**Goal**: Oftentimes, countries face major deaths towards infants, which are led by different kinds of disease. By deeply analyzing and understanding the trend between the infant deaths and other diseases will give outside countries information to help and provide medical aids to the right environment.

**Result**:
Results are presented in a report with recommendations and follow-up steps. Based on this report, clear and well-founded decisions can be made and provide medical support.

**Project Duration**:
Project duration takes between 2 weeks to almost as long as 3 months. In order to carry out the best performance with the shortest amount of time, It is important to have accurate and narrowed datasets or it can take longer to process through data cleaning.

**Case** - How can we reduce the number of infant deaths by providing appropriate medical support?

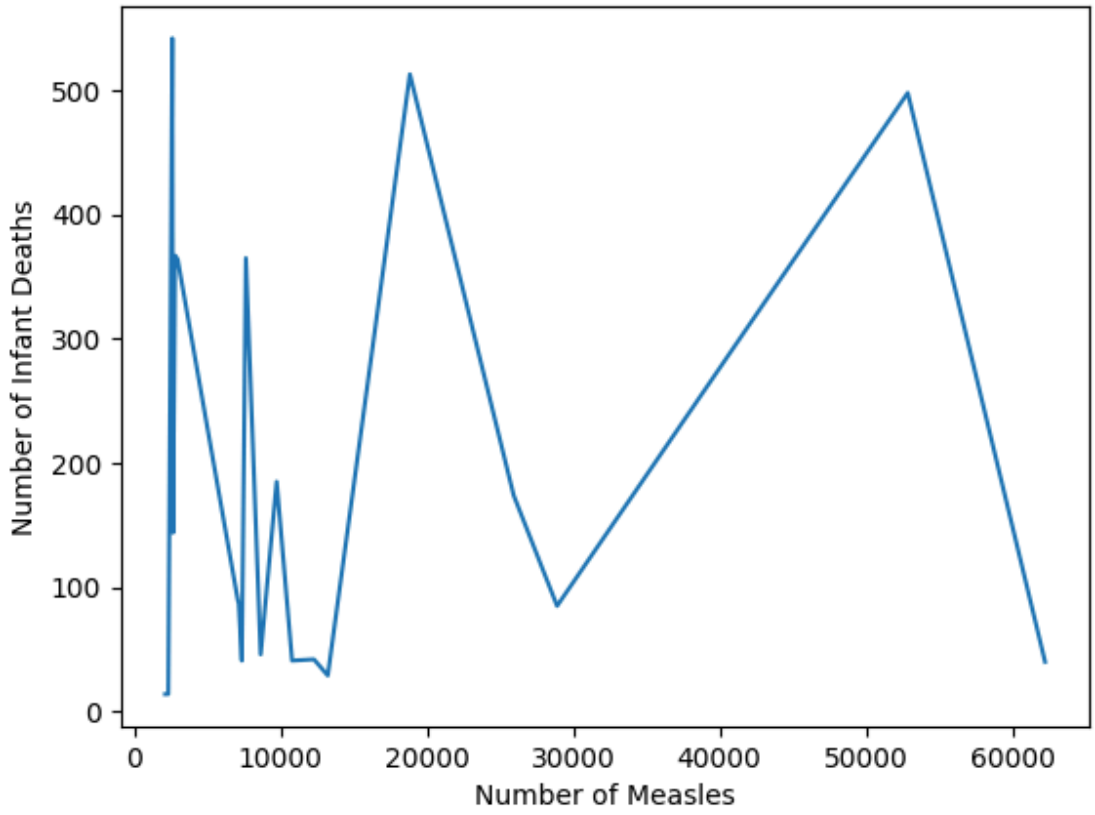
In the current state of developing countries, we often see variations of diseases, such as HIV, Hepatitis_B, Measles and Polio. WIth these diseases, it is important to find out what really struggles these countries to cure the disease and receive medical support from their poor environment..

**Basic research on the data for Measles**:

- In 2003, Madagascar had a massive outbreak on Measles, but it didn't cause massive infant deaths.
- In 2002, Madagascar had significantly less measles infected but had about the same infant deaths.
- In 2013, Nigeria had a similar situation where it had a massive outbreak on Measles, but had even less infant deaths than 2011.

