

Analysis of MSF Countries:

Multi-Criteria Decision Support Model Identifying Which Countries to Support or Abandon



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1. Executive Summary

Médecins Sans Frontières (MSF), also known as Doctors Without Borders, is an international humanitarian organization that has a mission to provide medical assistance to people experiencing natural disasters, lack of healthcare, epidemics, and conflicts. They are currently operating in 78 countries with over 3000 volunteers annually. Data provided has been analyzed using to weigh the threats and opportunities to operations.

2. Introduction & Problem Description

MSF was founded by a small group of people in 1971 to address issues that were being faced by people internationally that required assistance with healthcare needs due to war, outbreaks of diseases, and natural disasters. It has gone through some changes over the years, but the mission remains the same and continues to provide support in 78 countries. MSF has experienced some significant risks/ threats, especially in countries with political conflict, due to the appearance of taking sides when setting up support for only one side of the parties in conflict. US-occupied countries or even work for the Coalition forces causes stress for the organization they have headquarters in the US. This has left MSF volunteers and aid stations vulnerable to attacks, gunfire, and kidnapping in addition to the potential of injury and disease that comes as part of regular possible expectations.

MSF is evaluating their presence in 52 countries. This will report will review data that to assist in analyzing whether to remain in a country or abandon their relief efforts due to the threats.



3. Proposed Method

The Euclidean model will be used to evaluate multiple criteria to establish a weighted distance and arrange the alternatives in a ranked order. Alternatives will align as risks/threats (-) or opportunities/strengths (+). The ideal or optimal point will be identified as $(x=1, y=0)$ and the reverse for the least optimal decision alternative.

Some factors for the decision criteria include data for:

- Pandemics/ epidemics
 - These would be opportunities in this evaluation. Typically, one would want to minimize illnesses and that is still true, but in this instance, MSF would be interested in going to countries to assist with medical services.
- Healthcare
 - MSF would consider organized healthcare a threat and want to minimize their presence in countries that have adequate healthcare for all citizens and focus on countries with poor healthcare institutions.
- Economic factors
 - An example of a factor that would be considered an opportunity would be to maximize countries with a high level of poverty,
 - An example of a factor that would be a threat would be a country where the savings to debt ratio is high. This would be a country that is more developed and have less need for the services of the MSF.
- Education levels
 - Lower education levels in the population would be an opportunity. Conversely if the country has a population that has a high-level of post-secondary education that would be considered a threat.

- Population factors
 - Areas where the average age of death would be an opportunity to go in improve the people's health.
- Employment/ Unemployment
 - Countries with high unemployment would be a strength in this report as those people would need more support.
 - Conversely a country with high employment is likely to not need as much support from MSF.
- Living conditions
 - Countries with much of their citizens living in rural communities or slums would be opportunities. Once people are further away from the cities or lack the means to live in better communities is usually a sign that they would need healthcare assistance.
- Technology
 - A higher level of technology in a country would suggest that they could be in a better position. This would consider it a threat for MSF as they would likely have lower opportunities to perform their work.
- Political Instability
 - This one almost speaks for itself as it is part of their mission to help people in countries that are in distress. This is an opportunity for MSF.



4. Normalizing (Standardizing the measurement scale)

- The process for normalizing the data would begin with determining the maximum and minimum of each of the criterion.
 - Formula in excel= MAX (x₁, x₂, x₃...) to find the highest number (x_n) in the data set.
 - Formula in excel= MIN (x₁, x₂, x₃...) to find the lowest number (x_i) in the data set.
- Then the data would then be normalized with the MAX and MIN. The formula in Excel would be =AVERAGE (x₁, x₂, x₃...) or $X_n = (x_1 - x_i) / (x_n - x_i)$.
- Once the this is completed, then the Euclidean Distance can be calculated.
 - Each Country would then have the average of all scores for opportunities and threats calculated.
 - The average would then be used to derive the Euclidean Distance.
 - Definitions for Euclidean formula.
 - p_x= the ideal opportunity (x=1, y=0)
 - q_x=the average opportunity for each country
 - p_y= the maximum threat point
 - q_y= the average threat for each country
 - $= \sqrt{((p_x - q_x)^2) + (p_y - q_y)^2}$
- Ranking the Euclidean Distances is the last step to the evaluation.

