Epidemiological characteristics of imported and domestic COVID-19 cases in Taiwan: a retrospective study

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Research Article

Keywords: Epidemiology, COVID-19, SARS-CoV-2, Imported, Domestic

Posted Date: November 30th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-116895/v1

Abstract

Background: This study aimed to elaborate Taiwan's epidemiological characteristics of 2020 COVID-19 in human, temporal, and geographical dimensions.

Methods: Big data for cases from January to May 2020 were obtained from the public database of Taiwan Centers for Disease Control (CDC) in June 2020. The data were used to analyze and compare differences, correlations, and trends in human, temporal, and geographical characteristics of imported and domestic COVID-19 cases.

Results: During the study period, 443 cases were confirmed, with a mortality rate of 1.6%. The epidemiological features indicated that most cases (87.6%) were imported. No difference was observed between sexes, but significant differences were observed in age groups (p = 0.002). The age group of 20¬–29 years accounted for the highest proportion of imported cases (40.7%), with an odds ratio (OR) of 2.748, whereas the age group of 50–59 years had the largest proportion of domestic cases (23.6%, OR = 2.770). March 2020 displayed the highest proportion of imported cases (78.1%, OR = 4.278). A significant difference was observed in different regions (p = 0.003), with northern Taiwan exhibiting the highest proportion of both imported and domestic cases (63.4% and 80.0%); in particular, domestic cases in northern Taiwan had an OR of 2.309.

Conclusion: This is the first report comparing domestic and imported cases of COVID-19 from surveillance data from the Taiwan CDC during January-May 2020. The study also highlights the importance of longitudinal and geographically extended studies in understanding the implications of COVID-19 transmission for Taiwan's population.

Background

In December 2019, clusters of unknown pneumonia were discovered in Wuhan, Hubei Province, China, with most initial cases of the pandemic being related to history of activity at Huanan Seafood Market. China announced on January 7, 2020, that the pathogen was a new type of coronavirus [1]. The pandemic then rapidly spread to other cities and provinces in China as well as around the world, and human-to-human transmission was subsequently verified [2,3]. The World Health Organization (WHO) announced it as a Public Health Emergency of International Concern on January 30, 2020 [4]. The disease caused by the novel coronavirus was referred to as Coronavirus Disease-2019 (COVID-19) on February 11, 2020 [5,6], and was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses [5].

The novel coronavirus SARS-CoV-2 is a betacoronavirus in the family Coronaviridae (CoV) [7]. Key pathogens causing human and animal diseases, CoV is a group of round-shaped, positive-sense single-stranded RNA viruses with a mantle. CoV, named after its viral crown-like spike protein observed under electron microscope, can be divided into alphacoronavirus, betacoronavirus, gammacoronavirus, and deltacoronavirus [8]. Coronaviruses can cause diseases among humans and other vertebrates and are zoonotic [9]. Animal hosts of CoV include bats (the largest population), pigs, cattle, turkeys, cats, dogs, and ferrets, and sporadic cross-species transmission has been reported [10]. Whether the novel coronavirus SARS-CoV-2 that causes COVID-19 has an animal host requires further research and verification [11]. Seven coronaviruses have been known to infect humans, including the alphacoronaviruses HCoV-229E and HCoV-NL63 as well as HCoV-HKU1, HCoV-OC43 or severe acute respiratory syndrome coronavirus (SARS-CoV), Middle East respiratory syndrome-related coronavirus (MERS-CoV), and the newly discovered betacoronavirus SARS-CoV-2 [12]. Human infection by coronaviruses mainly exhibits respiratory symptoms, including general upper respiratory tract infection symptoms such as nasal congestion, runny nose, cough, and fever. However, patients with SARS-CoV, MERS-CoV, and SARS-CoV-2 exhibit more severe symptoms than with typical human coronaviruses, with some cases displaying severe pneumonia and respiratory failure [13,14].

Currently, the complete transmission route of SARS-CoV-2 is yet to be fully understood [15]. Investigation of confirmed cases and laboratory tests indicated that droplets, direct or indirect contact with virus-bearing oral and nasal secretions, or long-term close contact (within approximately 2 m) with confirmed patients in a confined space without using respiratory protection increases the risk of human-to-human transmission [16]. Some novel coronaviruses may cause diarrhea in animals, and the virus can be found in their feces [17]. Human feces may also be tested positive for SARS-CoV-2 nucleic acid, in turn leading to spread of the virus among humans [18].

According to information released by the WHO, the incubation period for infection with SARS-CoV-2 to onset of illness is 1–14 days, and a confirmed patient may be infectious 2 days before the onset of illness [19]. The clinical manifestations of currently known confirmed COVID-19 cases include fever, dry cough, fatigue, and shortness of breath. Other symptoms include muscle pain, headache, sore throat, and diarrhea, and some cases display loss (or abnormality) of smell or taste [20]. According to current epidemiological information, most patients can recover, whereas a small number progress to severe pneumonia, respiratory distress syndrome, multiple organ failure, shock, or even death [21]. Most deaths have underlying medical history such as diabetes, chronic liver disease, renal insufficiency, or cardiovascular disease [22,23].

Taiwan, located at 23°4' north latitude and 121°0' east longitude, has a subtropical climate, with monthly average temperatures and monthly average relative humidity of 16°C–29°C and 75%–90%, respectively. A developed country, Taiwan's per capita gross domestic product is US$27,171 [24]. Despite the large number of imported COVID-19 cases and a number of domestic cases, the use of big data in epidemiological information to explore COVID-19-related risks in Taiwan has been sparse. Thus, the purpose of this study was to employ the Taiwan National Infectious Disease Statistics System (TNIDSS) to explore the epidemiological characteristics, differences, and trends regarding sex, age, season, and residential area of confirmed imported and domestic COVID-19 cases in Taiwan from January to May 2020.

