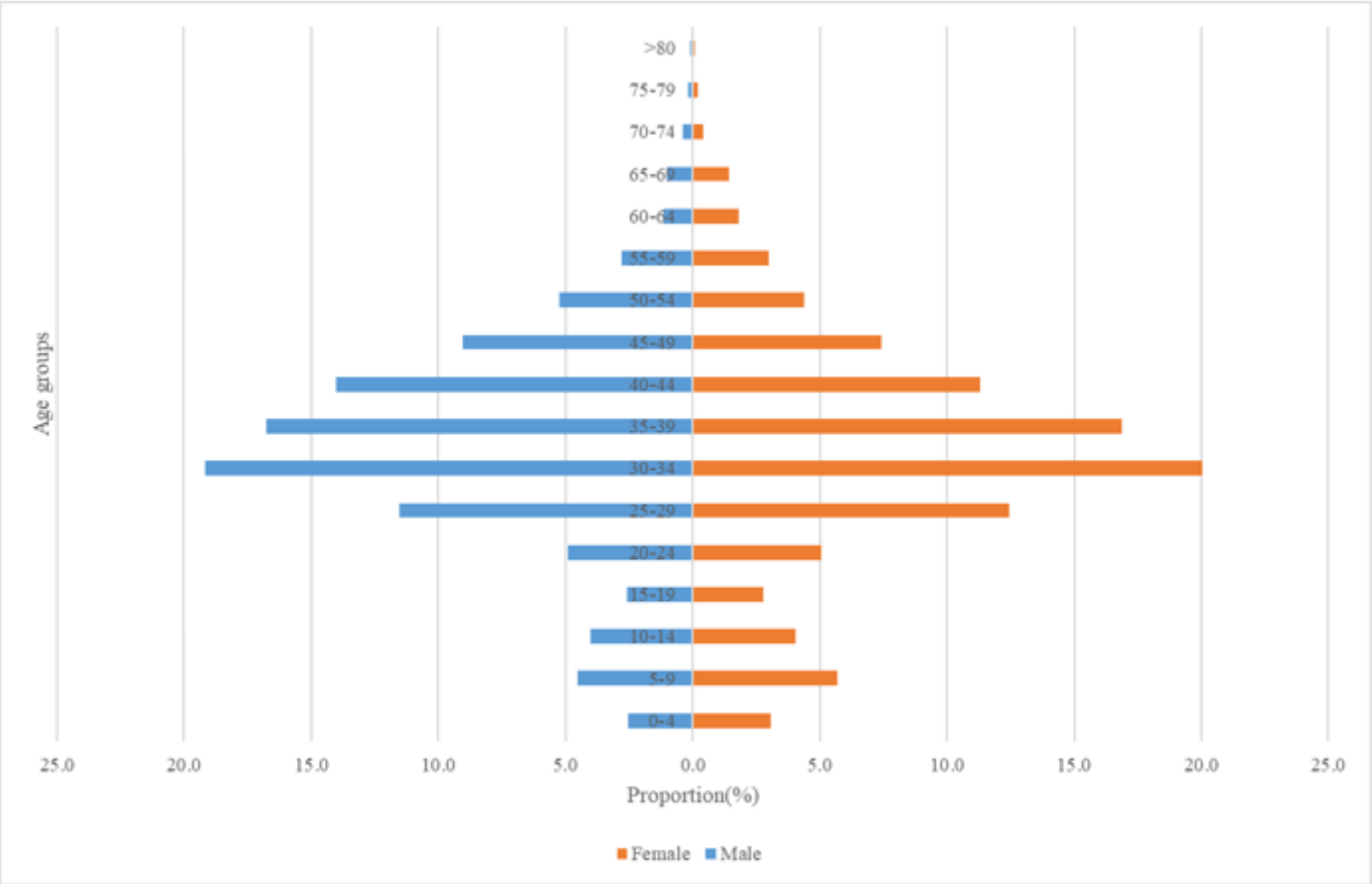


Figure 4 Gender and age distribution

Figure 4

Gender and age distribution

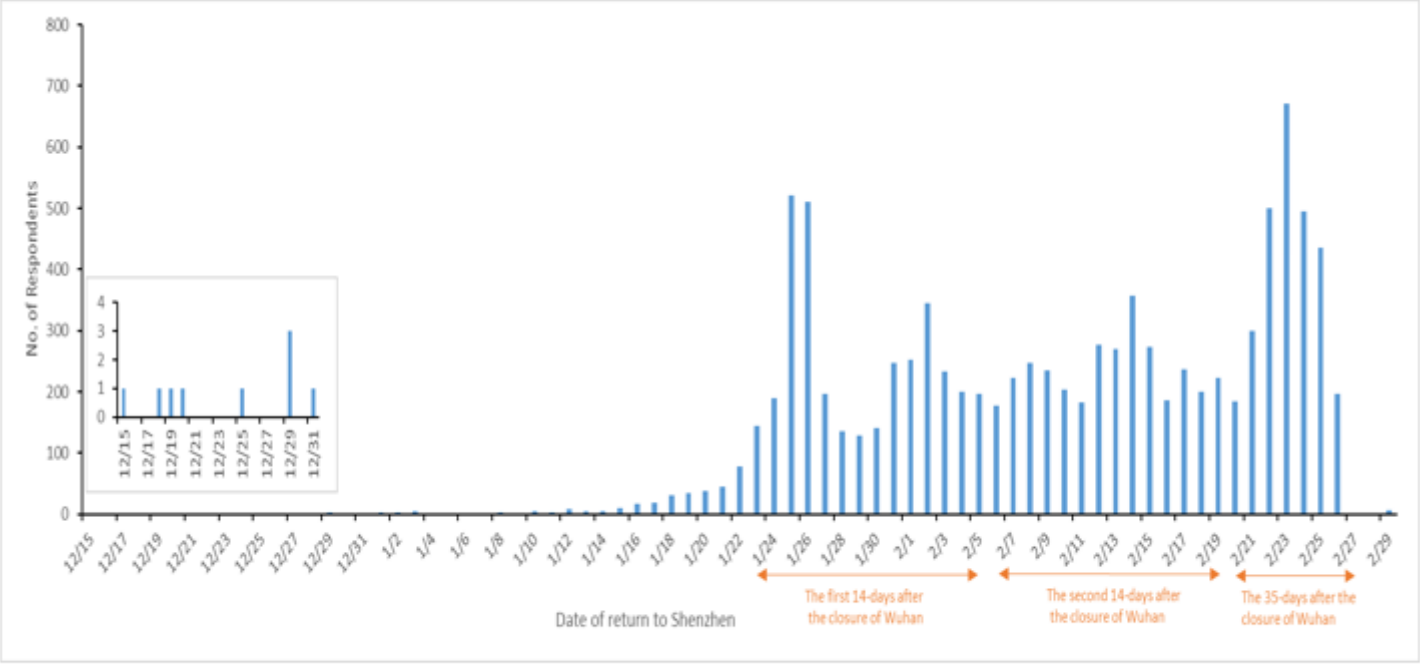


Figure 5 The distribution of return date

