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## Short Communication

## Influenza versus COVID-19 cases among influenza-like illness patients in travelers from Wuhan to Hong Kong in January 2020

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## ABSTRACT

**Objective:** The COVID-19 outbreak in Wuhan, Hubei, China, followed the seasonal influenza epidemic. Since some COVID-19 cases may have been misdiagnosed as seasonal influenza in January 2020, before testing capacity was adequate, it is relevant to study the proportions of influenza and COVID-19 cases among influenza-like-illness (ILI) patients and their temporal pattern.

**Results:** This study analyzed the record of the ILI patients with a recent travel history to Wuhan who arrived in Hong Kong between 31 December 2019 and 21 January 2020. We found that the proportion of COVID-19 cases among the total ILI patients is much smaller than a study among ILI in Wuhan. This difference in proportion could be due to the difference in sampling. We argue that it is essential to consider both samples when inferring the number of COVID-19 cases from ILI patients.

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## Introduction

The coronavirus 2019 (COVID-19) pandemic has dominated the world for well over half a year since the early outbreak in Wuhan, China. The pandemic hit Wuhan, Hubei, China hard, and the city had been in lockdown for more than 70 days. Much attention has been focused on estimating the accurate prevalence of COVID-19 cases in Wuhan in January 2020. Even though large-scale serological studies have been conducted, the initial spread of the virus in Wuhan still remains unclear. It seems clear, though, that the COVID-19 outbreak followed the seasonal influenza epidemic. Since both influenza and COVID-19 are respiratory diseases, COVID-19 could have been misdiagnosed as influenza initially before testing capacity was in place.

This study by the Centre for Health Protection (CHP) in Hong Kong investigated the distribution of seasonal influenza and COVID-19 cases imported from Wuhan from 31 December 2019 to 21 January 2020 (Centre for Health Protection and Department of Health, 2020). This piece of information is critical for estimating

the prevalence of COVID-19 compared with seasonal influenza among travelers from Wuhan to Hong Kong in January 2020, which has attracted attention recently (Du et al., 2020).

## Method and results

On 31 December 2019, the CHP alerted medical superintendents on the cluster of pneumonia cases in Wuhan and required prompt investigation of patients with respiratory symptoms and fever who had visited the wet market or seafood market in Wuhan within two weeks before their onset of symptoms (Centre for Health Protection and Department of Health, 2020). Four days later, the CHP updated the criteria to require monitoring patients with symptoms and who had a travel history to Wuhan within two weeks before their onset of symptoms (Centre for Health Protection and Department of Health, 2020). The reporting criteria were later extended to patients with symptoms and having visited a medical hospital in Mainland China or having close contact with a confirmed symptomatic coronavirus case. It was not until 21 January 2020 that the CHP started to closely monitor the patients from Hubei Province, aside from Wuhan (Centre for Health Protection and Department of Health, 2020). Therefore, it is reasonable to assume that a large majority of the cases tested for coronavirus in Hong Kong from 31 December 2019 to 21 January 2020 traveled from Wuhan. Since the CHP ceased to report non-COVID respiratory infections from Wuhan after 21 January, our comparison of non-COVID-19 respiratory infections versus COVID-

**Abbreviations:** COVID-19, coronavirus disease 2019; SARS-CoV-2, severe-acute-respiratory-syndrome coronavirus 2; ILI, influenza-like-illness.

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**Table 1**  
The comparison of seasonal influenza and COVID-19 positive rates from two studies.

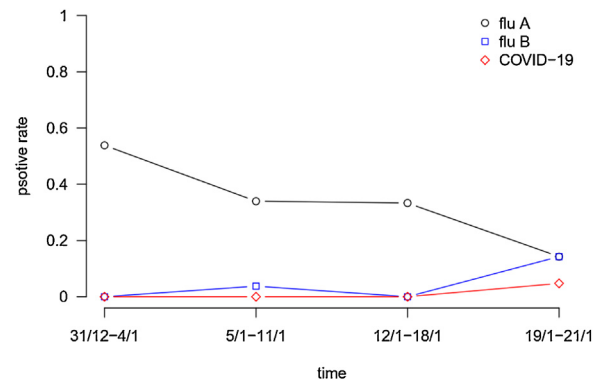
	The current study	Kong et al
Location	Hong Kong (imported from Wuhan)	Wuhan
Sample	ILI patients	ILI patients
Time	31/12/2019–21/01/2020	First three weeks in 2020
Sample size	117	120
Influenza virus positive	36.8%	43.3%
SARS-CoV-2 positive	0.9%	7.5%

19 among influenza-like-illness (ILI) patients focused on the cases prior to that date. Starting from 23 January 2020, Wuhan underwent an unprecedented 76-day lockdown leading to an extremely low mobility of the population (CNN, 2020). Reverse transcription-polymerase chain reaction (RT-PCR) testing was applied to detect influenza virus versus coronavirus (including Coronavirus 229E, coronavirus HKU1, and SARS-CoV-2, which causes COVID-19) in the samples of all suspected cases imported from Wuhan to Hong Kong. Besides influenza virus and coronavirus, other respiratory viruses (including human rhinovirus/enterovirus, Adenovirus, coronavirus OC43, parainfluenza virus, respiratory syncytial virus) were also tested and reported. This showed a tremendous effort to screen for COVID-19. This study relied on the accuracy of the official data from the Hong Kong Center for Health Protection.