Methods

Ethical Statement

This study did not require ethical approval because it used information freely available in the public domain and the analysis of open-source datasets in which the data were properly anonymized [25,26].

Definition of reported and confirmed cases [27]

1. Definition of clinical conditions

Patient displaying any of the following conditions: (1-1) fever (≥38°C) or respiratory tract symptoms; (1-2) abnormal smell and taste or diarrhea of unknown cause; or (1-3) clinical symptoms highly suspected by physicians to be community-acquired pneumonia.

2. Definition of inspection conditions

Clinical specimens (e.g., nasopharyngeal or throat swab, sputum, or lower respiratory tract extracts) that are tested positive in the novel coronavirus molecular biology nucleic acid test—identification of the novel coronavirus.

3. Definition of epidemiological conditions

Individuals with any of the following conditions within 14 days before the onset of illness: (3-1) a history of foreign travel or residence, or contact with individuals from abroad who have fever or respiratory symptoms; (3-2) close contact with highly probable or confirmed cases with symptoms consistent with COVID-19 (including providing care, staying with them in the same space without proper protection, or having direct contact with their respiratory tract secretions or body fluids); and (3-3) cluster infection phenomenon .

4. Definition of reported case

Individuals who meet any of the conditions stated in (4-1) through (4-4): (4-1) "meet any of the clinical conditions in (1-1) and epidemiological conditions"; (4-2) "meet clinical conditions (1-2) and epidemiological conditions (3-1) or (3-2)"; (4-3) "meet clinical condition (1-3)"; or (4-4) "meet the inspection conditions."

5. A confirm case is defined as a patient who must meet the test conditions.

Data source

Taiwan has a population density of 627 per km^2, an area of 36,188 km^2, and a population of approximately 23.5 million. The majority (95%) of the population lives in western Taiwan, which is divided into northern, central, and southern regions. Only 5% of Taiwan's population lives in eastern Taiwan, and this population is categorized as disadvantaged based on medical care and socioeconomic status. In addition, Taiwan has three outlying islands: Penghu, Kinmen, Matsu islands.

This study used TNIDSS, which is the public database of the online platform of Taiwan CDC [28]. The database includes all Category 1–5 communicable diseases as stipulated by the Communicable Disease Control Act. Since January 2020, Taiwan CDC has made available information on confirmed COVID-19 cases in the TNIDSS, providing the public, academics, and media with current information on the COVID-19 pandemic. In addition, Taiwan announced in January 2020 that COVID-19 is a Category 5 communicable disease under the Communicable Disease Act, and the data available for inquiry include the number of domestic and imported COVID-19 cases from January to May 2020.

The internet datasets contain information on gender, age, month of case confirmation, and area of residence of those with COVID-19. The datasets do not contain information regarding the medical history of patients, signs and symptoms, or treatment.

Statistical Analyses

The number of domestic and imported COVID-19 cases from January to May 2020 was determined using the database, and the distribution of their epidemiological characteristics (sex, age, year and month of confirmed illness, season, and area of residence), differences, and results were examined. Descriptive data are shown as mean and summary statistics, where appropriate. Categorical variables were compared using the chi-square test. Odds ratios (ORs) were computed through logistic regression and the 95% confidence intervals (CIs) through parameter estimation. Environmental variables that were significantly correlated with toxoplasmosis cases were tested for independence in a multiple linear regression analysis. All statistical analyses were performed using SPSS software (IBM SPSS Statistics 21; Asia Analytics Taiwan Ltd., Taipei, Taiwan). All statistical tests were two-sided with an α level of 0.05. Values of $p < 0.05$ were considered statistically significant.

Results

During the survey period of January to May 2020, the total number of confirmed COVID-19 cases was 443 (including 55 domestic confirmed cases and 338 imported cases), and data related to risk of infection (sex, age, month of infection, and area of residence) with their statistical significance were obtained (Tables 1–4).

A comparison of the domestic confirmed and imported cases revealed the following findings. (1) No significant difference for sex was observed. (2) For age, the ORs of domestic confirmed cases for the age groups of ≤9 and 50–59 years were 7.283 and 2.770, respectively, whereas the OR for imported cases for the age group of 20–29 years was 2.747. (3) For the month of infection, the ORs of domestic confirmed cases in January and February 2020 were 5.834 and 22.225, respectively, whereas the imported cases in March 2020 had an OR of 4.274. (4) In terms of area of residence, the OR of domestic confirmed cases in northern Taiwan was 2.309, whereas the imported cases living in southern Taiwan had an OR of 14.493 (Table 1).

A comparison of the number of confirmed cases of COVID-19 between men and women revealed that (1) no significant difference between age groups was observed; (2) in April 2020, the cases among men had an OR of 1.969; and (3) for residence, the OR of confirmed cases of men living in the southern region was 1.966 (Table 2). A comparison of the number of cases by age group yielded the following observations. (1) For month of infection, the ORs of cases for those aged 50–59 and ≥70 years in January and February 2020 were 7.974 and 5.597, respectively, whereas those aged 10–19, 20–29, and 20–29 years had ORs of 7.403, 1.827, and 10.049, respectively, in March, April, and May 2020. (2) In terms of area of residence, the OR of cases of individuals aged 60–69 years living in northern Taiwan was 2.408 (Table 3). The number of COVID-19 cases each month revealed that the OR for those living in northern Taiwan in March 2020 was 1.754. In addition,

the OR of individuals living in central Taiwan in January 2020 was 5.091, whereas the OR of those in southern Taiwan in May 2020 was 5.506 (Table 4).

A total of seven deaths (three domestic cases and four imported cases; six men and one woman; aged 40–80) from COVID-19 were recorded during the study period (Table 5).