**Assumption**: Even though these countries have prepared their outbreak from previous measles infection, Number of measles outnumbered from previous years. We can assume that measles don't cause critical death to infants and it is something that these countries are aware of and medically prepared.

| | Country | Status | Year | infant_deaths | HIV/AIDS | Hepatitis_B | Measles | Polio | Population |
|---|---|---|---|---|---|---|---|---|---|
| 896 | Madagascar | Developing | 2003 | 40 | 0.7 | 61 | 62233 | 65 | 17300000.0 |
| 1113 | Nigeria | Developing | 2013 | 498 | 3.9 | 46 | 52852 | 46 | 17200000.0 |
| 1055 | Mozambique | Developing | 2003 | 85 | 15.3 | 76 | 28898 | 67 | 19700000.0 |
| 130 | Bangladesh | Developing | 2005 | 174 | 0.1 | 45 | 25934 | 94 | 14300000.0 |
| 1115 | Nigeria | Developing | 2011 | 513 | 4.7 | 46 | 18843 | 48 | 16300000.0 |
| 1627 | Zambia | Developing | 2011 | 29 | 0.5 | 81 | 13234 | 83 | 14300000.0 |
| 593 | Ghana | Developing | 2002 | 42 | 3.5 | 8 | 12289 | 8 | 19900000.0 |
| 897 | Madagascar | Developing | 2002 | 41 | 0.7 | 51 | 10795 | 61 | 16800000.0 |
| 131 | Bangladesh | Developing | 2004 | 185 | 0.1 | 11 | 9743 | 88 | 14100000.0 |
| 335 | Chad | Developing | 2011 | 46 | 3.9 | 33 | 8650 | 4 | 12300000.0 |
| 1130 | Pakistan | Developing | 2006 | 365 | 0.1 | 78 | 7641 | 77 | 15800000.0 |
| 264 | Burkina Faso | Developing | 2012 | 41 | 0.8 | 9 | 7362 | 9 | 16600000.0 |
| 1056 | Mozambique | Developing | 2002 | 87 | 14.5 | 76 | 7155 | 76 | 19100000.0 |
| 1057 | Mozambique | Developing | 2001 | 90 | 13.4 | 25 | 7085 | 72 | 18600000.0 |
| 1131 | Pakistan | Developing | 2005 | 364 | 0.1 | 7 | 2981 | 78 | 15400000.0 |
| 1129 | Pakistan | Developing | 2007 | 367 | 0.1 | 75 | 2801 | 75 | 16300000.0 |
| 127 | Bangladesh | Developing | 2008 | 144 | 0.1 | 96 | 2660 | 96 | 14900000.0 |
| 1119 | Nigeria | Developing | 2007 | 542 | 5.2 | 42 | 2613 | 54 | 14600000.0 |



