Fund Distribution Analysis

Help International

Problem Statement

HELP International is an international humanitarian NGO that is committed to fighting poverty and providing the people of backward countries with basic amenities and relief during the time of disasters and natural calamities. It runs a lot of operational projects from time to time along with advocacy drives to raise awareness as well as for funding purposes.

After the recent funding programmes, they have been able to raise around $ 10 million. Now the CEO of the NGO needs to decide how to use this money strategically and effectively. The significant issues that come while making this decision are mostly related to choosing the countries that are in the direst need of aid. The problem here is to categorise the countries using some socio-economic and health factors that determine the overall development of the country. Suggest the countries which the CEO needs to focus on the most.

Analysis Approach

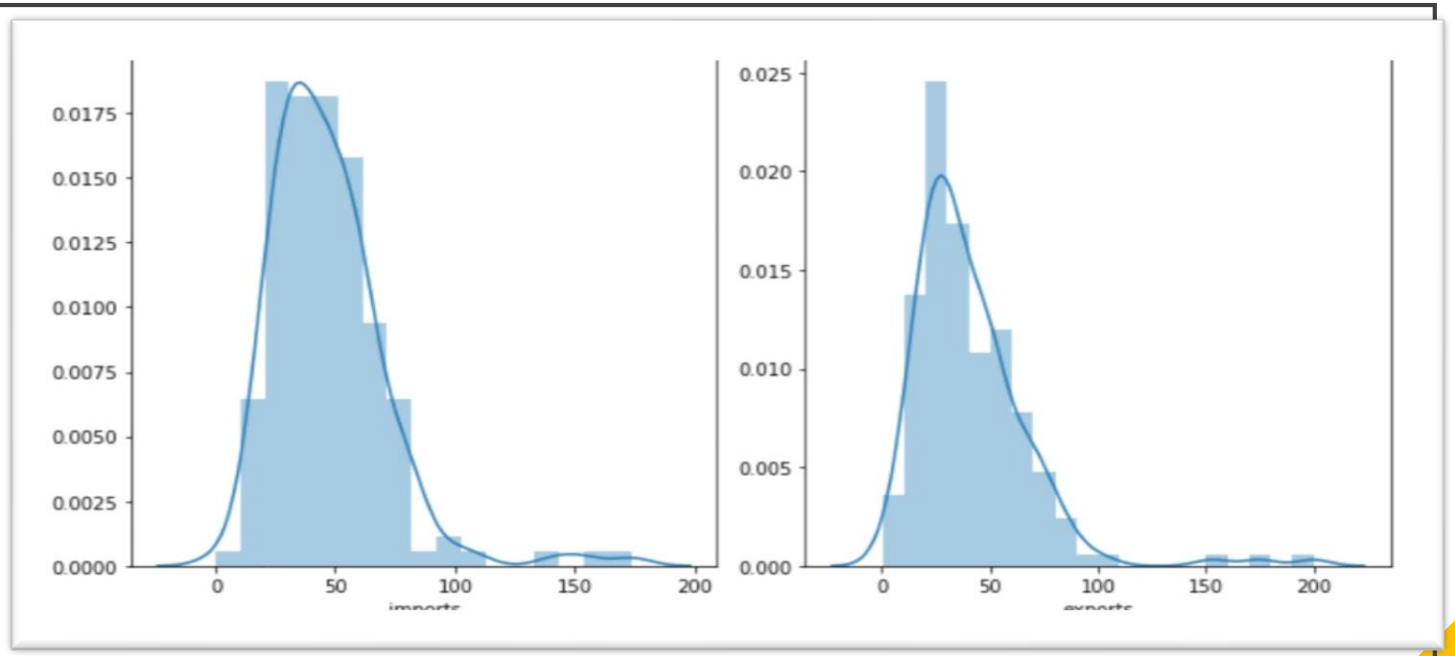
The dataset consisted of socio – economic and health facts of 167 countries.

