Letter to the Editor

An outbreak of influenza among trekkers in the Everest region of Nepal†

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Influenza, a contagious disease1 poses a public health threat especially among travelers as outbreaks are common. There was an outbreak of Influenza A in trekkers to the Everest region in the fall of 2018 and more than half of these patients required hospitalization leading to trip disruption.

A retrospective chart review of travelers presenting to CIWEC Hospital, Kathmandu, from 1 September to 30 November 2018, with influenza-like illness was conducted. Ethical approval was obtained from Nepal Health Research Council (NHRC) Reg. no. 646/2019. Diagnosis of influenza was made at CIWEC based on rapid test (QuickVue) and Polymerase Chain Reaction (PCR) was done for influenza on selected samples sent to Walter Reed/AFRIMS Research Unit Nepal (WARUN) laboratory after being enrolled in Sentinel Human Surveillance for Influenza in Nepal.

There were 216 travelers with influenza-like illness from September to November 2018 presenting to CIWEC from a total of 2724 patients seen. Sixty-two of these (28.7%) tested positive for Influenza. Forty-two (67.7%) acquired influenza while trekking and the rest were non-trekking travelers. The mean age of trekkers with influenza was 46 (range 21–73) whereas for non-trekkers it was 42 (range 8–73 years). Twenty-four (38.3%) people with influenza were from Europe followed by Asia, North America and Oceania. All the trekkers with influenza required helicopter evacuation from the trekking routes as they were too sick to walk. More than half the Everest trekkers (69.0%) required hospitalization whereas only 25% of the non-trekkers with influenza required hospitalization due to influenza (Figure 1). Among the trekkers, 40/42 (95.2%) were trekking in the Everest region, Dingboche (4530 m) being the main location of onset of flu-like symptoms and Namche Bazaar the major location for evacuation. One each was from Annapurna (2.4%) and Manasalu (2.4%) trekking regions. Among the Everest trekkers there were three potential mountaineers due to climb Mera Peak (6476 m), Baruntse Peak (7129 m) and Island Peak (6189 m). Influenza A was present in 57 (91.9%) and Influenza B in 5 (8.1%) among all travelers and among trekkers this was 41 (97.6%) and 1 (2.4%), respectively. The attack rate for Influenza among Everest trekkers was 0.13%, with 29692 trekkers present at the Everest area during the study period (Department of National Parks and Wildlife Conservation, Nepal, personal communication, 2019). Only 4/62 (6%) had received flu immunization and of these, three had Influenza A and one had Influenza B. Everest trekkers with influenza were all found to have influenza A. Among 16 samples confirmed by PCR at the WARUN lab, all influenza A patients were found to have Flu A/H1-pdm09 strain.

Review of CIWEC records from 2014 to 2018 showed that 137 patients had confirmed influenza and 62/137 (45%) of these were from the 3 month study period alone. Mass gathering, as can occur during trekking, has been identified as areas for viral exchange and amplification.2 Among trekkers with influenza in our study, one patient each had co-morbidity due to asthma, hypertension, varicose veins and implanted pacemaker and the rest were healthy trekkers. One Everest trekker with flu required intensive care unit admission due to concomitant pneumonia and atrial fibrillation.

Smaller shelters and crowded teahouses at higher elevations, less availability of water leading to less handwashing, presence of high altitude cough3 that facilitates viral transmission, somewhat weakened condition during trekking and low influenza vaccination rates may have played roles in the outbreak of Influenza in the Everest region curtailing the dreams of climbers, trekkers and summiteers.
Pretravel advice regarding influenza vaccination could have helped prevent such influenza outbreaks and reduced costs related to helicopter evacuation and hospitalization.

**Author contributions**

The concept and design of this study were performed by B.A., P.P. and S.K.S. Data collection was done by B.A and S.K.S. Data analysis and data visualization were done by B.A. Data interpretation was done by B.A. and P.P. The manuscript was prepared by B.A. and critically appraised and edited by P.P. and S.K.S. All authors agreed and approved the final manuscript.

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**Conflict of interest**

None declared.

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