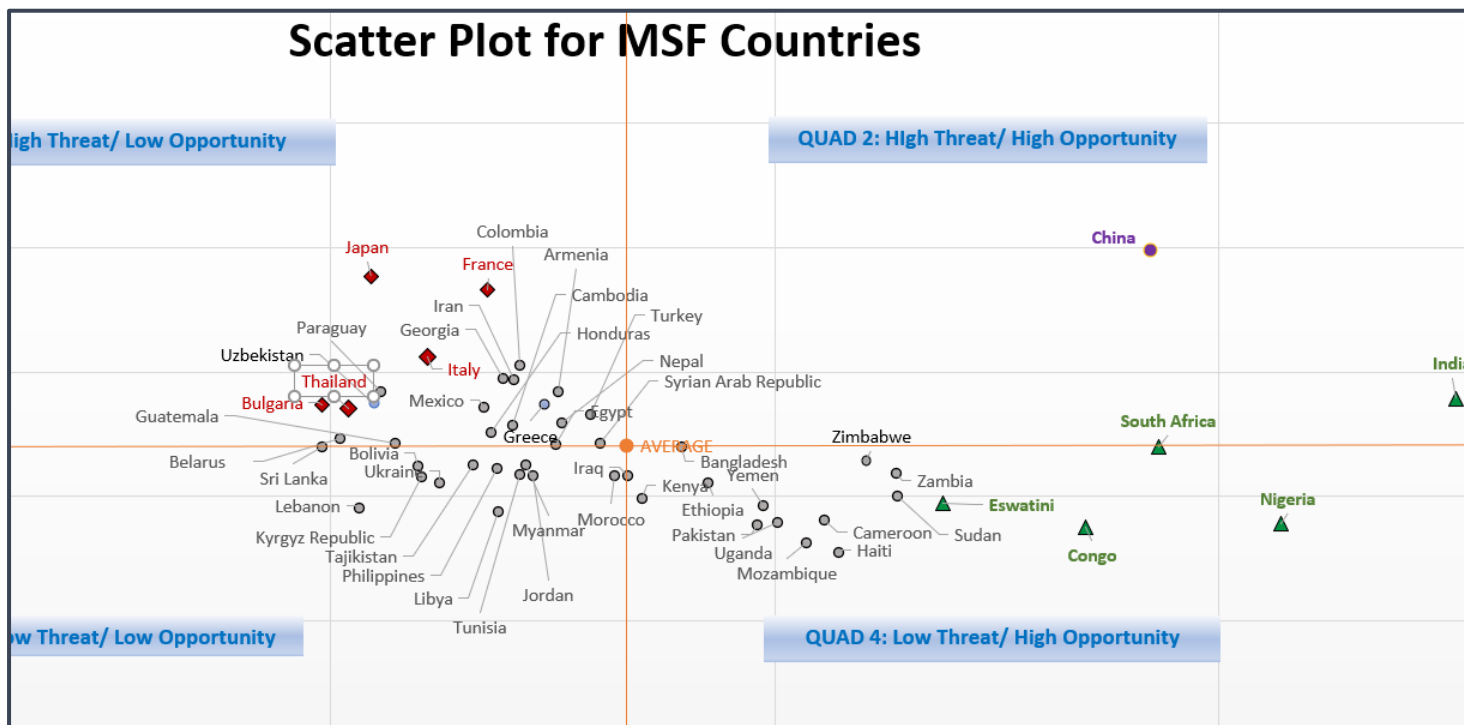
Criterion Name	Adjusted net national income (annual % growth) [NY.ADJ.NNTY.KD.ZG]	Antiretroviral therapy coverage (% of people living with HIV) [SH.HV.ARTC.ZS]	Antiretroviral therapy coverage for PMTCT (% of pregnant women living with HIV)	Male infant Mortality Rate (Death Per Thousand Births)	Maternal mortality ratio (modeled estimate, per 100,000 live births) [SH.STA.MMRT]	Preprimary education duration (years)	Access to clean fuels and technologies for cooking (% of population)	Contributing family workers female (% of female employment) (modeled ILO estimate)	GDP per capita growth (%)	Immunization HepB3 (% of one-year-old children)	School enrollment (primary) - index	School enrollment (secondary) - index	Travel
Armenia	9.735	78	NA	12	26	3	97	3.17799973	7.4	92	1.01	1.05	10190
Bangladesh	6.218	NA	NA	27	173	3	18	28.18400002	7	98	1.07	1.17	2995265
Belarus	3.751	45	99	3	2	4	98	0.035	1.4	97	1	0.99	99572
Bolivia	3.671	42	92	24	155	2	64	29.95000076	0.8	75	0.99	0.98	168792
Bulgaria	4.742	NA	NA	7	10	4	89	0.944999993	4.1	85	0.99	0.97	NA
Cambodia	6.815	78	96	27	160	6	18	4.907999992	5.5	92	0.97	0.85	116988
Cameroon	2.692	50	94	55	529	2	23	20.0739994	1.4	67	0.9	0.86	2127136
China	5.851	NA	NA	8	29	3	59	20.67099953	5.7	99	1.01	1	NA
Colombia	0.555	61	NA	14	83	6	92	5.539000034	1.9	92	0.97	1.05	286501
Congo	34.238	42	44	74	473	3	4	30.891000075	1.1	57	0.94	0.64	21722008
Egypt	-1.512	26	17	19	37	2	98	24.07600021	3.5	95	1.01	0.99	138274
Ethiopia	6.465	65	70	44	401	3	4	56.18700027	5.5	68	0.91	0.96	2971787
France	1.967	80	100	4	8	3	100	0.435999999	1.4	91	0.99	1	43211
Georgia	7.238	NA	NA	10	25	3	78	27.67000008	5.3	94	1.01	1.01	43371
Greece	2.279	NA	NA	4	3	6	94	5.401000023	2	96	1	0.95	563681
Guatemala	3.336	49	42	24	95	7	45	11.7869997	2.2	86	0.98	0.96	NA
Haiti	-3.866	62	76	55	480	6	4	27.80599976	-2.2	51	0.97	NA	1753664
Honduras	6.597	47	64	17	65	3	53	11.82199955	1	87	1	1.12	317549
India	8.255	NA	NA	30	145	3	41	29.9640007	4	91	1.02	1.02	1166656
Iran	3.918	19	67	13	16	1	98	17.91300011	NA	99	1.06	0.96	311786
Iraq	NA	NA	NA	25	79	2	98	4.921999931	2.1	84	0.84	0.75	3244821