Furthermore, the trend and impact of COVID-19 based on the characteristics of "patients' age group difference, changes in monthly incidence, and different geographic regions" were analyzed. Regarding age groups, 265 confirmed cases were recorded among the age group of 20–39 years (59.8%, 265/443), with men and women accounting for 131 (30%, 131/443) and 134 cases (30%, 134/443), respectively. The age group of 20–39 years recorded 200 cases (45%, 200/443) in March; the number of cases among the age group of 20–39 years in northern, central, and southern Taiwan were 166 (37%, 166/443), 37 (8%, 37/443), and 62 (14%, 62/443), respectively (Table 1). In changes in monthly incidence per 100,000 population from January to May 2020, the monthly incidence of total cases was 0.08, 0.12, 1.43, 0.27, and 0.03, respectively. The monthly incidence of cases for women over the same period was 0.04, 0.08, 0.74, 0.10, and 0.01, respectively; that of confirmed cases among the 20–29 age group was 0.01, 0.03, 0.54, 0.13, and 0.03, respectively; and that of those living in northern Taiwan was 0.04, 0.10, 0.99, 0.13, and 0.01, respectively (Fig. 2). With regard to geographic region, the six densely populated cities of Taipei City, New Taipei City, Taoyuan City, Taichung City, Tainan City, and Kaohsiung City recorded 118, 91, 53, 42, 16, and 49 cases, respectively (Fig. 3).

Discussion

Due to transport convenience, travelers may be exposed to infectious diseases or become ill overseas and may spread the disease from one country to another, causing a transnational pandemic. Thus, international travelers are of great significance in the epidemiology of infectious diseases [29]. For example, in the past decade, international travelers have faced threats such as Ebola, Zika, and chikungunya. Infectious disease surveillance networks that constantly evolve with time or environmental changes (e.g., the Global TravEpiNet, an alliance formed by health clinics across the United States, and Taiwan CDC's travelers' health surveillance network) have contributed to meeting the continuous demand for international traveler surveillance. In addition, the risks of travel-related diseases vary by destination and traveler characteristics. To assess the actual risks of international travelers, this study collected and analyzed correlations between imported cases of COVID-19 (i.e., international travelers) at a specific period and domestic cases in the same period.

Based on the chronological order of COVID-19 infection, the results indicate that increased numbers of domestic cases may have been caused by international travelers transmitting SARS-CoV-2 in Taiwan in March 2020. Moreover, the majority of imported cases fell within the age group of 20–29 years, which was similar to findings reported elsewhere [30]; however, the age group of 50–59 years had the highest proportion of domestic cases. This indicates that young people infected with COVID-19 may spread the disease to Taiwan through international travel, leading to a sharp rise in the infection rate among low-immunity populations (middle-aged and older adults) in the destination country (Taiwan), in turn causing health threats and a health care burden. Furthermore, according to studies elsewhere, most confirmed COVID-19 cases are concentrated in metropolitan areas [31], which concurs with the findings of this study. This study revealed that with the concentration of imported cases in metropolitan areas of northern Taiwan (particularly Taipei City), domestic cases also rose significantly, resulting in increased risk for local residents. This study inferred that the incidence and spread of COVID-19 is geographically concentrated and limited. Accordingly, the SARS-CoV-2 infections imported through overseas travel are likely to be the major risk factor for the COVID-19 pandemic in Taiwan. These findings may serve as the basis for governments or public health experts to formulate pandemic prevention policies and health resource allocation decisions.

According to the literature, no difference has been observed in the sex of patients with COVID-19 [32], which is consistent with the results from the number of confirmed COVID-19 cases (including imported and domestic cases) in this study. However, this study also discovered that patients differed by sex in their risk of infection according to month of infection and area of residence, with the highest risk observed in men infected in April 2020 or men living in southern Taiwan. Thus,

individuals of different sex may have been exposed to different levels of health threats due to the month of infection or area of residence when they were infected with COVID-19. Second, according to another study [33], patients with COVID-19 are mainly adults, and most cases of childhood infections are related to contacts with or family gatherings involving adults with confirmed infections. The results of this study revealed that the majority of patients with COVID-19 in Taiwan are adults (aged 20 years or older, 94.4%, 418/443) and that the source of childhood infection was family gatherings, similar to the findings of the aforementioned study. However, this study also determined that risks to individuals of different ages varied by month of infection and area of residence. Middle-aged and older adults (aged 50–59 years and 70 years or older) had a higher risk of infection in January and February, whereas young people were at higher risk during March–May. Therefore, the medical and health care burden for different age groups varies in different months, which causes unbalanced consumption of medical resources. In addition, older adults (aged 60–69 years) living in northern Taiwan also faced a higher infection risk. This indicates that when individuals of different age groups are infected with COVID-19, they, similarly to the aforementioned comparison by sex, are exposed to different health hazard risks due to the month of infection or area of residence. Furthermore, this study determined that the risk of local residents being infected with COVID-19 differs according to month of infection and place of residence. Another possible reason is the disproportionate attention to pandemic prevention by patients with COVID-19 in different months of infection and the varying effectiveness of pandemic prevention in different areas of residence, which led to the rise in the risk of COVID-19 infection. The aforementioned results can serve as a reference for the Taiwanese government in formulating pandemic prevention policies, preventive medicine, and clinical care.

Regarding the epidemiological trends of COVID-19, the results indicated that compared with other age groups, patients aged 20–39 years (including imported and domestic cases) accounted for the highest proportion (percentage) regardless of sex, age, or area of residence, which concurs with findings reported elsewhere [33]. The possible reason is that young people have milder COVID-19 symptoms and higher infectivity; thus, the number of confirmed cases for this group was high. In addition, the results also indicate that incidence of COVID-19 in March 2020 was highest regardless of sex, age, or region, which was inferred to be related to the major outbreak of the pandemic in Europe and the United States in March 2020. Moreover, this study discovered that patients with COVID-19 were concentrated in the densely populated metropolitan areas of Taipei City and New Taipei City in northern Taiwan (47%, 209/443), which was inferred to be related to the characteristic of COVID-19 being transmitted rapidly in crowded and confined spaces [34]. Taiwan's epidemiological characteristics of COVID-19 in human, temporal, and geographical dimensions are recommended to be incorporated into the planning and strategy implementation of public health measures and pandemic prevention.

