The Preventive Strategies for Influenza: Interim Report

Motivation: In influenza seasons a large number of people are subject to suffer from this disease and many are end up dying. Many people got infected and seek help from the hospitals and other professional medical units. This creates a crisis thorough out the nation, and causes many problems, such as not adequate medical supplies or medical personnel to handle this sort of situation.

In addition to that, according to research between 2009 and 2017, there were certain age groups who were more vulnerable to die from influenza. In order to decrease the death of influenza, manage the crisis in a better performance, I needed to make this research to find out which age group is more vulnerable and which states has the most population of this particular age group, so that we can arrange our medical supplies and medical personnel deployment accordingly to decrease the influenza deaths.

Objective: This project will find out which age group is more vulnerable for influenza and which states have the highest number of this age group population, so that in our strategic planning we can give priority to send more medical supplies and medical personnel to those states in order to effectively deal with influenza and decrease the number of deaths.

Scope: The strategic planning must decrease the deaths of influenza.

Hypothesis

With the data that is provided from 2009-2017, it is obvious that the age group of 85 and over are subject to die from influenza more than the other younger age groups. Therefore, my analyses were related to find out the relationship between the influenza deaths and age groups` mortality.

My hypothesis especially focused on:

“Patients of Influenza that are 85 and over are inclined to die more than the younger age groups.”

Data Overview

1. Influenza deaths by geography
   Underlying Cause of Death, 1999-2020 Request (cdc.gov)
   https://coach-courses-us.s3.amazonaws.com/public/courses/da_program/CDC_Influenza_Deaths_edited.xlsx

2. Population data by geography, time, age, and gender
   https://coach-courses-us.s3.amazonaws.com/public/courses/data-immersion/A1-A2_Influenza_Project/Census_Population_transformed_202101.csv

Data Limitations

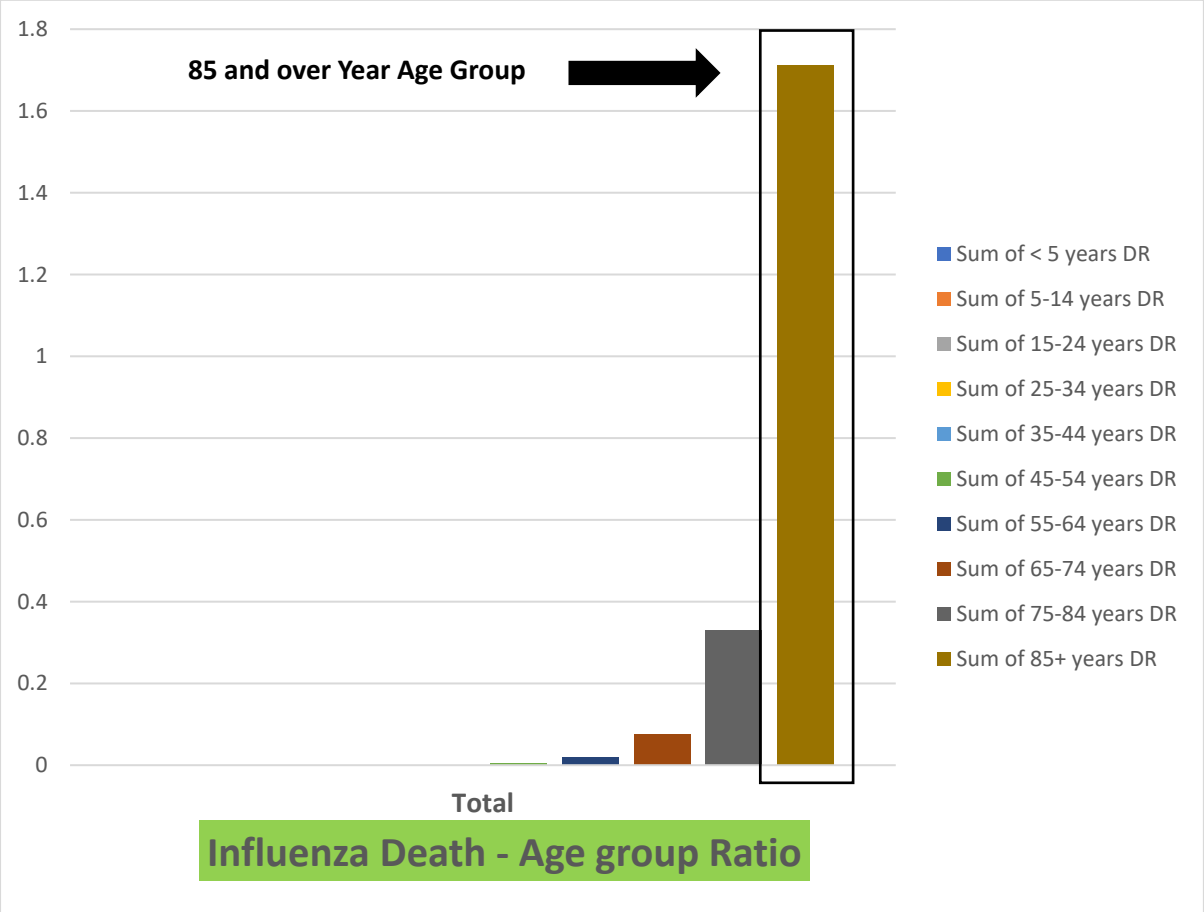
Unfortunately, even though I prove that the 85 and over age group are more inclined to die due to influenza, the data that were gathered were belong to 2009 – 2017. Since we are currently in 2024, this we require recent years data up to this year in order to make a better analysis and strategic planning.