Italy	1.838	84	74	3	2	3	100	1.547999978	0.5	95	0.97	0.99	95202
Japan	1.818	NA	NA	2	5	5	100	3.9619999893	0.9	99	NA	NA	NA
Jordan	2.794	NA	NA	15	46	2	99	0.340999991	0.5	89	0.98	1.02	688399
Kenya	1.455	75	80	34	342	3	13	8.880000114	3	92	1	0.9	2125686
Kyrgyz Republic	5.158	36	77	19	60	6	81	11.09599972	2.3	95	0.99	1	207812
Lebanon	1.076	NA	NA	7	29	3	NA	4.125999928	-5.7	80	0.91	0.97	944973
Libya	NA	35	48	11	72	2	NA	0.693000019	1	73	0.96	1.18	528066
Mexico	2.830	NA	NA	12	33	6	85	6.652999878	-1.2	56	1.01	1.09	518167
Morocco	3.998	57	59	58	70	3	97	27.98800087	-0.7	88	0.93	0.89	454508
Mozambique	6.830	50	100	21	289	5	4	43.525000153	1	99	0.97	NA	NA
Myanmar	4.519	61	79	41	250	5	18	34.75899887	2.7	90	0.96	1.09	1403090
Nepal	11.593	53	72	29	186	2	28	59.15599823	5	93	1.02	1.07	NA
Nigeria	-2.623	57	51	83	917	5	5	20.48999977	-0.4	57	0.94	0.9	5406875
Pakistan	5.325	8	6	63	140	2	43	51.25500107	-1	75	0.86	0.87	1636360
Paraguay	5.353	37	71	19	129	5	66	10.7130003	-1.3	86	0.97	1.07	NA
Philippines	6.528	35	18	25	121	1	43	8.588999748	4.6	65	0.96	1.11	157215
South Africa	2.582	62	93	31	119	7	85	0.782999992	-1.2	77	0.96	1.07	722405
Sri Lanka	3.583	NA	NA	7	36	2	26	17.91699982	1.7	99	0.99	1.05	NA
Eswatini	1.050	86	83	47	437	2	50	38.77299881	-4.9	93	0.94	1.01	1834855
Sudan	2.020	17	8	48	295	3	41	2.790999889	NA	90	NA	NA	NA
Syrian Arab Republic	NA	17	NA	15	31	3	99	6.962999821	1.3	54	0.97	0.99	3061925
Tajikistan	NA	42	81	34	17	4	80	28.63999939	4.5	97	0.99	0.9	253142
Thailand	5.702	68	97	37	5	74	22.43099976	2.1	97	1	0.97	79902	
Tunisia	NA	16	24	16	43	3	99	5.019999981	-0.1	92	0.99	1.14	119977
Turkey	6.066	NA	NA	10	17	5	NA	22.16500092	-0.5	99	0.99	0.98	25717
Uganda	3.192	69	98	37	375	3	1	18.76799965	2.8	93	1.03	0.79	533607
Ukraine	8.952	43	92	8	19	5	96	0.243000001	3.8	76	1.02	0.98	367801
Uzbekistan	NA	51	65	22	29	4	92	12.40400028	3.6	96	0.99	0.99	794894
Yemen	NA	21	18	47	164	6	65	40.375	NA	73	0.87	0.73	7669674
Zambia	NA	72	90	44	213	4	16	51.88999939	-1.6	88	1.02	0.6	NA
Zimbabwe	3.950	78	90	38	458	2	29	11.09000015	-1.2	90	0.98	0.96	668153
MAX/MIN													
MAX	34.238	86	100	83	917	7	100	59.15599823	7.4	99	1.07	1.18	21722008
MIN	-3.866	8	6	2	2	1	1	0.035	-5.7	51	0.84	0.6	10190

