

計畫名稱: 零售庫存系統的時空資料分析與誤差傳播—

以健保特約機構口罩剩餘數量為例

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Abstract

This study aimed to assess the gap between the supply and demand of adult surgical masks under limited resources. Owing to the implementation of the real-name mask rationing system, the historical inventory data of aggregated mask consumption in a pharmacy during the early period of the COVID-19 outbreak (April and May 2020) in Taiwan were analyzed for supply-side analysis. We applied the Voronoi diagram and areal interpolation methods to delineate the average supply of customer counts from a pharmacy to a village (administrative level). On the other hand, the expected number of demand counts was estimated from the population data. The relative risk (RR) of supply, which is the average number of adults served per day divided by the expected number in a village, was modeled under a Bayesian hierarchical framework, including Poisson, negative binomial, Poisson spatial, and negative binomial spatial models. We observed that the number of pharmacies in a village is associated with an increasing supply, whereas the median annual per capita income of the village has an inverse relationship. Regarding land use percentages, percentages of the residential and the mixed areas in a village are negatively associated, while the school area percentage is positively associated with the supply in the Poisson spatial model. The corresponding uncertainty measurement: villages where the probability exceeds the risk of undersupply, that is, $\Pr(RR < 1)$, were also identified. The findings of the study may help health authorities to evaluate the spatial allocation of anti-epidemic resources, such as masks and rapid test kits, in small areas while identifying priority areas with the suspicion of undersupply in the beginning stages of outbreaks.