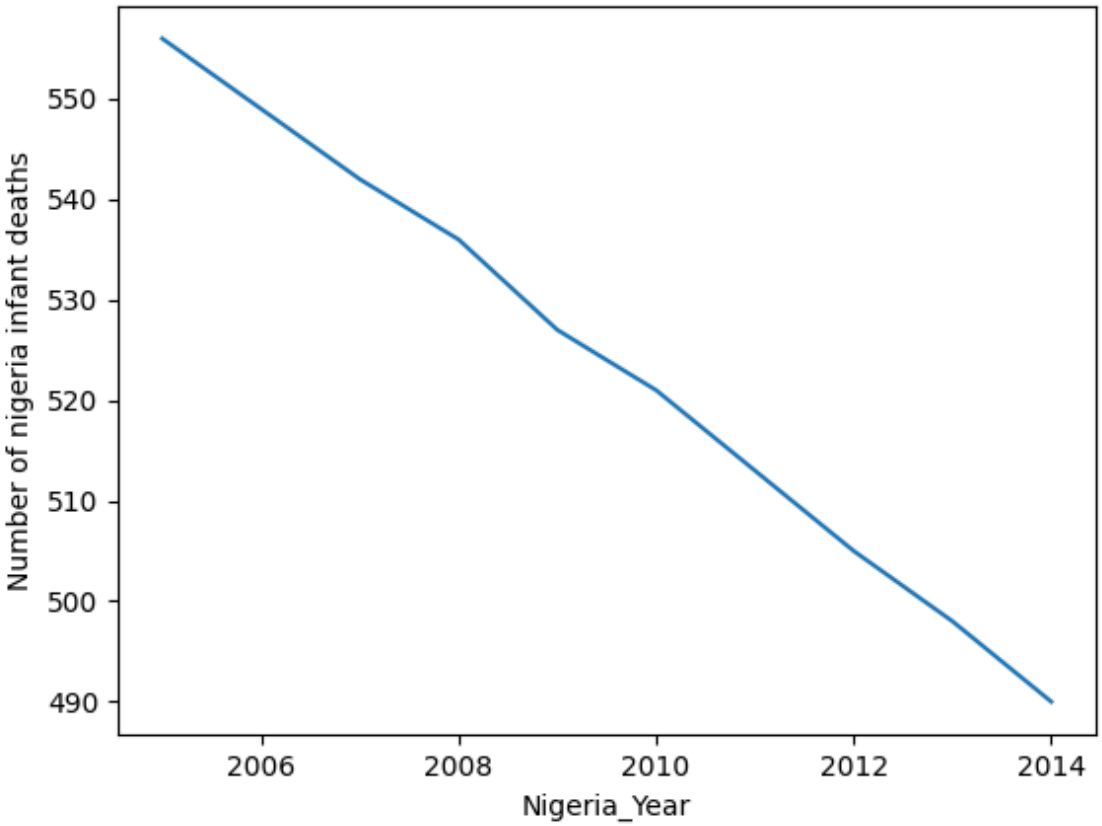
**Target : Nigeria**

**Goal** : To find the decreasing correlation between infant_deaths and HIV infection.

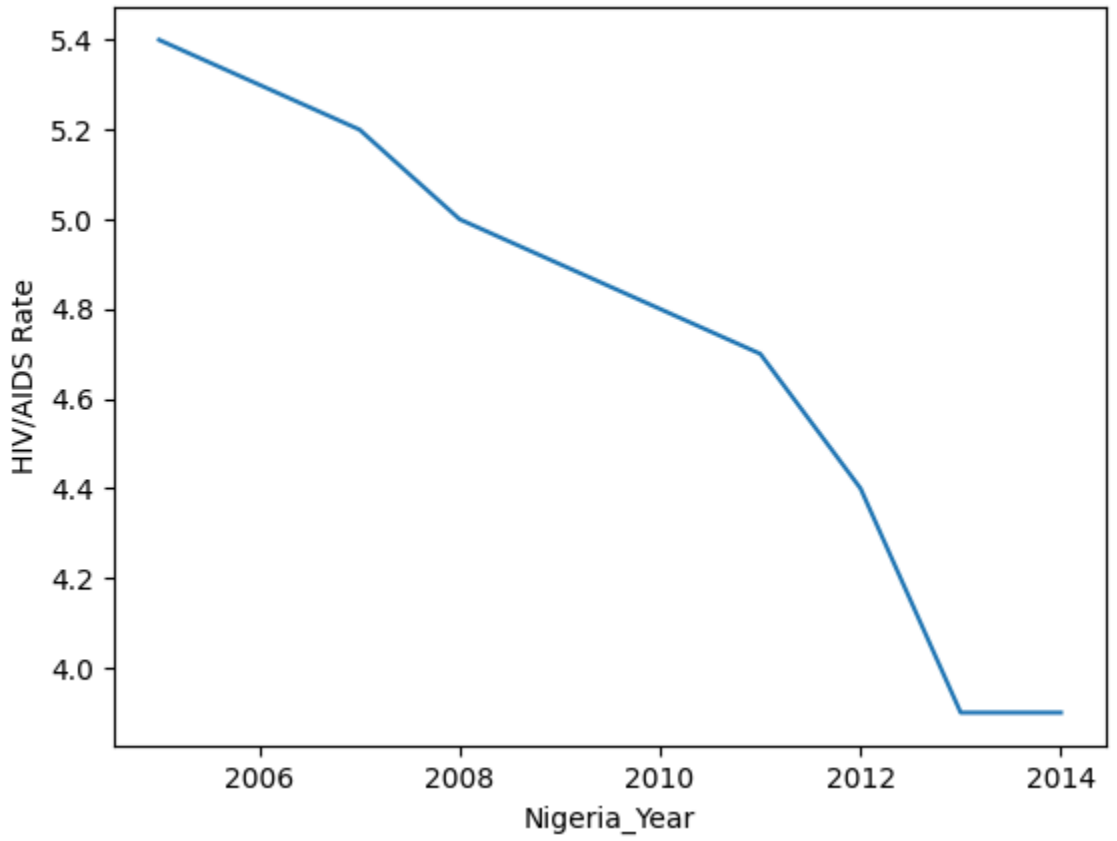
I want to create a graph that shows a decrease in percent change without actually comparing the values since it is not valid to compare between actual number of infant deaths and HIV numbers.

