Intelligence Analytics Challenge 5.0 Team: Taiwan No. 1

We believe the first priority for kids is to survive. In the dataset from UNICEF, we choose 5 years old mortality rate to evaluate the quality of kids. After performing Regression analysis, we find sanitation service, Polio vaccine, urbanized population, and Tetanus vaccine have a strong negative relationship with under 5 years old mortality rate. It means increasing any one of these factors could decrease under 5 years old mortality rate. (Figure1)

In the Demographic Indicators category, we noticed a trend that the ratio of under 5 years old kids to the total population is different from different areas. In the Africa area, the ratio is higher compared with other areas. (Figure2) Although the ratio seems to be high when the under 5 years old mortality rate is high, it is more related to the high birth rate. (Firgure3)

To decrease the under 5 years old mortality rate, according to our model, we suggest people to enhance sanitation service, increase injection of Polio and Tetanus vaccine, and extend more urban areas. (Firgure4)

Besides an overall advice we provide more specific recommendations. We classify all countries into 4 clusters based on their under 5 years old mortality rate. There are 4 clusters called “High”, “Medium-High”, “Medium-Low” and “Low”. We would especially focus on “High” cluster.

1. Improve the quality of sanitation services systems among a nation.

    Based on our model prediction, one percentage increase in sanitation service will help the under 5 years old mortality rate decrease by 0.269 thousandths.

2. Enhance the injection about three doses of pneumococcal conjugate vaccine (PCV3).

    Based on our model prediction, one percentage increase in the coverage of PCV3 will help the under 5 years old mortality rate decrease by 0.7069 thousandths.

3. Enhance the injection about three doses of diphtheria, pertussis and tetanus vaccine (DTP3β).

    According to our model, one percentage increase in the coverage of DTP3β will cause the under 5 years old mortality rate to decrease by 1.7630 thousandths. This feature has the highest negative impact. Therefore, governments in this cluster should prioritize to consider this method.

4. Inspect the quality about three doses of the polio vaccine (polio3).

According to our model, when the polio3 coverage increases one percentage, the 5 years old mortality rate will increase by 2.3332 thousandths. Because the coefficient of polio3 in our model is positive (+2.3332). Any government in this cluster should evaluate an infant who needs to take vaccination of polio3.

Visualization Link

Intelligence Analytics Challenge 5.0
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Figure1

OLS Regression Results

Dep. Variable:	mortality_rate	R-squared:	0.740
Model:	OLS	Adj. R-squared:	0.732
Method:	Least Squares	F-statistic:	90.31
Date:	Fri, 27 Mar 2020	Prob (F-statistic):	5.92e-53
Time:	17:29:34	Log-Likelihood:	-815.73
No. Observations:	197	AIC:	1645.
Df Residuals:	190	BIC:	1668.
Df Model:	6		
Covariance Type:	nonrobust		

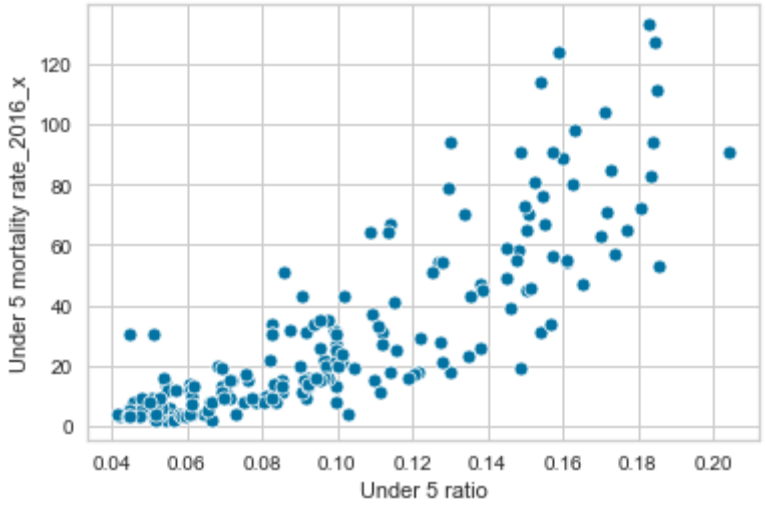
	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	168.1467	16.505	10.188	0.000	135.591	200.703
sanitation_services_t	-0.6745	0.060	-11.246	0.000	-0.793	-0.556
polio3	-0.4775	0.123	-3.883	0.000	-0.720	-0.235
MCV2	0.0250	0.049	0.510	0.610	-0.072	0.122
Urbanized_pop	-0.1151	0.057	-2.021	0.045	-0.227	-0.003
PAB_against_tetanus	-0.5047	0.219	-2.309	0.022	-0.936	-0.074
HepB3	0.0541	0.056	0.963	0.337	-0.057	0.165