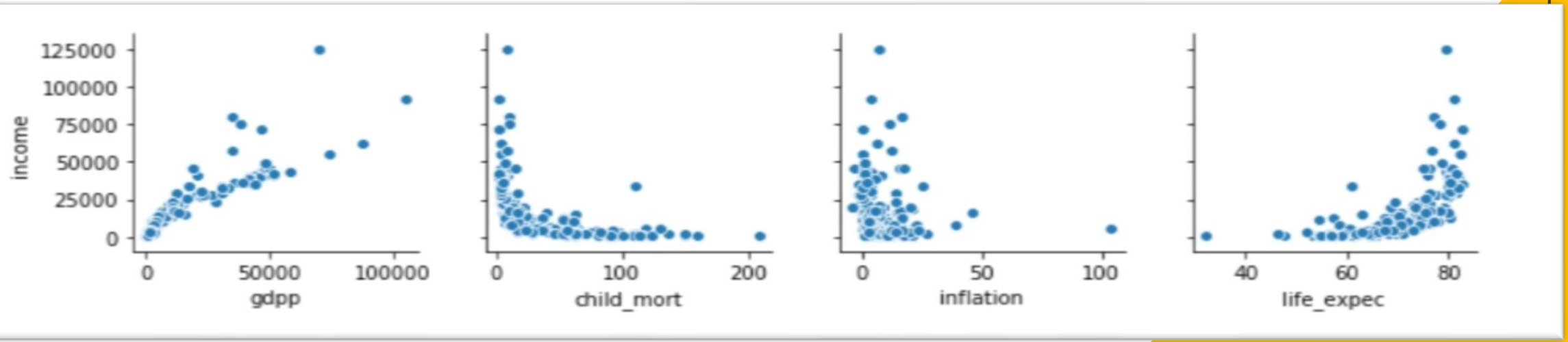
Each of the countries were clustered into one of the four clusters that we have formed using K – means clustering.

We could successfully get a cluster which contain countries having very low gdp and income, high inflation, low health and high child mortality indicating under development.

We have captured almost 95% information from all the factors provided by using PCA for dimensionality reduction.

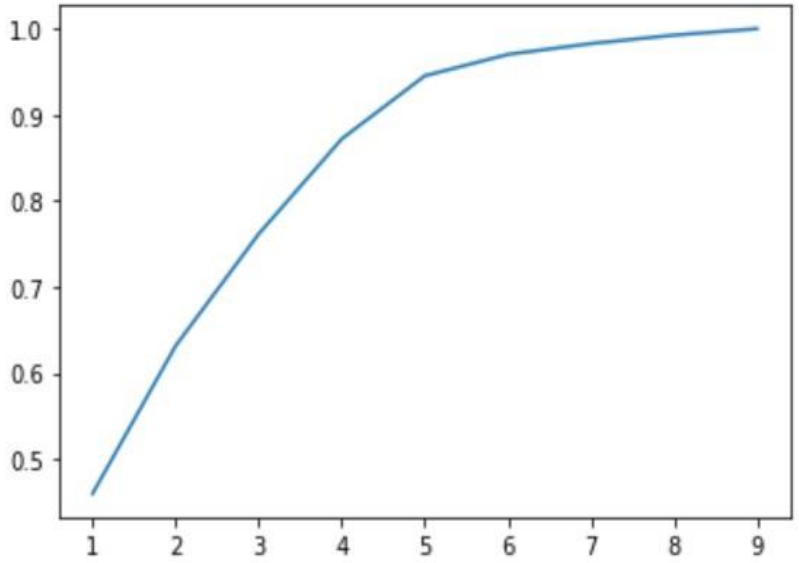
Data Visualizations





Results of PCA

Scree Plot



- Almost 95 % of the data was described by 5 PCs
- Took 5 out of 9 PCs for dimensionality reduction
- Performed Incremental PCA with 5 components to get the final dataset