In this data some of the age groups` deaths are classified as supressed. Therefore, we were not able to find the real death numbers behind that.

Although in the population sheet we had Puerto Rico, we did not have that info at the influenza sheet.

Descriptive analysis

The influenza death rates are organized according to the age groups. It was obvious that there was a strong correlation between the influenza deaths and the population over 55. As we can see that the bar chart below shows that there is a linear effect and it hits its peak value at the 85 and over age groups.

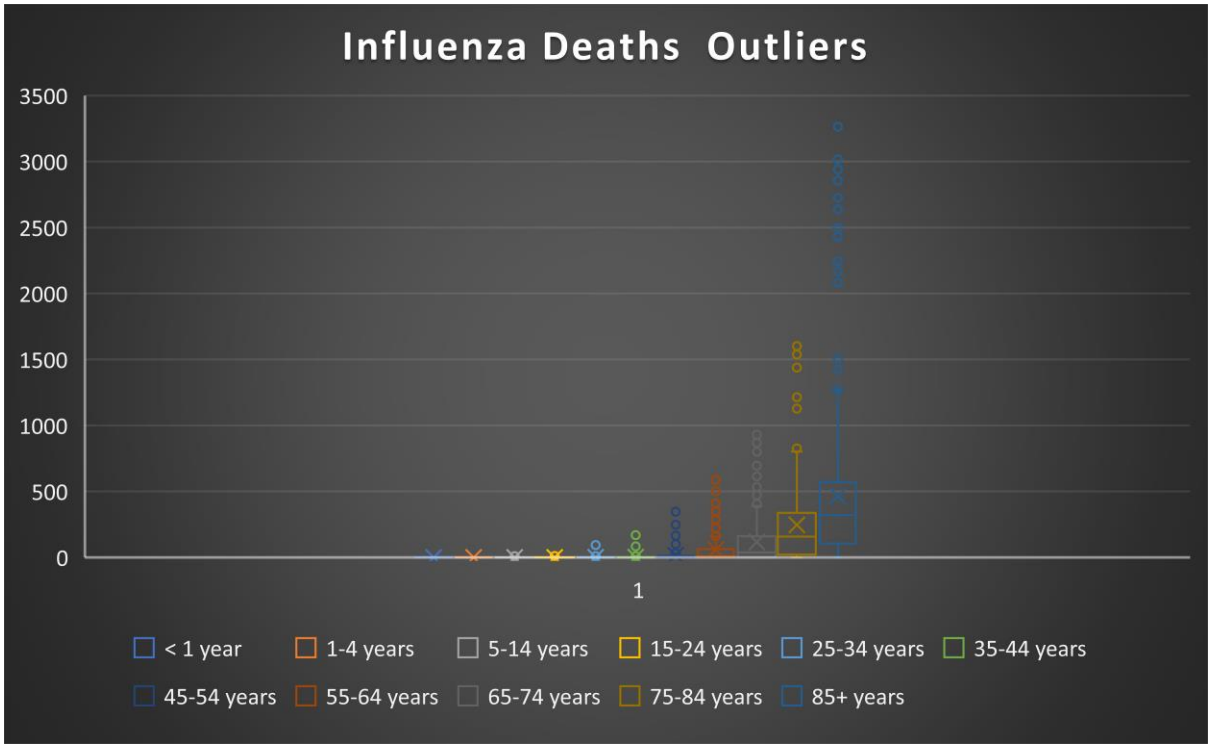


Data Spread

Updated Hypothesis: Influenza Patients that are 85 years old and older are more inclined to die.		
Data Spread		
	Variable 1	**Variable 2**
Dataset Name	Influenza Deaths 85+/ 85+Age group Population	Influenza death 85-Age group / 85-age group Population
	Ratio 85+ Inf. /85+ Pop.: **0.004185439**	
Sample or Population	Sample	sample
Normal Distribution	Left Skewed (when age is increased deaths also increased)	Left Skewed (when age is decreased deaths also decreased)
Variance	**VARIANCE influenza deaths 85+**	**VARIANCE influenza deaths 85 under**
	303916	19241
Standard Deviation	**Standart dev. Influenza deaths 85+**	**Standart dev. Influenza deaths 85 under**
	551	139
Mean	**Mean influenza deaths 85+**	**Mean influenza deaths 85 under**
	463	44
Outlier Percentage		
	Mean-STDeviation lower bound	Mean-STDeviation lower bound
	-88	-95
	Mean+STDeviation upper 1st bound	Mean+STDeviation upper bound
	1015	183
	Mean+STDeviation upper 2nd bound	Mean+STDeviation upper 2nd bound
	1566	322
	Mean+STDeviation upper 3rd bound	Mean+STDeviation upper 3rd bound
	2117	461
	16 outliers from California and New York between 2009 - 2017	
	ratio of outliers: 16/461= 3%	
Correlation		
Variables	Influenza Deaths 85+	85+Age group Population
Proposed Relationship	As the population of people ages 85+ increases, the number of influenza deaths increases	As the population of people ages under 85, the number of influenza deaths decreases
Correlation Coefficient	0.941433189	
Strength of Correlation	There is a strong relationship between the 85+ year old population and influenza deaths.	
