

# Inter-continental analysis on accessibility to vaccination service during COVID-19 pandemic

Tuesday, July 16, 2024 11:20 AM (20 minutes)

## Background

Reflecting on the trajectory of COVID-19 from its emergence to its containment, it is evident that vaccination continues to be a potent strategy in mitigating its impact. However, vaccination rates exhibit notable disparities within and across nations. The uneven spread of vaccination sites leads to unequal access beyond supply issues. In the study, we estimated the vaccine accessibility and potential knock-on effects on vaccination uptake and public health.

## Method

We included 54 countries/regions spanning all continents, collecting 1km resolution population distribution data and vaccination site locations. We applied the Probability Density Function (PDF) curve to visualize travel times to nearby vaccination sites and used cumulative opportunity measures to access vaccine accessibility within 30 minutes. Additionally, we used E2SFCA method to comprehensively evaluate disparities in vaccine accessibility based on the uneven population distribution within each country.

## Finding

For most nations, the median travel time to nearest vaccination site falls within a 30-minute range. The PDF curves for most countries exhibit a right-skewed distribution or approximate a normal distribution, indicating the inadequate vaccine service coverage in certain areas. Furthermore, we observed that regions such as USA and UK generally have higher cumulative opportunities, in contrast to lower levels in Canadian and many African nations. Hong Kong ranks highest with an impressive accessibility of 331.7 sites within a 30-minute range.

## Interpretation

The results of accessibility were compared with GDP per capita at country level to reveal disparities in health care and health economy, which provides policy implication to target country/region for vaccine access when the next pandemic comes.

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**Session Classification:** Paper Presentations

**Track Classification:** Global Health: Infectious Diseases