K – means Clustering

Finding the optimal cluster number

Silhouette technique

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For n_clusters=2, the silhouette score is 0.304339954285527
For n_clusters=3, the silhouette score is 0.3079553690964611
For n_clusters=4, the silhouette score is 0.32638946117592943
For n_clusters=5, the silhouette score is 0.2519641694787017
For n_clusters=6, the silhouette score is 0.2579276973080551
For n_clusters=7, the silhouette score is 0.2766148073217792
For n_clusters=8, the silhouette score is 0.27256038122753223
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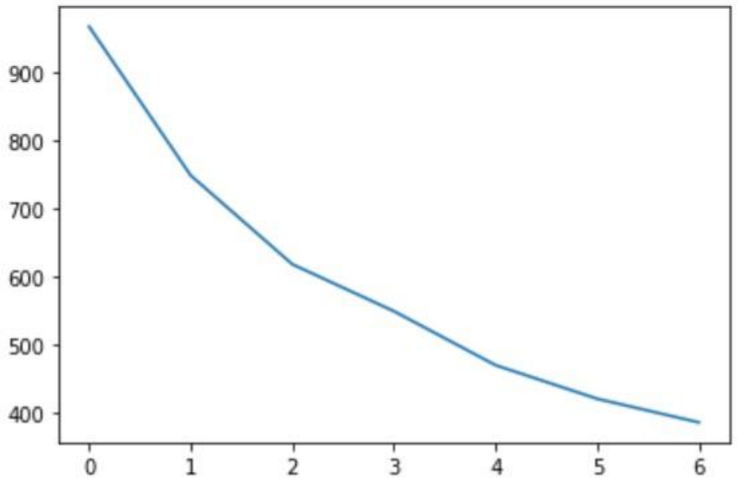
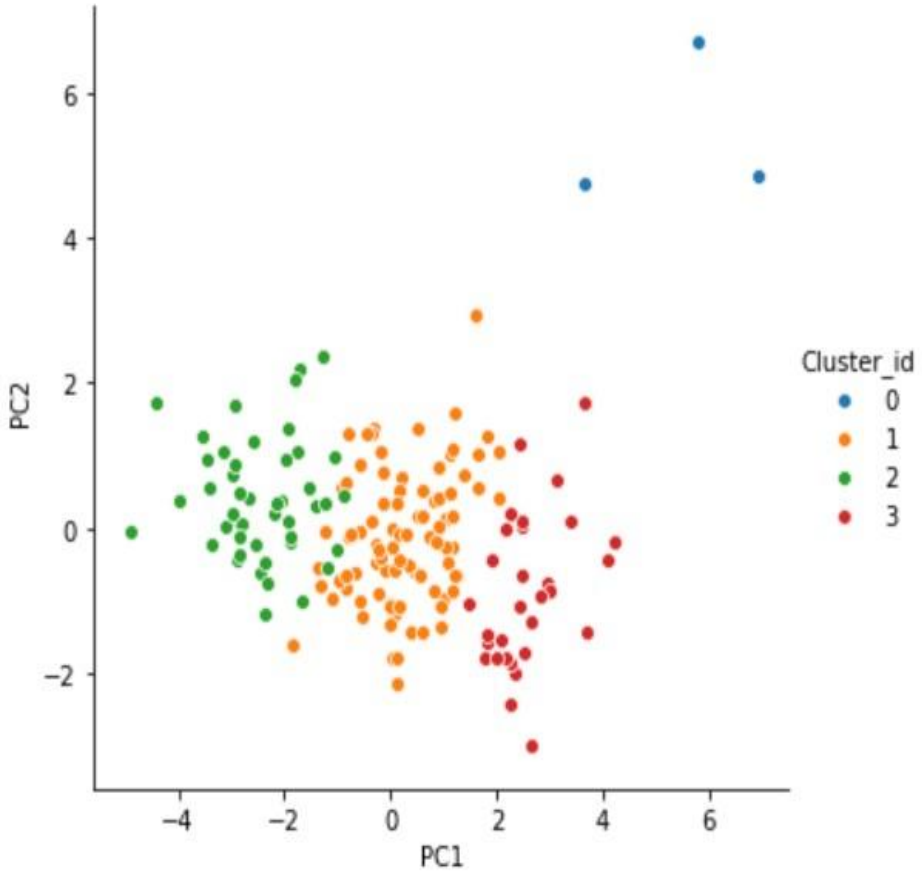
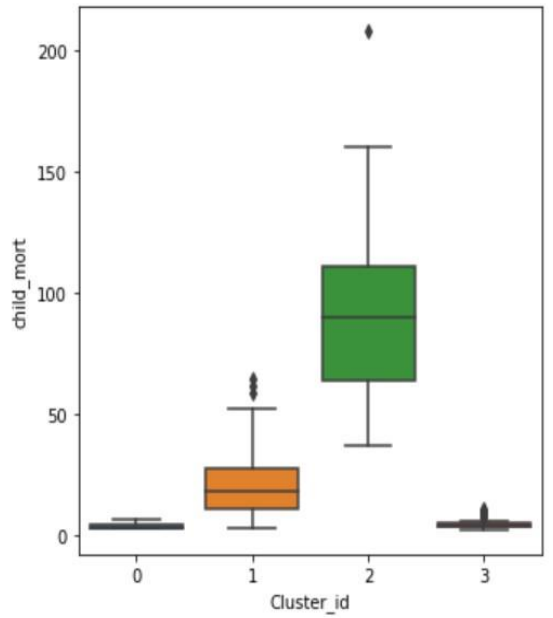
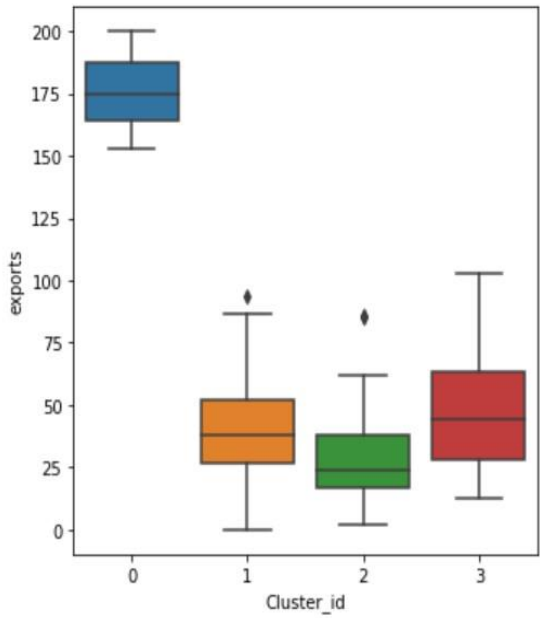
Elbow method

