**Exploring the Relationship Between Hospitalization and Mortality:**

**A Cross-National Comparative Study Based on COVID-19 Data**

**Lecturer: Brenda Mullally**

**Student: Haopeng Liang**



**Project Report**

Data Science in Practice

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# Introduction

## Background

Since the outbreak of COVID-19 at the end of 2019, medical systems around the world have faced unprecedented challenges. Countries' medical resources, hospital bed availability, and medical staff's response capabilities greatly affect the mortality and recovery rates of the epidemic. Because COVID-19 can cause severe respiratory symptoms, a large number of patients require hospitalization, including treatment in general wards and intensive care units. Therefore, hospital processing capacity has become an important indicator for evaluating the response of public health systems in various countries to the epidemic.

## Purpose

The main objective of this study was to analyze the relationship between COVID-19 hospitalization rates and mortality as a window to observe and evaluate the handling capacity of hospitals in different countries during the outbreak. A deeper understanding of the relationship between these two indicators can provide insight into how countries' health systems are actually performing at the height of a pandemic. In addition, this research may also help us understand how to allocate and use healthcare resources more effectively during similar public health crises in the future.

## Research Questions and Hypotheses

This study will explore the following research questions:

* What is the relationship between hospitalization rates and mortality during the COVID-19 outbreak?
* Does this relationship vary significantly between countries, and do these differences reflect the capacity of hospitals in each country?

Based on these questions, this study proposes the following hypotheses:

* **Hypothesis 1**: There is a positive correlation between hospitalization rates and mortality, that is, countries with higher hospitalization rates also have relatively higher mortality rates.
* **Hypothesis 2**: There is a negative correlation between the number of hospital beds and mortality, i.e. countries with more beds have lower COVID-19 mortality rates.

## Data Sources and Variables

The analysis in this study is based on two main datasets selected from ***Our World in Data***. The first dataset (***covid-hospitaliztions.csv***) includes daily hospitalizations and ICU use for COVID-19 for each country, while the second dataset (***owid-covid-data.csv***) provides detailed statistics on COVID-19 cases and deaths from the beginning of the outbreak to the present day. Specific data include country name, ISO code, observation date, cumulative and new cases, cumulative and new deaths, number of patients in hospital, number of ICU patients, and number of hospital beds per 1,000 people. In addition, the dataset also provides demographic information and health care resources for each country, such as the number of hospital beds and the number of health care personnel, which provides important background information for this study.

Key variables include:

* iso\_code：The ISO code for the country, which identifies the country analysed.
* date：Date of data recording.
* total\_deaths：Cumulative number of deaths.
* new\_deaths：New number of deaths.
* hosp\_patients：Number of current inpatients.
* icu\_patients：Number of patients in the ICU.
* hospital\_beds\_per\_thousand：Hospital beds per thousand people.

These variables will be used to construct analytical models to explore the relationship between hospitalization rates and mortality and their reflection to hospital handling capacity.

## Significance of the Study

Through comprehensive analysis of these data, this study hopes to reveal the potential association between hospitalization rates and mortality and explore the role of medical resource allocation in controlling COVID-19 mortality. This research can not only provide decision support for public health policymakers, but also enhance public awareness of the importance of epidemic response and resource allocation.

## Background

## Purpose

The relation between Hospitalization and DeathIs.

Is the relationship positive or negative?

Which can reflect the capacity of hospitals in each country to treat Covid-19 at that time.