Effect of three lockdowns in London: Case study for residential fires

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ABSTRACT

Objectives: The effect of lockdown periods on the number of residential fires was investigated based on three factors: the weekly change in the number of residential fires, the time of the day of residential fires, and the notional cost associated with residential fires.
Study design: observational study.
Methods: Analysis from Open Data Source. A new index was introduced and the weekly change during the lockdown periods was investigated to accommodate the seasonal differences in the number of residential fires.
Results: From the index change, the number of residential fires increased at the beginning of each lockdown period. The timing of residential fires shifted during the day.
Conclusions: These changes were associated with meal preparation or mealtimes. Adjustment to lockdowns as the global pandemic dragged on, such as changes to mealtimes, and getting used to lockdown life, are believed to be responsible for these changes.

1. Introduction

Since the emergence of COVID-19, everyday life has dramatically changed. All over the world, stay-at-home or lockdown orders were imposed. Under the lockdowns, people were forced to stay home more, to prevent the spread of and possible death from COVID-19 [1]. For these reasons, the United Kingdom (UK) experienced three lockdown periods before fully reopening in the Summer of 2021 [2].

Lockdowns affected cooking and eating behaviors [3,4]. The London Fire Brigade (LFB) pointed out more than 60% of residential fires start from the kitchen [5]. Prior to the outbreak of the pandemic, there are detailed studies on fire statistics in the UK conducted by Spearpoint and Hopkin [6]. As people spent more time at home or cooking, it is plausible the number of cooking fires, thus residential fires, increased during these periods.

In an initial study, the number of residential fires in London did not change during the initial lockdown period, while the number of residential fires in San Francisco and Tokyo increased [7]. The reason for this inconclusive trend may be the result of socioeconomical and cultural differences, as well as perception and varying situations in the pandemic.

In this work, further study has been conducted in the change of the number of residential fires in London during various lockdown periods

using data obtained from Open Data sources.

2. Methods

2.1. Data collection

Data was obtained from London Fire Brigade Incident Records [8]. Residential fires, called Dwelling fires, are categorized in here, under IncidentGroup (Fire), StopCodeDescription (Primary Fire), PropertyCategory (Dwelling). Dwelling fires were counted and the necessary information for analysis was obtained during a designated period. Since the daily change in the number of fires fluctuates, in this study, three indicators were selected: weekly change in the number of residential fires, time of day of the incident, and the notional cost during the lockdown periods. In the UK, these notional costs were recorded since 2017 thus, no data for 2015 and 2016 is provided.

2.2. Target duration

The duration targeted in this study was from March 26, 2020 to May 3, 2020 (39 days, 1st lockdown), November 5, 2020 to December 2, 2020 (28 days, 2nd lockdown) and December 21, 2020 to March 7, 2021 (77 days, tier 4 stay-at-home restriction and 3rd lockdown) in London

[2]. For the weekly change in the number of residential fires, the week before and after the lockdown period are also included. The 3rd lockdown period needs attention; week 1 is from December 21 to 22 (2 days), in order to separate tier 4 stay-at-home weeks and national lockdown weeks. As the final week in 1st and 3rd lockdown period (week 10 and week 13 respectively) has less than 7 days due to the lockdown duration.

2.3. Index

To investigate weekly changes in the number of residential fires, a new index was introduced. This index was calculated using the following steps.

Step 1. The numbers of residential fires in 2020 and 2021 were first estimated. Fig. S1 provides the number of residential fires each month in 2015–2019. A decreasing trend is observed in Fig. S1.

A simple linear equation was applied to the data from 2015 to 2019, then the number of residential fires in 2020 and 2021 was estimated.

Step 2. The estimated 2020 and 2021 number of residential fires was divided by the average value (2015–2019), considering those numbers as 2020 and 2021 adjustment factors.

$$\text{Adjustment factor}(\text{AF})_y = \frac{\text{The estimated number of residential fires}_y}{\text{The average number of residential fires } (2015-2019)}$$

where *y* means year, in this case 2020 or 2021.

Step 3. The weekly number of residential fires during the lockdown period was compared with the 2015–2019 average data during the corresponding week.

Step 4. Index was calculated as follows;

$$\text{Index} = 100$$
$$\times \frac{\text{The weekly number of residential fires }_w}{\text{The weekly average number of residential fires } (2015-2019)_w} \div \text{AF}_y$$

where *w* means week, a corresponding period.

3. Results & discussions

3.1. Weekly change in the number of residential fires

The index increased initially then decreased in all lockdown periods as shown in Fig. 1 (a), **(b) and (c)**. This suggests at the beginning of each lockdown period, the number of residential fires increased, and decreased. The index in the 3rd lockdown period did not increase as much as the 1st and 2nd lockdown periods. The reason for this is not surprising. The 3rd lockdown period (tier 4 restriction) started only 19 days after the 2nd lockdown period and London was already under tier 3 restriction.