Omnibus:	83.631	Durbin-Watson:	1.888
Prob(Omnibus):	0.000	Jarque-Bera (JB):	456.030
Skew:	1.529	Prob(JB):	9.42e-100
Kurtosis:	9.797	Cond. No.	2.90e+03

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 2.9e+03. This might indicate that there are
strong multicollinearity or other numerical problems.

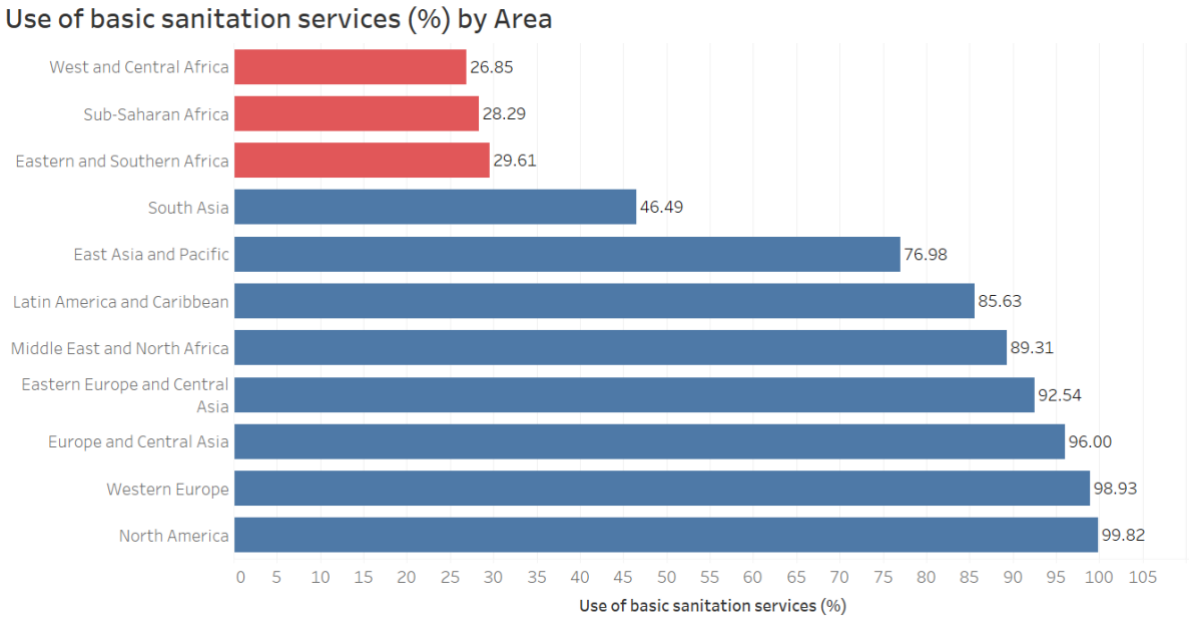
we find sanitation service, Polio vaccine(polio3), urbanized population, and Tetanus vaccine (PAB_against_tetanus) have a strong negative relationship with under 5 years old mortality rate. It means increasing any one of these factors could decrease under 5 years old mortality rate.