| | Country | Status | Year | infant_deaths | HIV/AIDS | Hepatitis_B | Measles | Polio | Population |
|---|---|---|---|---|---|---|---|---|---|
| 1121 | Nigeria | Developing | 2005 | 556 | 5.4 | 18 | 110927 | 45 | 139000000.0 |
| 1120 | Nigeria | Developing | 2006 | 549 | 5.3 | 27 | 704 | 46 | 14300000.0 |
| 1119 | Nigeria | Developing | 2007 | 542 | 5.2 | 42 | 2613 | 54 | 14600000.0 |
| 1118 | Nigeria | Developing | 2008 | 536 | 5.0 | 41 | 9960 | 6 | 1530000.0 |
| 1117 | Nigeria | Developing | 2009 | 527 | 4.9 | 63 | 1272 | 66 | 15400000.0 |
| 1116 | Nigeria | Developing | 2010 | 521 | 4.8 | 49 | 8491 | 54 | 159000000.0 |
| 1115 | Nigeria | Developing | 2011 | 513 | 4.7 | 46 | 18843 | 48 | 16300000.0 |
| 1114 | Nigeria | Developing | 2012 | 505 | 4.4 | 42 | 6447 | 42 | 167000000.0 |
| 1113 | Nigeria | Developing | 2013 | 498 | 3.9 | 46 | 52852 | 46 | 17200000.0 |
| 1112 | Nigeria | Developing | 2014 | 490 | 3.9 | 49 | 6855 | 49 | 1760000.0 |

**Graph showing the decrease in infant deaths over the year in Nigeria**:




Graph Showing the decrease in HIV rate over the years in Nigeria:




According to the data shown below, we see that these countries have a high Hepatitis B rate but it is extremely rare for an infant to die. Since they are considered “Developed” countries, it is expected to provide good medical support, which led me to think about how much GDP really affects medical support?

| | Country | Status | Year | infant_deaths | HIV/AIDS | Hepatitis_B | Measles | Polio | Population | Diphtheria | thinness_1-19 years | GDP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 870 | Luxembourg | Developed | 2014 | 0 | 0.1 | 94 | 0 | 99 | 556319.0 | 99 | 1.0 | 119172.74180 |
| 873 | Luxembourg | Developed | 2011 | 0 | 0.1 | 95 | 6 | 96 | 518347.0 | 99 | 0.9 | 115761.57700 |
| 876 | Luxembourg | Developed | 2008 | 0 | 0.1 | 94 | 1 | 96 | 48865.0 | 99 | 0.9 | 114293.84330 |
| 871 | Luxembourg | Developed | 2013 | 0 | 0.1 | 94 | 0 | 99 | 54336.0 | 99 | 0.9 | 113751.85000 |
| 878 | Luxembourg | Developed | 2006 | 0 | 0.1 | 95 | 8 | 99 | 472637.0 | 99 | 0.9 | 89739.71170 |
| 880 | Luxembourg | Developed | 2004 | 0 | 0.1 | 94 | 0 | 99 | 45895.0 | 99 | 1.0 | 75716.35180 |
| 80 | Australia | Developed | 2013 | 1 | 0.1 | 91 | 158 | 91 | 23100000.0 | 91 | 0.6 | 67792.33860 |
| 81 | Australia | Developed | 2012 | 1 | 0.1 | 91 | 199 | 92 | 22700000.0 | 92 | 0.6 | 67677.63477 |
| 881 | Luxembourg | Developed | 2003 | 0 | 0.1 | 95 | 1 | 99 | 45163.0 | 98 | 1.0 | 65445.88530 |
| 82 | Australia | Developed | 2011 | 1 | 0.1 | 92 | 190 | 92 | 223424.0 | 92 | 0.6 | 62245.12900 |
| 79 | Australia | Developed | 2014 | 1 | 0.1 | 91 | 340 | 92 | 2350000.0 | 92 | 0.6 | 62214.69120 |
| 1431 | Sweden | Developed | 2011 | 0 | 0.1 | 42 | 26 | 98 | 9450000.0 | 98 | 1.4 | 59593.28711 |
| 1430 | Sweden | Developed | 2012 | 0 | 0.1 | 53 | 30 | 98 | 9520000.0 | 98 | 1.4 | 57134.77700 |
| 704 | Ireland | Developed | 2011 | 0 | 0.1 | 95 | 285 | 95 | 4580000.0 | 95 | 0.3 | 52567.52568 |
| 1087 | Netherlands | Developed | 2014 | 1 | 0.1 | 92 | 140 | 96 | 168658.0 | 96 | 1.0 | 52157.46870 |
| 83 | Australia | Developed | 2010 | 1 | 0.1 | 92 | 70 | 92 | 223175.0 | 92 | 0.7 | 51874.84800 |
| 1088 | Netherlands | Developed | 2013 | 1 | 0.1 | 51 | 2632 | 97 | 1680000.0 | 97 | 1.0 | 51574.48942 |
| 99 | Austria | Developed | 2008 | 0 | 0.1 | 83 | 448 | 83 | 8320000.0 | 83 | 1.7 | 51386.37665 |
| 93 | Austria | Developed | 2014 | 0 | 0.1 | 98 | 117 | 98 | 8540000.0 | 98 | 1.8 | 51322.63997 |
| 96 | Austria | Developed | 2011 | 0 | 0.1 | 89 | 68 | 89 | 8390000.0 | 89 | 1.7 | 51126.74139 |