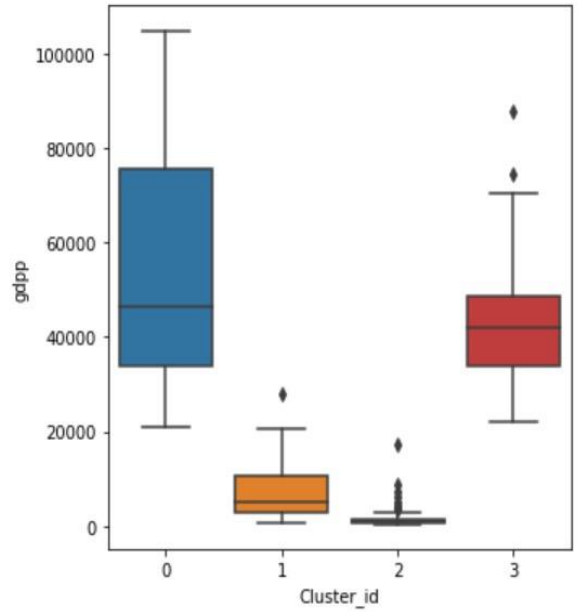


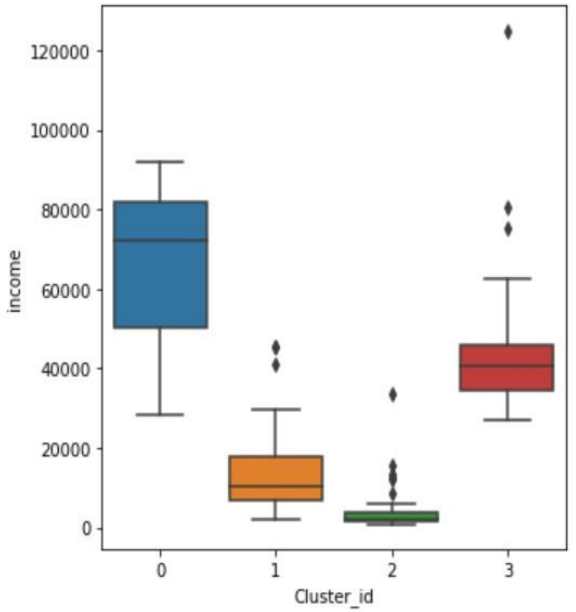
Results of K - means











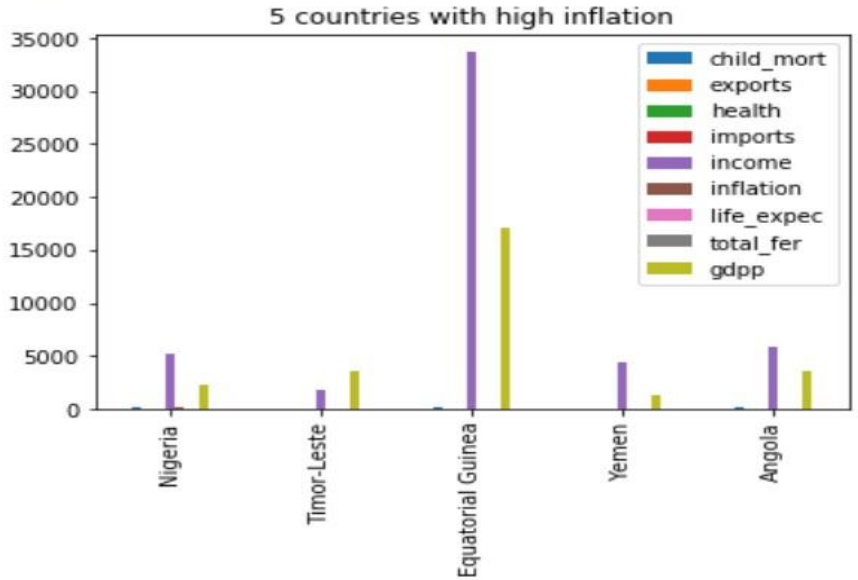
Cluster Analysis

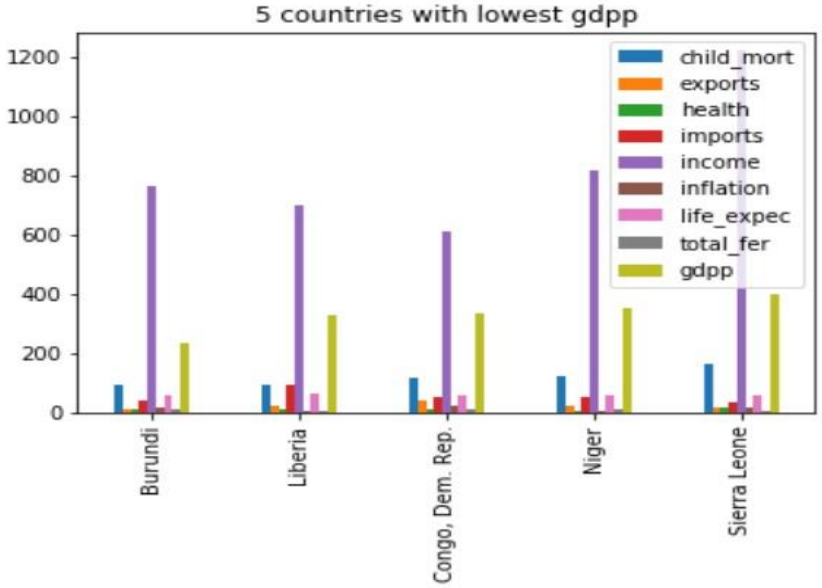
Cluster_id	child_mort	exports	health	imports	income	inflation	life_expec	total_fer	gdpp
0	4.133333	176.000000	6.793333	156.666667	64033.333333	2.468000	81.433333	1.380000	57566.666667
1	21.389655	41.290678	6.235862	48.038689	12968.620690	7.413460	72.935632	2.286552	6919.103448
2	92.961702	29.151277	6.388511	42.323404	3942.404255	12.019681	59.187234	5.008085	1922.382979
3	4.953333	45.826667	9.168667	39.736667	45250.000000	2.742200	80.376667	1.795333	43333.333333