Firgure2



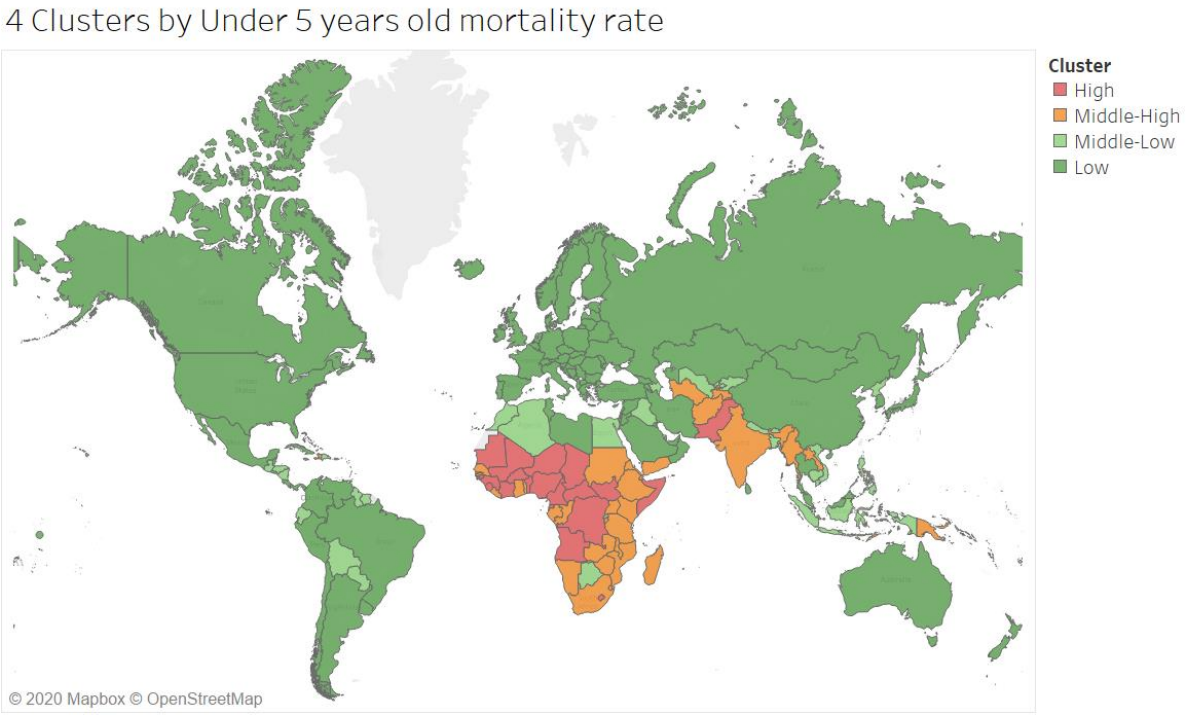
The higher ratio of under 5 years-old population tends to have higher under 5 years-old mortality rate, and the trend is exponential.

Figure3



Most of those countries are in Africa with a low percent of sanitation services

Figure 4



We classify all countries into 4 clusters based on their under 5 years old mortality rate. There are 4 clusters called “High”, “Medium-High”, “Medium-Low” and “Low”.

Firgure5

OLS Regression Results

Dep. Variable:	mortality_rate	R-squared:	0.509
Model:	OLS	Adj. R-squared:	0.333
Method:	Least Squares	F-statistic:	2.899
Date:	Fri, 27 Mar 2020	Prob (F-statistic):	0.0532
Time:	17:29:35	Log-Likelihood:	-76.409
No. Observations:	20	AIC:	164.8
Df Residuals:	14	BIC:	170.8
Df Model:	5		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	66.0714	18.363	3.598	0.003	26.687	105.456
sanitation_services_t	-0.2690	0.146	-1.847	0.086	-0.581	0.043
BCG	0.5647	0.389	1.453	0.168	-0.269	1.398
PCV3	-0.7069	0.216	-3.265	0.006	-1.171	-0.243
DTP3β	-1.7630	0.924	-1.908	0.077	-3.745	0.219
polio3	2.3332	0.898	2.598	0.021	0.407	4.259

Omnibus:	1.358	Durbin-Watson:	1.655
Prob(Omnibus):	0.507	Jarque-Bera (JB):	1.036
Skew:	-0.310	Prob(JB):	0.596
Kurtosis:	2.074	Cond. No.	896.

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

1. one percentage increase in sanitation service will help the under 5 years old mortality rate decrease by 0.269 thousandths.

2. one percentage increase in the coverage of PCV3 will help the under 5 years old mortality rate decrease by 0.7069 thousandths.

3. one percentage increase in the coverage of DTP3β will cause the under 5 years old mortality rate to decrease by 1.7630 thousandths

4. one percentage increase in the coverage of polio3 will cause the under 5 years old mortality rate to increase by 2.3332 thousandths