According to the Organisation for Economic Co-operation and Development, USA health spending in the US is about 18.3 percent of GDP.

First 20 results sorted by ascending order from lowest GDP **(Population range was fixed between 1 million to 3 million for fair comparison)**:

| | Country | Status | Year | infant_deaths | HIV/AIDS | Hepatitis_B | Measles | Polio | Population | Diphtheria | thinness_1-19 years | GDP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1305 | Senegal | Developing | 2010 | 21 | 0.4 | 89 | 428 | 76 | 12900000.0 | 89 | 1.4 | 11.631377 |
| 312 | Cameroon | Developing | 2006 | 58 | 7.2 | 81 | 196 | 78 | 17900000.0 | 81 | 6.7 | 12.989164 |
| 1632 | Zambia | Developing | 2006 | 33 | 15.9 | 81 | 459 | 83 | 12400000.0 | 81 | 7.0 | 13.154199 |
| 1260 | Russian Federation | Developing | 2001 | 21 | 0.3 | 43 | 2072 | 97 | 14600000.0 | 96 | 2.8 | 21.362386 |
| 909 | Malawi | Developing | 2003 | 43 | 24.2 | 84 | 167 | 85 | 12300000.0 | 84 | 7.6 | 26.152517 |
| 593 | Ghana | Developing | 2002 | 42 | 3.5 | 8 | 12289 | 8 | 19900000.0 | 78 | 8.8 | 39.484473 |
| 1106 | Niger | Developing | 2014 | 49 | 0.5 | 68 | 1142 | 67 | 19100000.0 | 68 | 9.8 | 43.646498 |
| 131 | Bangladesh | Developing | 2004 | 185 | 0.1 | 11 | 9743 | 88 | 14100000.0 | 99 | 2.1 | 46.757917 |
| 891 | Madagascar | Developing | 2008 | 34 | 0.5 | 77 | 3 | 77 | 20000000.0 | 77 | 7.8 | 47.733254 |
| 621 | Guinea | Developing | 2012 | 28 | 1.9 | 62 | 6 | 63 | 11300000.0 | 62 | 7.8 | 52.348565 |
| 1050 | Mozambique | Developing | 2008 | 72 | 12.6 | 75 | 4 | 74 | 22800000.0 | 75 | 3.7 | 53.127719 |
| 620 | Guinea | Developing | 2013 | 27 | 1.0 | 63 | 53 | 63 | 11500000.0 | 63 | 7.7 | 54.169324 |
| 1045 | Mozambique | Developing | 2013 | 62 | 5.1 | 78 | 8 | 78 | 26400000.0 | 78 | 3.6 | 65.985681 |
| 262 | Burkina Faso | Developing | 2014 | 39 | 0.6 | 91 | 343 | 91 | 17600000.0 | 91 | 8.2 | 75.146411 |
| 1075 | Nepal | Developing | 2014 | 18 | 0.1 | 92 | 1279 | 92 | 28300000.0 | 92 | 15.9 | 76.238698 |
| 1261 | Rwanda | Developing | 2014 | 12 | 0.4 | 98 | 10 | 98 | 11300000.0 | 98 | 5.8 | 76.569952 |
| 689 | Indonesia | Developing | 2000 | 187 | 0.1 | 65 | 3344 | 72 | 21200000.0 | 75 | 11.0 | 78.927440 |
| 1309 | Senegal | Developing | 2006 | 23 | 0.7 | 89 | 3 | 89 | 11600000.0 | 89 | 11.2 | 89.838296 |

