

# The Relationship of Median Age and Urban Population Rates to Infection and Mortality Rates in Covid-19 Outbreak

Asst. Prof. Dr. Ali Ergin Gümüş<sup>1\*</sup> MSc. Ege Gümüş<sup>2</sup>

1.Hasan Ali Yücel Faculty of Education, Istanbul University-Cerrahpaşa Büyükçekmece Yerleşkesi Alkent 2000  
Mah. Yiğittürk Cad. No:5/9/1 Büyükçekmece/Istanbul, Turkey  
2.TOMTEC Imaging Systems GmbH, Edison Str. 6, 85716, Unterschleissheim, Germany

## Abstract

As of today, 6th of April 2020, the number of Covid-19 cases are 1 289 380. This study aims to prove the proportional relationship between median age and urban population rates to infection and mortality rates in countries with more than 1 000 infected patients.

**Keywords:** Covid-19, Median age, Urban Population

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## 1. Introduction

As of 6th of April 2020, the Covid-19 pandemic spread across 183 dependent or independent countries, infected more than a million people and killed more than 70 000 people worldwide. A vaccine or a very effective drug has not been found yet. Although its negative effects are have been decreasing in some Eastern and Southeast Asian countries, such as China, South Korea and Japan, it is still an alarming outbreak that continues to spread to the rest of the world.

When we look at the worldwide distribution of more than 1 250 000 infected patients, it is interesting that five in 100 000 of the Northern Hemisphere (NH) population, and only one in 100 000 of the population of the Southern Hemisphere (SH) has the disease. However, this difference can be explained by the following;

- The fact that the outbreak began in the NH,
- Improved communication between the NH countries,
- Higher population density values per km<sup>2</sup> in the NH,
- The NH countries having winter during the months when the outbreak therefore receiving less ultraviolet rays,
- The lack of metropolitan cities in the SH,
- The weight of rural population in the SH countries compared to urban population (self-isolation)

On the other hand, the negative effects of the disease caused by coronavirus increase proportionally to the age of patients. As a matter of fact, the children and the young people can easily beat the virus when they are infected, and often they don't show the symptoms. On the contrary, the elderly is much more at risk, and most deaths occur in elderly patients.

## 2. The Connection of the Covid-19 Outbreak with Median Age

Median age is defined as the age directly between the youngest and the oldest. Half of those who make up the population are older than the median age and the other half are younger. As the median age decreases, the population rejuvenates and vice versa. Median age tends to have a higher value in developed countries as well as in countries with higher emigration. Table 1. shows the highest and lowest median age among UN member states.

Table 1. Countries of High and Low Median Age

1	Monaco	55,40	187	Benin
2	Japan	48,60	188	Mozambique
3	Germany	47,80	189	Zambia
4	Italy	46,50	190	Congo (D.R.)
5	Andorra	46,20	191	Chad
6	Greece	45,30	192	Mali
7	San Marino	45,20	193	Angola
8	Slovenia	44,90	194	Uganda

Since coronavirus is more negatively affecting the elderly, are the effects more dominant in the countries with higher median age? The following is based on the data published instantaneously by John Hopkins University to find the answer to this question. There are only a small number of countries in the world where the virus is not transmitted. The number of cases in many countries are also very small. For this reason, countries with more than 1 000 cases as of 6th of April 2020 are taken into account for the following observation.

The median age of 12 of the countries evaluated in the study is less than 30<sup>1</sup>, 22 of them is in the range of 30-39.99<sup>2</sup>, and 26 of them is more than 40<sup>3</sup>. In countries with a median age of less than 30, the rate of transmission of coronavirus in the total population is very low. In contrast, as the median age of society increases, the rate of transmission increases (Figure 1). As a matter of fact, there is a 14 fold difference between countries with median age less than 30 and countries with median age of more than 40.