3.2. Time of day

The number of residential fires were counted based on the time of the day. As the number of residential fires varies among years, the ratio was calculated. The 2015–2019 data was averaged and compared with the data during the lockdown periods. Fig. S2 (a), (b), and (c) shows the comparison.

3.3. Notional cost

Notional cost is calculated based on the length of time rounded up to the nearest hour spent by Pump, Aerial and Fire Rescue Unit (FRU) appliances at the incident and charged at the LFB hourly rate. A larger notional cost suggests the fire was either larger or more complicated, thus costing more. The number and the percentage of residential fires which cost more than 10,000 pounds were compared with the last 3 years (2017–2019) in Fig. S3 (a) (b) and (c). No cost-of-living adjustment was performed as the focus of this section is high-cost fires. Fig. S3 (a) shows the number of high-cost fires per day was at least triple compared to the previous 3 years during the 1st lockdown period. The number of high-cost fires during the 2nd lockdown period in Fig. S3 (b) was relatively small and is similar to the previous 3 years. During the 3rd lockdown period the number and percentage of the high-cost fires was greater than those within the last 3 years (Fig. S3 (c)), while the difference was not as large during the 1st lockdown period. The number and the percentage of the high-cost fires were approximately 1.5 times more than previous 3 years. The number and the percentage of the high-cost fires increased during the 1st and 3rd lockdown periods, which indicate that more fires are greater, thus cost more, than usual.

4. Discussion

The greatest increase of the index is observed in week 2 of the 1st lockdown period. When restaurants were closed and dine-in became unavailable, the frequency of cooking or use of cooking-related devices naturally increased. The 1st lockdown period was expected but started quickly, there was little time for preparation for the population. As the time passed since the 1st lockdown period, it is also hypothesized that more restaurants became ready for take-out and people became accustomed to life in lockdown. Many still worked from home most of time by the time 2nd and 3rd lockdown based on Mobility Data [9]. As most of the kichen fires are initiated during the process of cooking [10], this implies that people showed some mishandling towards fire or heat-related equipment at the beginning. This reduces to the nominal level after the initial phase. Thus, it is considered people needed some time to adjust lockdown life.

From Fig. S2 (a) (b) and (c), the change around the lunchtime showed similar trends to the one during the 1st and 2nd lockdown periods while it was not so significant in the 1st lockdown period as the only small increase was observed around 12:00. During three lockdown periods, the differences are as follows: changes in the ratio of residential fires around the meal or meal preparation time in the morning, afternoon or night.