According to the findings, the mortality of patients with COVID-19 in Taiwan was 1.6%; men accounted for most of these deaths (85.7%, 6/7). Deaths were also concentrated in the age group of 40–80 years. These findings concur with those of other studies [35-37]. Most COVID-19 cases involving children exhibit mild symptoms, with sporadic deaths [38]; no children died in Taiwan. A noteworthy aspect is that the sources of infection for patients with COVID-19 in Taiwan (including those resulting in death) were contact infection, family gatherings, and hospital infection; no community spread was recorded. A possible reason is the decisive and accurate pandemic prevention policies by the government and the joint efforts of the public and the government to combat the pandemic.

This study has the following two limitations. First, the infectious disease data published by the Taiwan CDC on the Internet platform provide only the basic epidemiological data of patients with COVID-19; they do not contain clinical data or detailed experimental procedures. However, the authenticity of the positive confirmed cases announced by Taiwan's CDC is convincing. In addition, differences or trends in patients' clinical data or symptoms could not be compared. Second, the data disclosed on the platform also do not contain any information related to the SARS-CoV-2 genotype; thus, the study is incapable of determining (1) the genotype of SARS-CoV-2 currently prevalent in Taiwan or (2) the genetic relationship between the SARS-CoV-2 genotypes in Taiwan and those in other countries. However, this study has one advantage, which is the instant and accurate data disclosed by Taiwan's public sector on the online public platform. In addition, the platform has maintained an abundance of information over a long period, enabling researchers and institutions to describe or employ

statistical methods on the monitored infectious disease data to produce academic value, promote effective disease control, and maintain the health of the Taiwanese public.

Conclusions

In conclusion, this study was the first to report on the human, temporal, and geographic characteristics and trends of imported and domestic COVID-19 cases in Taiwan from January to May 2020. It verified that an increase in the number of international travelers infected with COVID-19 within a short period of time in Taiwan resulted in increased domestic cases. The linkage relationship of the disease indeed burdened Taiwan's medical staff and threaten people's health. Moreover, most of the imported cases were young people; however, the domestic cases were mostly middle-aged and older adults. The low-immunity populations in the visited country was burdened. The increase in the number of visitors infected with COVID-19, the visiting younger population, and the place of residence of the visiting individuals were verified risk factors. Moreover, incidence of confirmed COVID-19 cases per 100,000 population was highest in March 2020 (1.43), and most of the confirmed cases were concentrated in northern Taiwan. This information will be useful for policymakers and clinicians directing prevention and control activities for COVID-19, a severe illness and an enormous burden on Taiwan. The identified data may inform future surveillance and research efforts in Taiwan.

Abbreviations

CDC: Centers for Disease Control; ORs: Odds Ratios; CIs: Confidence Intervals; WHO: World Health Organization; COVID-19: Coronavirus Disease-2019; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2; CoV: Coronaviridae; SARS-CoV: Severe Acute Respiratory Syndrome Coronavirus; MERS-CoV: Middle East Respiratory Syndrome-related Coronavirus; TNIDSS: Taiwan National Infectious Disease Statistics System; TravEpiNet: Travel Epidemic Network.

Declarations

Ethics approval and consent to participate

This study did not require ethical approval because it used information freely available in the public domain and the analysis of open-source datasets in which the data were properly anonymized

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analysed during this study are included in this published article.

Competing interests

The authors(s) declare that they have no competing interests.

Funding

This research received no external funding.

Authors' contributions

Conceptualization, CKP and CPY; Investigation, YCC, KYL, HLL, MTT, DCW, FHL and CJH; Methodology, CKP and CPY; Validation, CHW, YCC, KYL, HLL, MTT, DCW, FHL and CJH; Writing – original draft, CHW and CPY; Writing – review & editing,

YCC, CKP and CPY. All authors commented on the draft, contributed to the interpretation of the findings and approved the manuscript.

Acknowledgements

This manuscript was edited by Wallace Academic Editing. The authors are grateful to all our colleagues in the Department of Medical Records in Tri-Service General Hospital, National Defense Medical Center for their help in the collection of government data. We would like to thank Su-Chuen Lin for assistance in data entry. We also would like to thank Hong-Ling Lin, Yu-Jui Chen, and Jui-Cheng Lu for technical assistance.

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Tables

Table 1. Epidemiological features of domestic, imported cases by analyze surveillance data of COVID-19 patients in Taiwan during 2020/1 and 2020/5

Variables	Total Cases N=443 (%)	Domestic Cases N=55 (%)	Imported Cases N=388 (%)	*P Value*	*OR*
Gender					
Male	220 (49.66)	26 (47.27)	194 (50)	NS	N/A
Female	223 (50.34)	29 (52.73)	194(50)		
Age Group					
<=9y	4 (0.90)	2 (3.64)	2 (0.52)	0.022	7.283
10-19y	21 (4.74)	3(5.45)	18 (4.64)	NS	N/A
20-29y	169 (38.15)	11 (20)	158 (40.72)	0.003	2.748
30-39y	96 (21.67)	10 (18.18)	86 (22.16)	NS	N/A
40-49y	42 (9.48)	8 (14.55)	34 (8.76)	NS	N/A
50-59y	52 (11.74)	13 (23.64)	39 (10.05)	0.003	2.770
60-69y	43 (9.71)	4 (7.27)	39 (10.05)	NS	N/A
>=70	16 (3.61)	4 (7.27)	12 (3.09)	NS	N/A
Month					
Jan.	19 (4.29)	8 (14.55)	11 (2.84)	<0.001	5.834
Feb.	28 (6.32)	19 (34.55)	9 (2.32)	<0.001	22.225
Mar.	328 (74.04)	25 (45.45)	303 (78.09)	<0.001	4.278
Apr.	61 (13.77)	3 (5.45)	58 (14.95)	NS	N/A
May	7 (1.58)	0 (0)	7 (1.80)	NS	N/A
Residency					
Northern	290 (65.46)	44 (80)	246 (63.40)	0.015	2.309
Central	70 (15.80)	10 (18.18)	60 (15.46)	NS	N/A
Southern	83 (18.74)	1 (1.82)	82 (21.13)	0.001	14.471

NS: Non-significant. N/A: Not applicable.