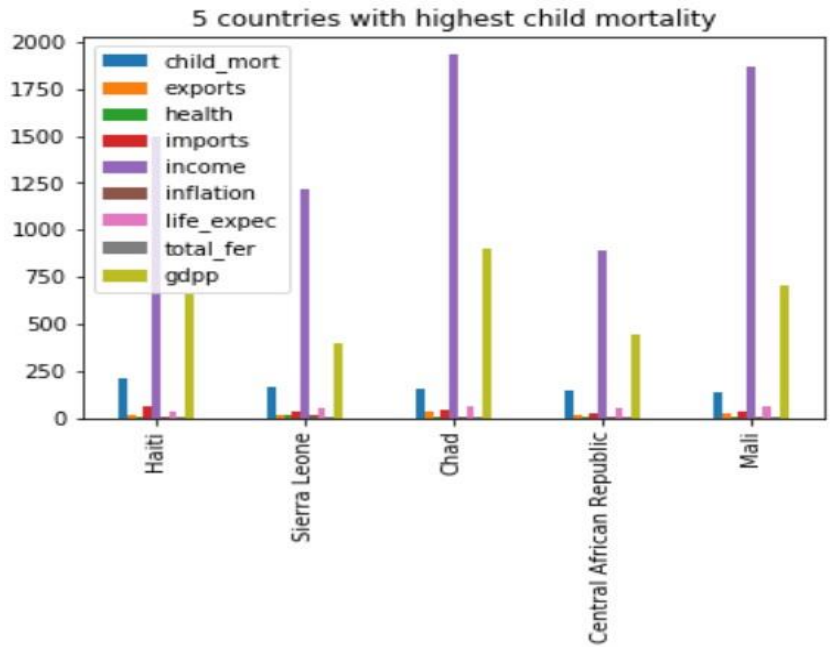
- From the table, it is clear the cluster contains countries with least GDP per capita and lowest income is Cluster 2.
- The feature of this cluster include highest child mortality, lowest exports of goods, one among the cluster spending lowest on health,second lowest imports of goods, Highest inflation, lowest life expectancy rate and Highest total_fer which implies that atmost 5 children can be born to each woman.
- The countries in this cluster can be considered for the fund since these are under developed as suggested by gdp and income, High inflation that shows there is un employement, low life expectations suggest that most of the population is young and can help in boosting economy if more jobs are made, Export rate is also very low probably since the countries doesn't produce much and is not self sufficient, high child mortality shows lack of progress in health sector and provision of vaccines for kids.

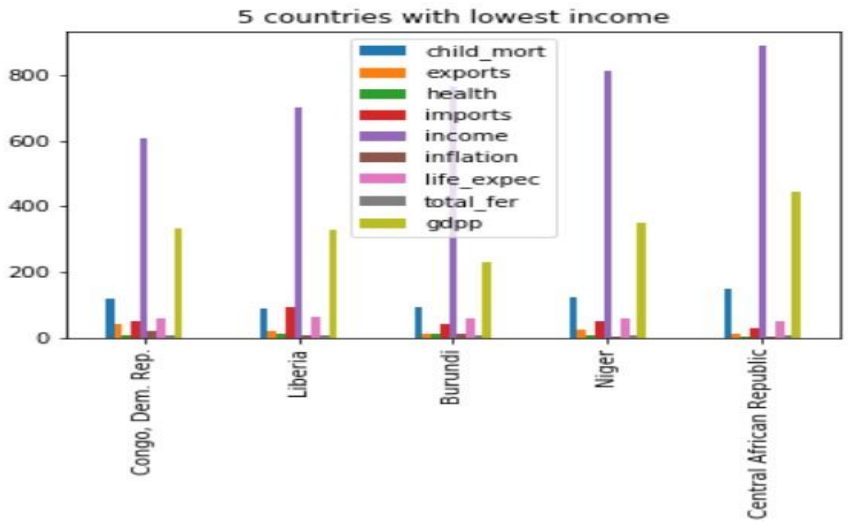
Summary

Final Observations and List of Countries nominated for the fund


5 countries with high inflation
child_mort
exports
health
imports
income
inflation
life_expec
total_fer
gdpp
35000
30000
25000
20000
15000
10000
5000
0
Nigeria
Timor-Leste
Equatorial Guinea
Yemen
Angola


5 countries with lowest gdpp
child_mort
exports
health
imports
income
inflation
life_expec
total_fer
gdpp
1200
1000
800
600
400
200
0
Burundi
Liberia
Congo, Dem. Rep.
Niger
Sierra Leone


5 countries with highest child mortality
child_mort
exports
health
imports
income
inflation
life_expec
total_fer
gdpp
2000
1750
1500
1250
1000
750
500
250
0
Haiti
Sierra Leone
Chad
Central African Republic
Mali


5 countries with lowest income
child_mort
exports
health
imports
income
inflation
life_expec
total_fer
gdpp
800
600
400
200
0
Congo, Dem. Rep.
Liberia
Burundi
Niger
Central African Republic

Final 6 countries suggested for the Aid.

- There are 4 countries which has both low gdp and low income, which are :
  - Burundi
  - Congo, Dem. Rep.
  - Liberia
  - Niger
- There no common countries having High child mortality and high inflation.
- There was one country which had high child mortality and high inflation, which is:
  - Sierra Leone

  Also considering between Haiti and Sierra Leone, Sierra had lower income.
- Considered the country with highest inflation as well, which is:
  - Nigeria