It might be hypothesized from the notional cost analysis for the 3 lockdown periods that 1) people did not notice the fire while staying at home, resulting in larger fires 2) people caused larger fires at home or 3) it took longer for fire service to arrive at the scene, thus the fire became larger. The LFB 2020 annual report provides the response time did not increase, thus, it is likely human behaviors resulted in high notional cost caused by either from stress, inexperience or unfamiliarity with the usage of heat sources. Unfamiliarity in the usage of the heat sources may be hypothesized as the explanation for the 1st lockdown period as a larger increase was observed during the 1st lockdown period, than during the 3rd lockdown period. The reason why there is no difference during the 2nd lockdown period may be simply due to the fact that lockdown occurred over a short period of time. Yet, there may also
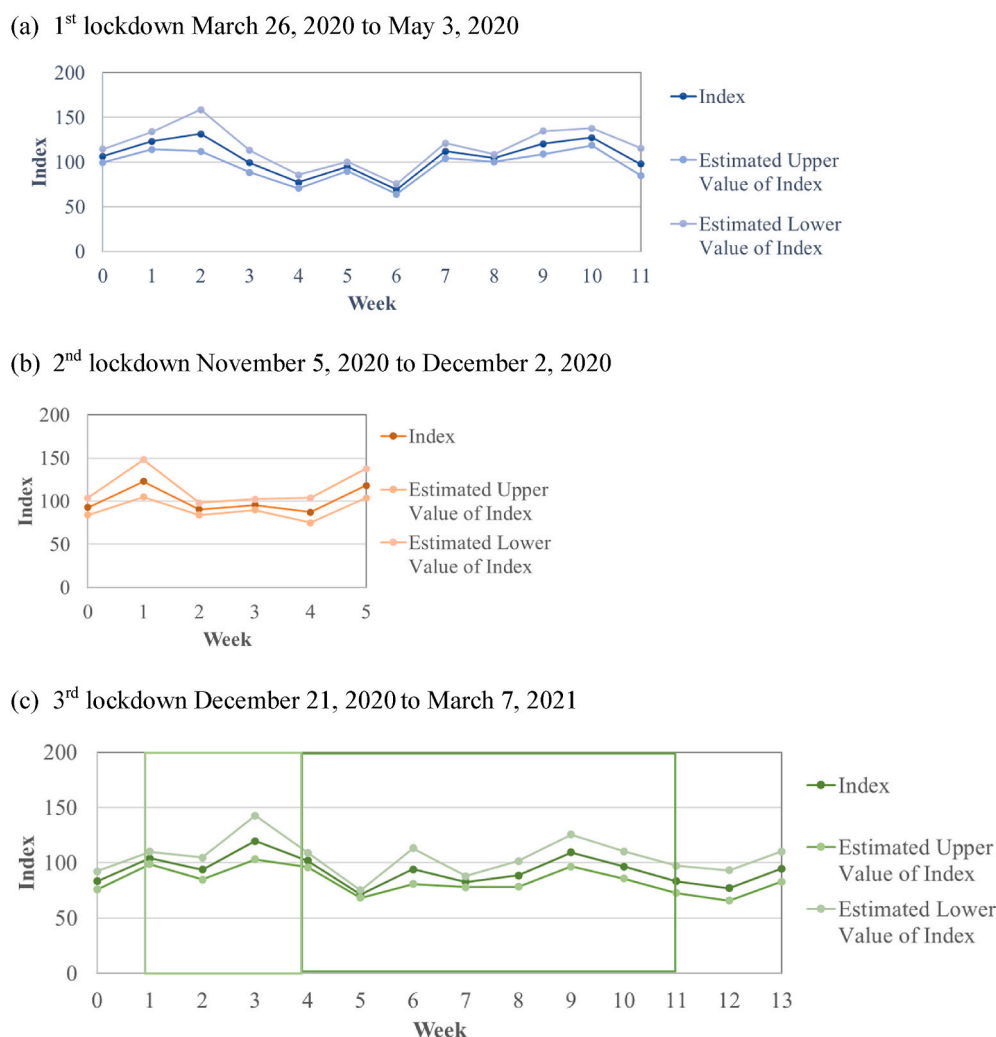
(a) 1ˢᵗ lockdown March 26, 2020 to May 3, 2020

(b) 2ⁿᵈ lockdown November 5, 2020 to December 2, 2020

(c) 3ʳᵈ lockdown December 21, 2020 to March 7, 2021

Fig. 1. Weekly change in the index. Week 0 means the week before the lockdown started. Lockdown period starts at week 1 and is indicated with colored squares. In the case of the 3rd lockdown, week 1 to week 3 was a 'tier 4 stay-at-home restriction', then national lockdown from week 4 in London. Middle line indicates the index, the top and the bottom lines indicate the range of values (considering the standard deviation of the number of fires).

additional considerations that require further investigation.

5. Conclusion

While it is not clear the effect of lockdown on the number of residential fires in London at a glance, the detailed study showed that it is indeed affected. 1) The number of residential fires increased at the beginning of each lockdown period. 2) the time of the fires changed around the meal preparation and mealtime. And 3) the number of high-cost cases increased in the 1st and 3rd lockdown periods, especially the 1st lockdown period. These findings can be supported by people spending time in cooking yet the cooking time shifted from before-the-lockdown. In addition, the increase of high-cost cases indicates that inexperience of cooking and/or unfamiliarity of stay-at-home life may also be the issue. Those findings would be beneficial to understand the nature of residential fires as well as to prepare for future lockdowns.

Author statements

Authors declare that there is no funding to declare to perform this study. There is no competing interest to declare to perform this study. This study required no ethic approval as this study used Open Data source to study and no people involved other than authors.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhip.2022.100264.

References

[1] G. Iacobucci, Covid-19: UK lockdown is "crucial" to saving lives, say doctors and scientists BMJ 368 (2020) m1204, https://doi.org/10.1136/bmj.m1204.

[2] Timeline of UK government coronavirus lockdowns, Institute for Government analysis. https://www.instituteforgovernment.org.uk/charts/uk-government-coronavirus-lockdowns.

[3] K. Askew, Lockdown lifts interest in home-cooking: 91 % of Brits plan to cook 'as much, or more' this year, Food navigator.com, https://www.foodnavigator.com/Article/2021/02/26/Lockdown-lifts-interest-in-home-cooking-91-of-Brits-plan-to-cook-as-much-or-more-this-year.

[4] T. Benson, B. Murphy, A. McCloat, E. Mooney, M. Dean, F. Lavelle, From the pandemic to the pan: the impact of COVID-19 on parental inclusion of children in cooking activities: a cross-continental survey, Publ. Health Nutr. (2021) 1–7, https://doi.org/10.1017/S1368980021001932.