Table 2. Gender associated with other epidemiological features by analyze surveillance data of COVID-19 patients in Taiwan during 2020/1 and 2020/5

Variables	Total Cases N=443 (%)	Male Cases N=220 (%)	Female Cases N=223 (%)	P Value	OR	95%CI
Age Group						
<=9y	4 (0.90)	3 (1.36)	1 (0.45)	NS	N/A	N/A
10-19y	21 (4.74)	9 (4.09)	12 (5.38)	NS	N/A	N/A
20-29y	169 (38.15)	80 (36.36)	89 (39.91)	NS	N/A	N/A
30-39y	96 (21.67)	51 (23.18)	45 (20.18)	NS	N/A	N/A
40-49y	42 (9.48)	22 (10)	20 (8.97)	NS	N/A	N/A
50-59y	52 (11.74)	26 (11.82)	26 (11.66)	NS	N/A	N/A
60-69y	43 (9.71)	21 (9.55)	22 (9.87)	NS	N/A	N/A
>=70	16 (3.61)	8 (3.64)	8 (3.59)	NS	N/A	N/A
Month						
Jan.	19 (4.29)	9 (4.09)	10 (4.48)	NS	N/A	N/A
Feb.	28 (6.32)	10 (4.55)	18 (8.07)	NS	N/A	N/A
Mar.	328 (74.04)	157 (71.36)	171 (76.68)	NS	N/A	N/A
Apr.	61 (13.77)	39 (17.73)	22 (9.87)	0.016	1.969	1.125~3.446
May	7 (1.58)	5 (2.27)	2 (0.90)	NS	N/A	N/A
Residency						
Northern	290 (65.46)	136 (61.82)	157 (70.40)	NS	N/A	N/A
Central	70 (15.80)	28 (12.73)	33 (14.80)	NS	N/A	N/A
Southern	83 (18.74)	56 (25.45)	33 (14.80)	0.005	1.966	1.219~3.171

NS: Non-significant. N/A: Not applicable.

Table 3. Age groups associated with other epidemiological features by analyze surveillance data of COVID-19 patients in Taiwan during 2020/1 and 2020/5

Variables	Total Cases N=443 (%)	<=9y Case N=4 (%)	10-19y Case N=21 (%)	20-29y Case N=169 (%)	30-39y Case N=96 (%)	40-49y Case N=42 (%)	50-59y Case N=52 (%)	60-69y Case N=43 (%)	>=70y Case N=16 (%)	P Value	OR	95%CI
Month												
Jan.	19 (4.29)	0 (0)	0 (0)	2 (1.18)	1 (1.04)	3 (7.14)	9 (17.31)	2 (4.65)	2 (12.50)	<0.001	7.974	3.071~20.705
Feb.	28 (6.32)	0 (0)	1 (4.76)	6 (3.55)	3 (3.13)	4 (9.52)	9 (17.31)	1 (2.33)	4 (25.00)	0.002	5.597	1.679~18.662
Mar.	328 (74.04)	4 (100.00)	20 (95.24)	124 (73.37)	76 (79.17)	31 (73.81)	32 (61.54)	32 (74.42)	9 (56.25)	0.023	7.403	0.982~55.794
Apr.	61 (13.77)	0 (0)	0 (0)	31 (18.34)	16 (16.67)	4 (9.52)	1 (1.92)	8 (18.60)	1 (6.25)	0.028	1.827	1.061~3.147
May	7 (1.58)	0 (0)	0 (0)	6 (3.55)	0 (0)	0 (0)	1 (1.92)	0(0)	0(0)	0.009	10.049	1.199~84.213
Residency												
Northern	290 (65.46)	3 (75.00)	14 (66.67)	102 (60.36)	64 (66.67)	28 (66.67)	37 (71.15)	35 (81.40)	10 (62.50)	0.026	2.408	1.087~5.332
Central	70 (15.80)	1 (25.00)	1 (4.76)	28 (16.57)	9 (9.38)	7 (16.67)	7 (13.46)	5 (11.63)	3 (18.75)	NS	N/A	N/A
Southern	83 (18.74)	0 (0)	6 (28.57)	39 (23.08)	23 (23.96)	7 (16.67)	8 (15.38)	3 (6.98)	3 (18.75)	NS	N/A	N/A

NS: Non-significant. N/A: Not applicable.