Usefulness / Interpretation	As an emergency plan we can allocate our resources, and medical staff mainly to the states who have higher 85 and over years population groups.	
	So that we can have a better chance to prevent the occurrence of deaths.	

Outliers

As we can see from the outliers' graph that there are extreme numbers of death occurred at the 85+ age group in comparison with the younger age groups.



Results and Insight

Null Hypothesis H_0: Patients of Influenza that are 85 and over are not inclined to die more than the younger age groups

Alternative Hypothesis HA: Patients of Influenza that are 85 and over inclined to die more than the younger age groups

Correlation Testing of Hypothesis

t-Test: Two-Sample Assuming Unequal Variances		
	Total Influenza death 85+	**Total Influenza deaths younger than 85+**
Mean	463.7183406	441.6615721
Variance	304555.752	378473.2353
Observations	458	458
Hypothesized Mean Difference	0	
df	903	
t Stat	0.571156413	
P(T<=t) one-tail	0.284017869	
t Critical one-tail	1.646542822	
P(T<=t) two-tail	0.56803574	
t Critical two-tail	1.962594549	

This is a one tail t – test, the null hypothesis p-value is under .05. Therefore, we can reject the null hypothesis.

Remaining Analysis and Next Steps:

The current data do not show any corelation between influenza deaths decrease and adequate medical supplies and medical personnel in fighting against the flu.

On the other hand, we can assume that acting timely by having enough medical personnel and medical supplies to the patients, will help the patients to give a better chance to fight against this disease and help them to survive.

Therefore, finding out the 85 year and older age group population high states, and allocating our medical supplies and personnel accordingly to these states, before the pandemics season starts, according to CDC, flu season, begins in October and ends in May with the peak in the month of February, will get us a chance to manage this crisis better, and may help to reduce the influenza causing deaths.

As for the next step, we can find out the closest states to the 85 and over year old high population states, and designate them as the back-up states in case of emergency of needing more medical supplies, medical personnel, and quarantine area.