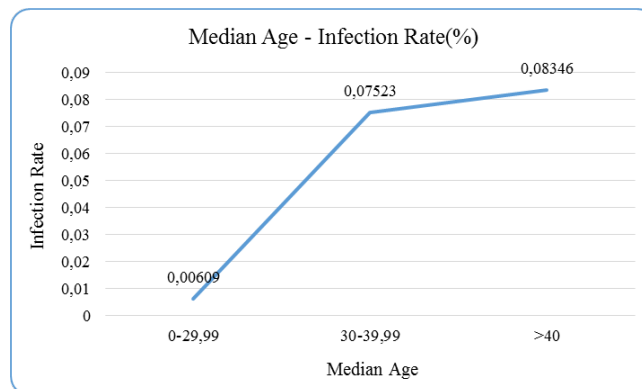


Figure 1. Average Transmission Rate Among the Total Population vs Median Age.

When the mortality rates in coronavirus patients and the median age of countries are examined, the results are moderately different. As the median age increases, the rate of transmission in the country rises proportionally, while the mortality rates among those infected begin to rise before 30 and after 40 (Figure 2). Countries with lower median ages are mostly underdeveloped and health care is inadequate. In developed countries, the proportion of the elderly among the population is higher.

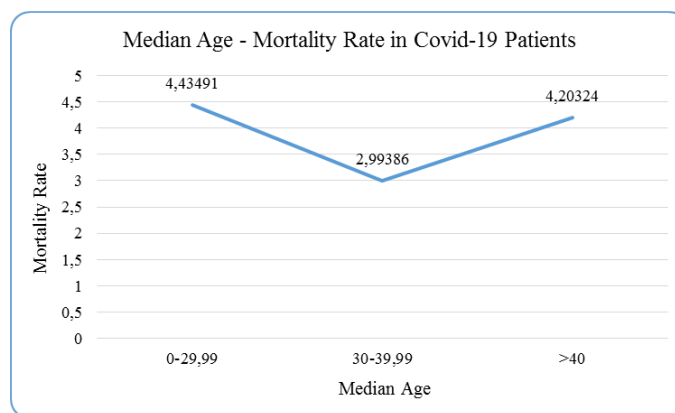


Figure 2. Average Mortality Rate In the Total Number of Cases In the Countries vs. Median Age.

Another conclusion in this study is that as the median age increases, the average mortality rate among the country's total population increases (Figure 3). In countries under 30 years of median age, the mortality rate of positive tested patients is only 0,00026% of the country's population. However, in countries with a median age of more than 40, the same rate is increased by 19 times to 0,00502.

<sup>1</sup> Algeria, Dominican Republic, Ecuador, Egypt, India, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, South Africa

<sup>2</sup> Argentina, Australia, Brazil, Chile, China, Colombia, Iceland, Indonesia, Iran (Islamic Republic of), Ireland, Israel, Luxembourg, New Zealand, Norway, Panama, Qatar, Saudi Arabia, Singapore, Thailand, Turkey, United Arab Emirates, United States of America

<sup>3</sup> Austria, Belgium, Canada, Croatia, Czech Republic (Czechia), Denmark, Estonia, Finland, France, Germany, Greece, Italy, Japan, Netherlands, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Serbia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom of Great Britain and Northern Ireland

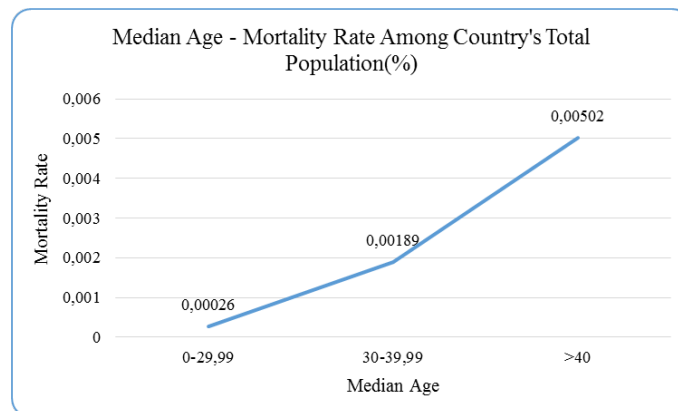


Figure 3: Median Age vs. Average Mortality Rate Among the Total Population.