First 20 results sorted by descending order from highest GDP **(Population range was fixed between 1 million to 3 million for fair comparison)**:

| | Country | Status | Year | infant_deaths | HIV/AIDS | Hepatitis_B | Measles | Polio | Population | Diphtheria | thinness_1-19 years | GDP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 598 | Greece | Developing | 2010 | 0 | 0.1 | 95 | 149 | 99 | 11100000.0 | 99 | 0.8 | 26917.758980 |
| 340 | Chile | Developing | 2013 | 2 | 0.1 | 9 | 0 | 9 | 17500000.0 | 91 | 0.8 | 15941.397220 |
| 1248 | Russian Federation | Developing | 2013 | 14 | 0.2 | 97 | 2339 | 98 | 14400000.0 | 97 | 2.3 | 15543.676530 |
| 1249 | Russian Federation | Developing | 2012 | 14 | 0.3 | 97 | 2123 | 98 | 14300000.0 | 97 | 2.3 | 15154.456870 |
| 339 | Chile | Developing | 2014 | 2 | 0.1 | 95 | 0 | 95 | 17600000.0 | 95 | 0.8 | 14817.377780 |
| 1250 | Russian Federation | Developing | 2011 | 14 | 0.3 | 97 | 629 | 97 | 14300000.0 | 97 | 2.3 | 14212.687000 |
| 765 | Kazakhstan | Developing | 2012 | 6 | 0.1 | 95 | 55 | 98 | 16800000.0 | 99 | 2.4 | 12387.189820 |
| 1253 | Russian Federation | Developing | 2008 | 16 | 0.3 | 98 | 27 | 98 | 14300000.0 | 98 | 2.3 | 11635.263700 |
| 996 | Mexico | Developing | 2008 | 37 | 0.1 | 97 | 0 | 96 | 11400000.0 | 96 | 1.7 | 9689.528870 |
| 347 | Chile | Developing | 2006 | 2 | 0.1 | 95 | 0 | 94 | 16300000.0 | 94 | 0.9 | 9484.681227 |
| 238 | Brazil | Developing | 2008 | 61 | 0.1 | 96 | 0 | 99 | 19300000.0 | 99 | 3.0 | 8787.613750 |
| 999 | Mexico | Developing | 2005 | 42 | 0.1 | 98 | 6 | 98 | 18500000.0 | 98 | 1.8 | 7986.798439 |
| 995 | Mexico | Developing | 2009 | 36 | 0.1 | 95 | 0 | 95 | 11600000.0 | 95 | 1.7 | 7748.123310 |
| 239 | Brazil | Developing | 2007 | 65 | 0.1 | 99 | 0 | 99 | 19100000.0 | 99 | 3.1 | 7313.557962 |
| 918 | Malaysia | Developing | 2007 | 3 | 0.1 | 96 | 394 | 97 | 26600000.0 | 97 | 8.7 | 7269.171140 |
| 1000 | Mexico | Developing | 2004 | 44 | 0.1 | 98 | 64 | 98 | 17000000.0 | 98 | 1.8 | 7199.596650 |
| 770 | Kazakhstan | Developing | 2007 | 8 | 0.1 | 94 | 13 | 94 | 15500000.0 | 93 | 2.4 | 6771.414797 |
| 919 | Malaysia | Developing | 2006 | 3 | 0.1 | 95 | 564 | 95 | 26100000.0 | 95 | 8.8 | 6222.982955 |

**Conclusion:** As we can see from these data, overall infant deaths are simply a lot more when a country 's GDP is low, which leads to economic weaknesses and low medical supplies.

**Overall conclusion from the analysis:**

By looking at countries' economic and disease factors, not only the disease infection rate causes significant changes to the infant deaths but also the combination of multiple factors like, GDP, their percentage of spending on medical support and environment people living can cause these deaths and need to pay more attention to individual countries and save lives.