Among all 117 symptomatic cases imported from Wuhan to Hong Kong between 31 December 2019 to 21 January 2020, 43 tested negative, and one tested positive for novel coronavirus (data are provided in the supplementary table). The comparison of influenza virus (A/B) and SARS-CoV-2 positive rates between the current study and Kong et al. is shown in Table 1. The proportion of novel coronavirus took up 0.9% of the total cases, and seasonal influenza (A/B) took up 36.8% of the total cases. Figure 1 presents the positive rates of seasonal influenza virus and SARS-CoV-2 among travelers from Wuhan from 31 December 2019 to 21 January 2020.

The descriptive analysis might reflect the distribution of seasonal influenza and COVID-19 cases in Wuhan at that early stage of the outbreak. The Hong Kong surveillance data should be accurate, considering the reporting system. The number of people reporting ILI during the winter was significantly higher than that of the previous year, suggesting the necessity to distinguish seasonal influenza from the COVID-19 outbreak (Kong et al., 2020). According to a study that retrospectively investigated the presence of SARS-CoV-2 among patients with ILI in Wuhan in the first three weeks of January 2020, 52 cases tested positive for seasonal influenza, and nine cases were tested positive for SARS-CoV-2 by RT-PCR (Kong et al., 2020). In our study, 43 influenza cases and one COVID-19 case were imported from Wuhan to Hong Kong from 31 December 2019 to 21 January 2020. The proportion of COVID-19 versus seasonal influenza cases was higher in Kong et al. compared with our study (Kong et al., 2020), which suggested that the travelers from Wuhan to Hong Kong were less likely to carry SARS-CoV-2 compared with the local Wuhan residents in the early outbreak of COVID-19. The detection of the SARS-CoV-2 positive rate among travelers with ILI from Wuhan to Hong Kong provides critical evidence for retrospective estimation of the scale of the early COVID-19 outbreak versus the winter peak of influenza in Wuhan.

Note that travelers from Wuhan to Hong Kong in the early January 2020 may not be representative of the overall residents in Wuhan because it might be possible that travelers from Wuhan to Hong Kong were of relatively high social-economic status and less likely to be epidemiologically linked with the wet and seafood markets. However, the ratio of COVID-19 versus influenza cases



**Figure 1.** The positive rate of influenza A, influenza B, and COVID-19 since the detection from 31 December 2019 to 21 January 2020 in Hong Kong.

among ILI in this study should be taken as seriously as that of Kong et al., since the sample sizes of both studies are comparable. Notably, it was not until 21 January 2020 that the testing of travelers to Hong Kong reported the first imported COVID-19 case. Studies with a high rate of COVID-19 cases (e.g., Kong et al.) might have attracted more attention. It is essential to pay equal attention to studies with “negative” findings or low rates. Only in this way can we get an unbiased estimate of COVID-19 prevalence in Wuhan in early January 2020.

The analysis of COVID-19 importing risk from Wuhan to Hong Kong could suggest developing appropriate travel restrictions and quarantining the suspected cases to mitigate the impact of the pandemic globally (Chinazzi et al., 2020).

**Limitations**

The SARS-CoV-2 RNA reference sequence was only available on 10 January 2020; it is unclear how COVID-19 cases were confirmed before that. This study relied on the accuracy of official data from the Hong Kong Center for Health Protection. This study’s sample size is small, but it is comparable to Kong et al. As we argued, this study and the dataset should be taken seriously to gain an unbiased estimate of the influenza and COVID-19 ratio in January 2020 in Wuhan, China.

**Ethics approval and consent to participate**

Ethical approval or individual consent was not applicable.

**Availability of data and materials**

All data and materials used in this work were publicly available.

**Consent for publication**

Not applicable.

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## Disclaimer

The funding agencies had no role in the study's design and conduct; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

## Conflict of interest

DH was supported by an Alibaba (China) Co. Ltd. Collaborative Research project. Other authors declare no competing interests.

## Authors' contributions

JT, DH conceived the study, carried out the analysis, discussed the results, drafted the first manuscript; HG, LY, SZ critically read and revised the manuscript, and all authors gave final approval for publication.

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None.

## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ijid.2020.09.1474>.

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