Figure 5

The distribution of return date

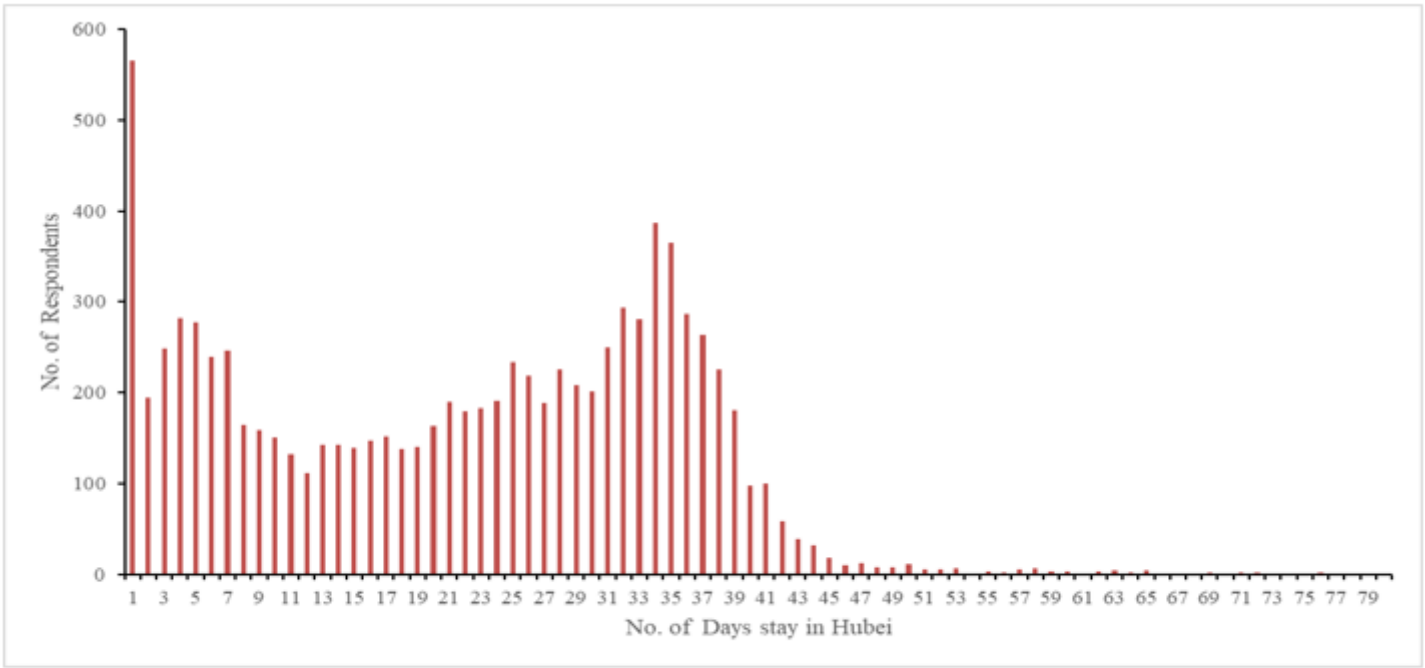


Figure 6 The distribution of duration.

Figure 6

The distribution of duration