Table 4. Infectious months associated with residency by analyze surveillance data of COVID-19 patients in Taiwan during 2020/1 and 2020/5

Variables	Total Cases N=443 (%)	Jan./2020 Cases N=19 (%)	Feb. /2020 Cases N=28 (%)	Mar. /2020 Cases N=328 (%)	Apr. /2020 Cases N=61 (%)	May . /2020 Cases N=7 (%)	P Value	OR	95%CI
Residency									
Northern	290 (65.46)	9 (47.37)	22 (78.57)	228 (69.51)	31 (50.82)	3 (42.86)	0.011	1.754	1.133-2.716
Central	70 (15.80)	8 (42.11)	4 (14.29)	42 (12.80)	7 (11.48)	0 (0.00)	<0.001	5.091	1.959-13.231
Southern	83 (18.74)	2 (10.53)	2 (7.14)	58 (17.68)	23 (37.70)	4 (57.14)	0.014	5.506	1.210-25.063

Table 5. The COVID-19 death cases from Taiwan's CDC surveillance data during 2020/1 and 2020/5

Death cases No.	Confirmed day	Death day	Domestic or Imported	Transmission route	Gender	Age
1	2020/2/15	2020/2/15	Domestic	Contact infections	Male	61
2	2020/2/23	2020/3/20	Domestic	Family cluster	Male	80
3	2020/2/28	2020/3/29	Domestic	Nosocomial infections	Female	50
4	2020/3/19	2020/3/29	Imported	Returning from Austria and Czech Republic	Male	40
5	2020/3/23	2020/3/29	Imported	Returning from Spain	Male	60
6	2020/3/19	2020/4/9	Imported	Returning from Egypt	Male	70
7	2020/3/24	2020/5/11	Imported	Returning from USA	Male	40

Figures

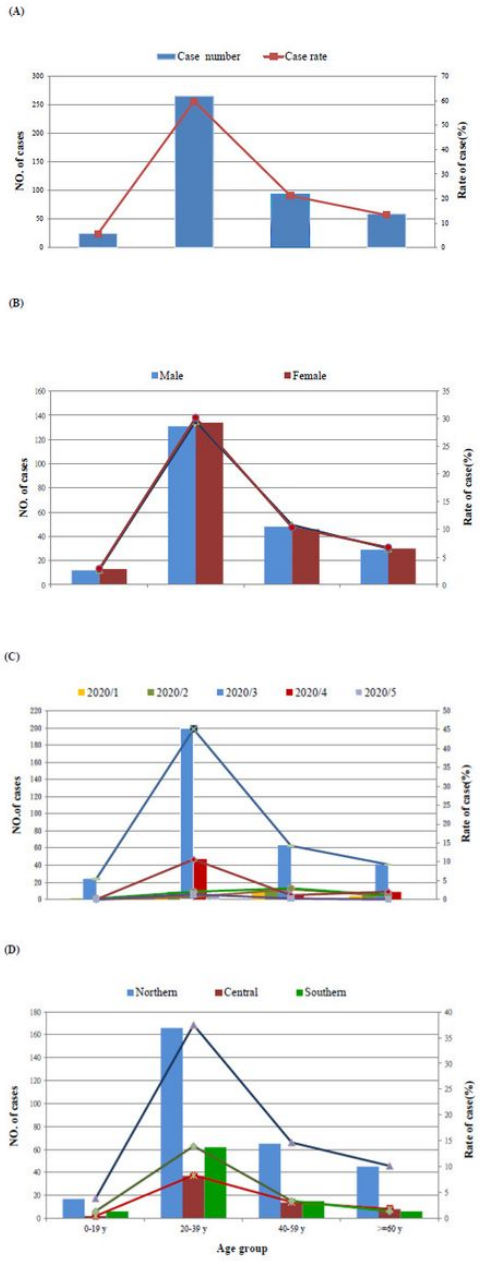
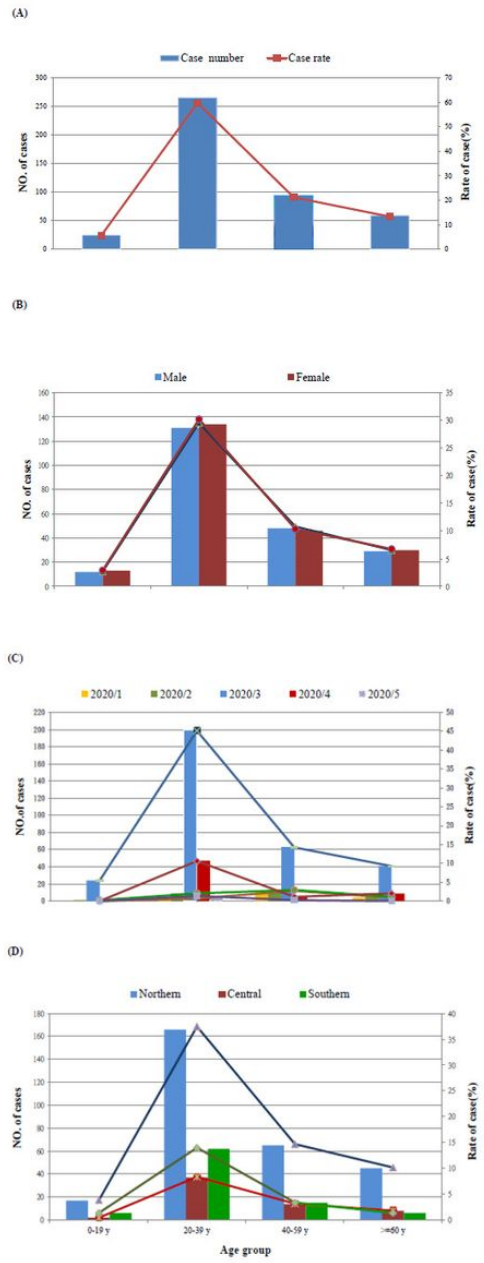


Figure 1

Cases and rate of confirmed COVID-19 among patients in Taiwan according to (A) age group, (B) sex, (C) month, and (D) residency by age group form 1/2020 to 5/2020. y=years old