### 3. Urban Population and Covid-19

Another demographic parameter worth studying is the proportion of urban population to rural population in countries with more than 1 000 cases. Very similar to the median age, as the urban population rates of countries rise, there is a significant increase in both transmission rates and mortality rates in coronavirus positives. Infection rate is almost non-existent in countries with less than 50% urban population (0,0016%). However, in countries with urban population of at least 80%, this rate increases almost 55 times (Figure 4). Likewise, as the urban population rate increases, mortality rates in positive cases (Figure 5) and mortality rates in the total population increase (Figure 6). The mortality rate gap between the countries with more than 80% urban population and countries less than 50% is about 58 times higher.

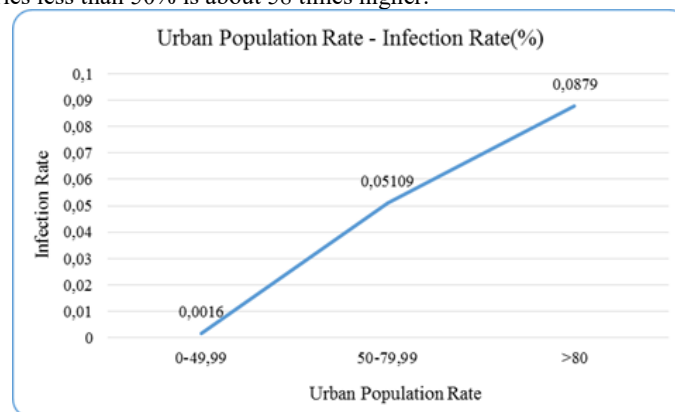


Figure 4: Urban Population Rate vs. Average Transmission Rate Within the Total Population.

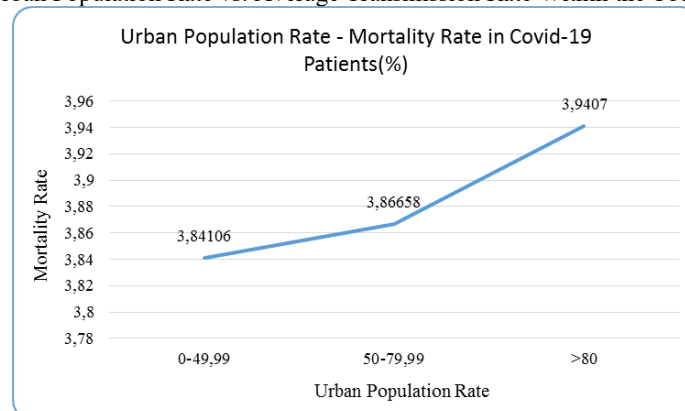


Figure 5: Urban Population Rate vs. Average Mortality Rate In the Total Number of Cases.

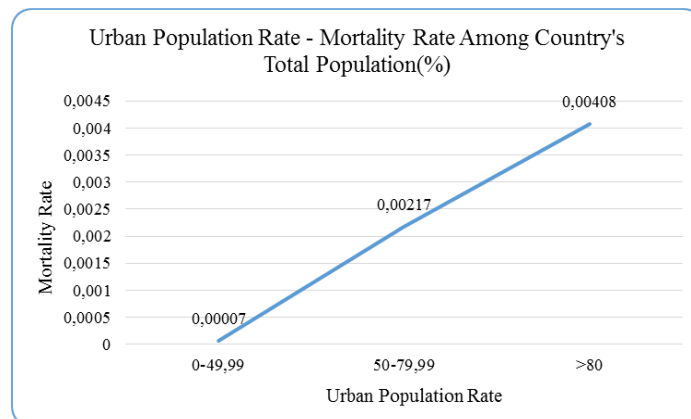


Figure 6: Urban Population Rate vs. Average Mortality Rate In the Total Population.

#### 4. Conclusion

As a summary, the negative effects and the consequences of the outbreak differs in each country; depending on the regime, healthcare availability, social distancing practices, and even public transportation usage. These factors cannot be neglected. However, if more than 1 000 elderly Covid-19 patients have been identified in a country with a higher median age and a higher urban population, likelihood of negative effects are much more higher compared to a country with a lower median age and a higher rural population.

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