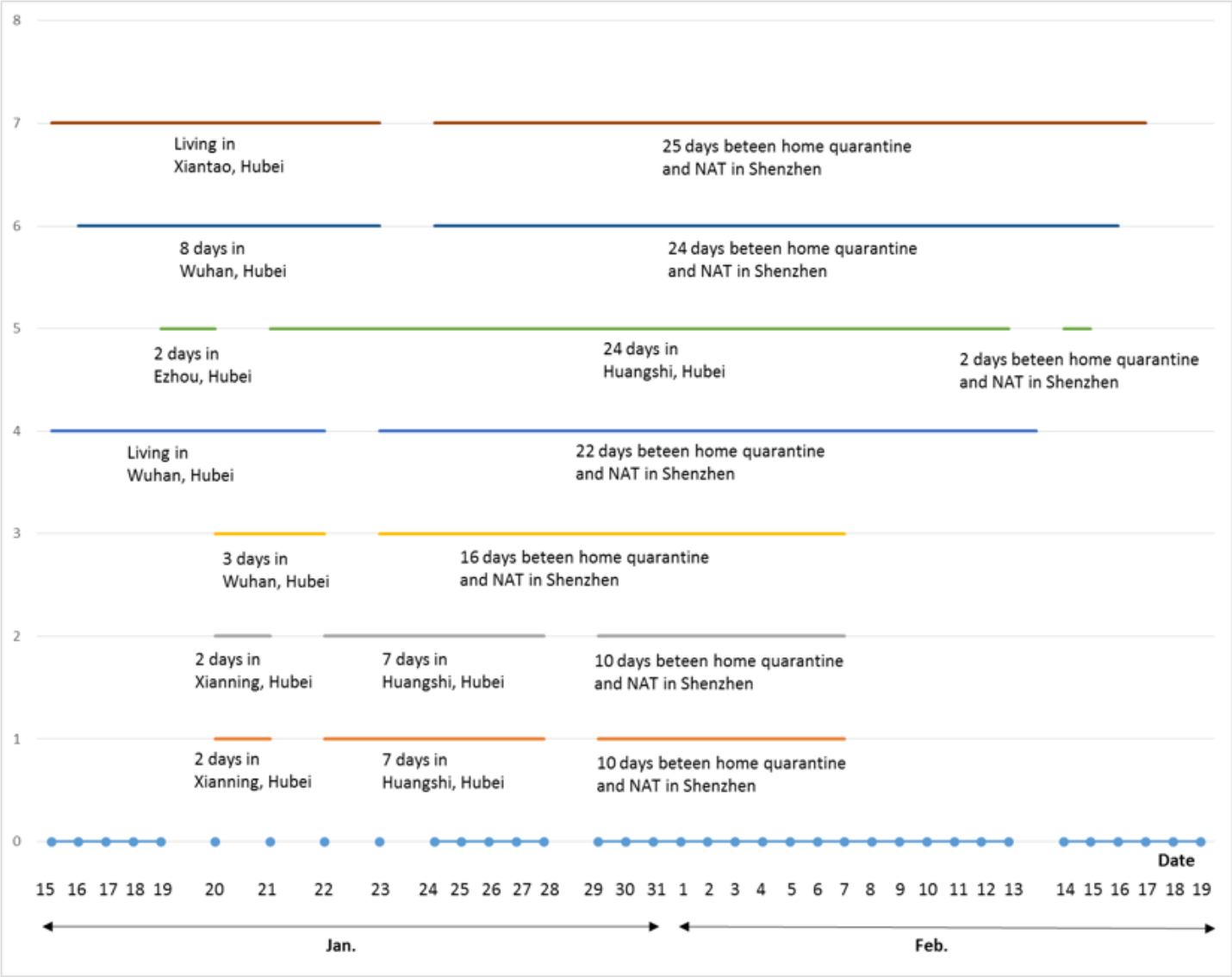


Figure 7 Epidemiologic features of the 7 patients

Figure 7

Epidemiologic features of the 7 patients

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