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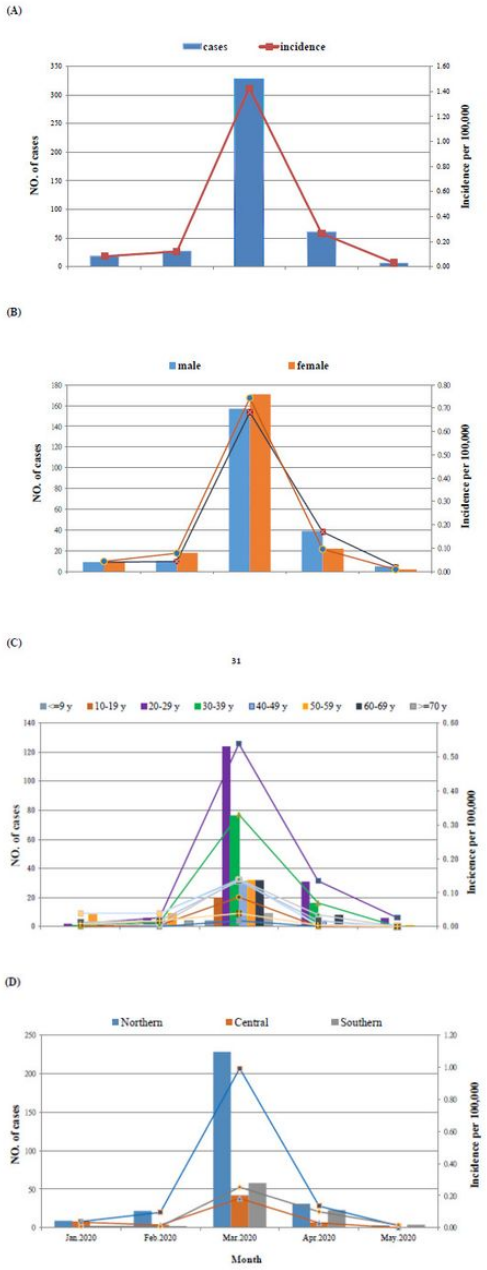
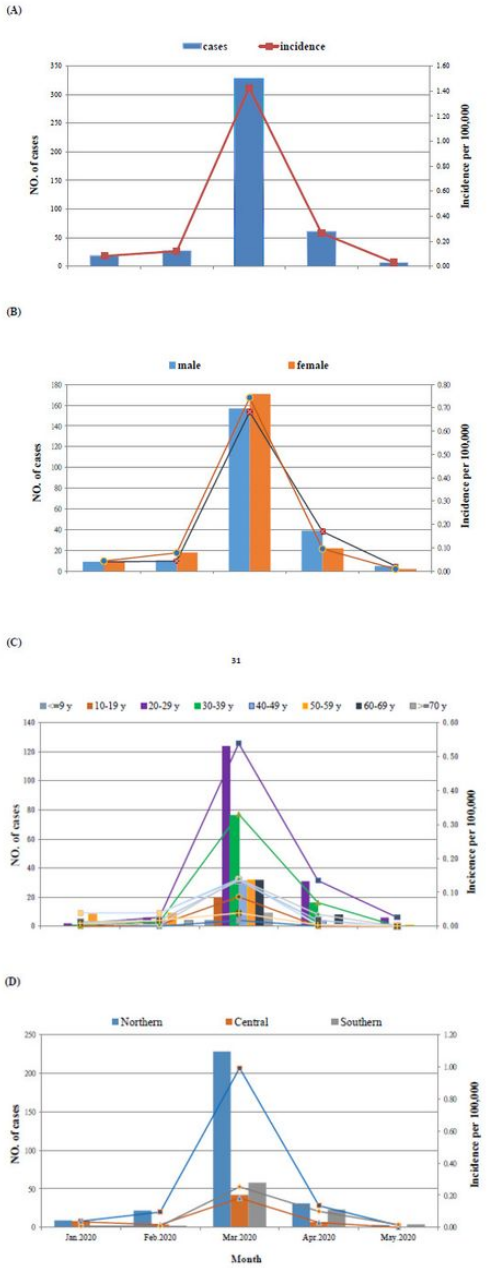


Figure 2

Cases and incidence of confirmed COVID-19 among patients in Taiwan according to (A) month, (B) sex, (C) age, and (D) residency by month form 1/2020 to 5/2020. y = years old



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Cases and incidence of confirmed COVID-19 among patients in Taiwan according to (A) month, (B) sex, (C) age, and (D) residency by month form 1/2020 to 5/2020. y = years old

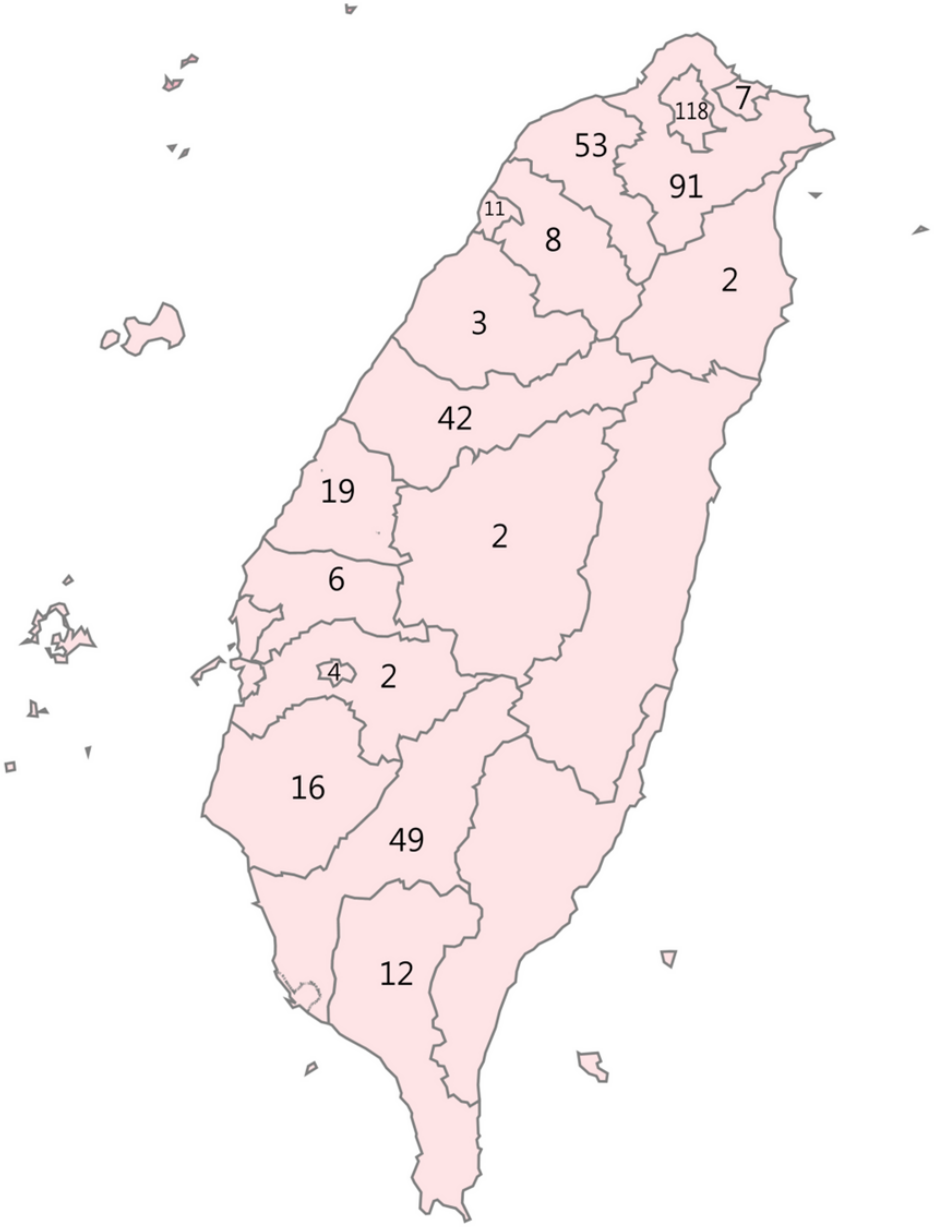
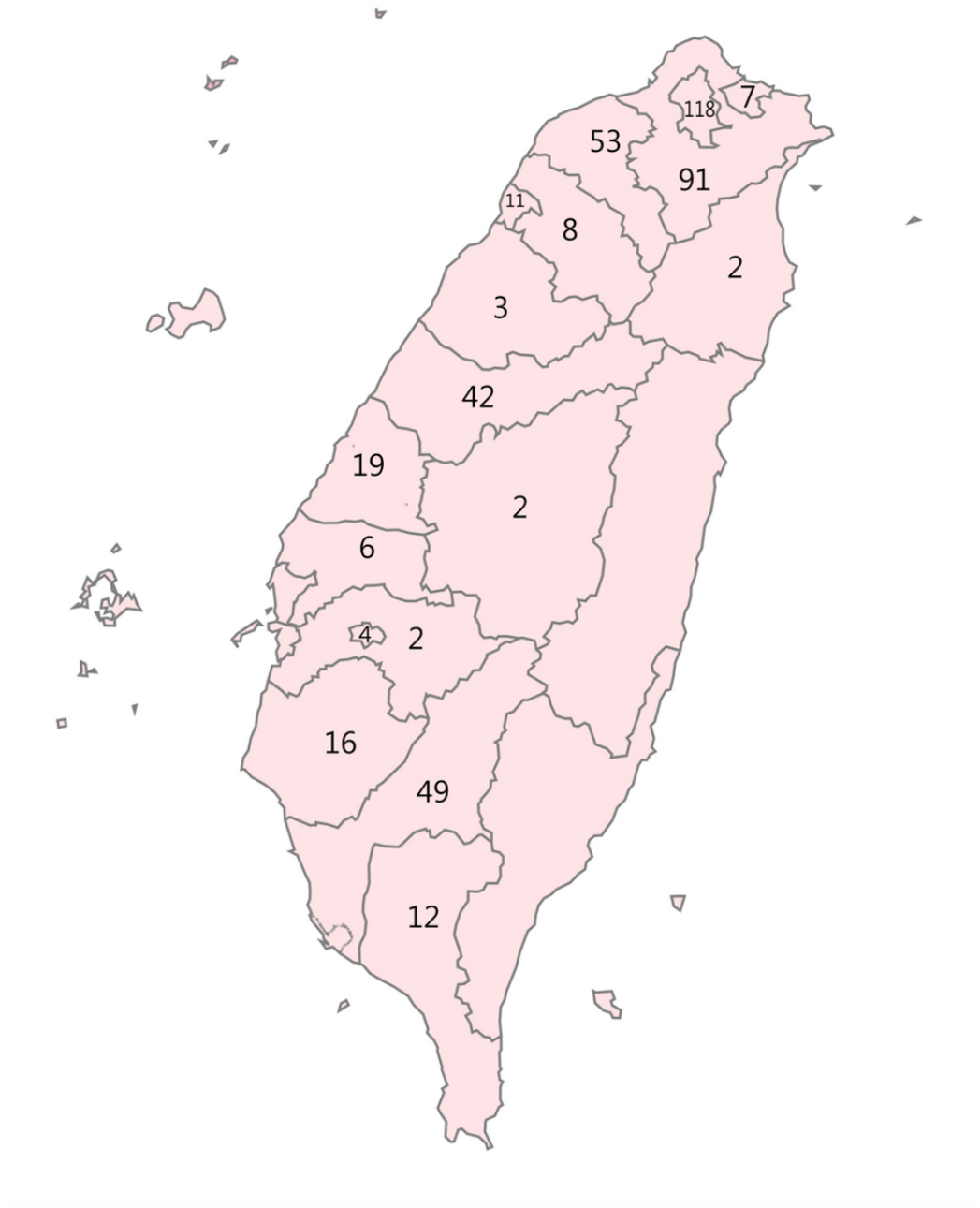


Figure 3

Geographical distribution of confirmed COVID-19 cases in Taiwan, 2020/1-2020/5. 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.



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