5. Scatter Chart

Graphical Representation

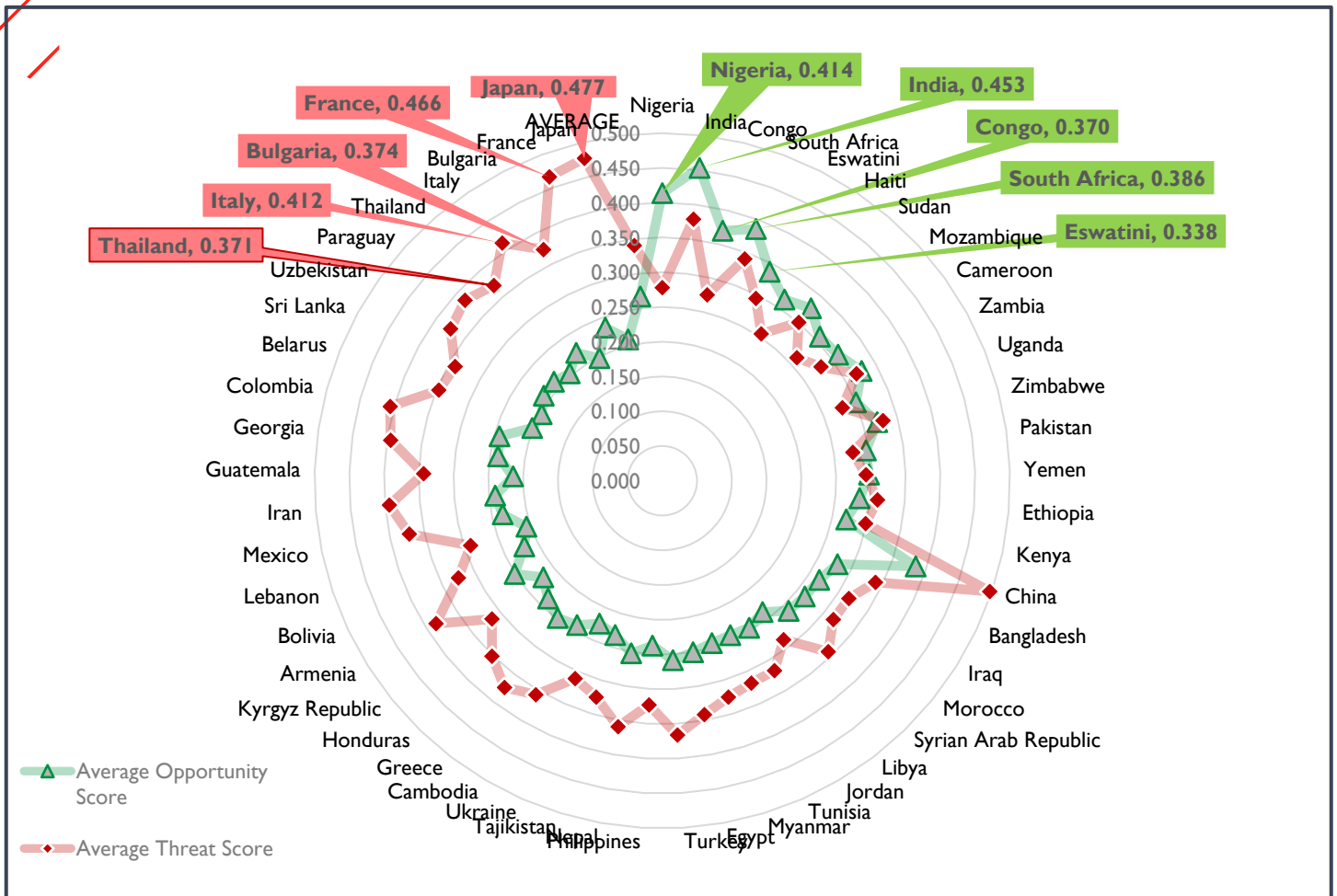
Definitions:

- **High Threat/ Low Opportunity** – These are countries that have threats that possibly outweigh the opportunities to provide healthcare and emergency support. MSF should consider possible countries to cease operations.
- **High Threat/ High Opportunity** - These countries have a demand for healthcare support. MSF will need to consider carefully to remain in these countries based on the potential risks. MSF should consider possible countries to cease operations.
- **Low Threat/ Low Opportunity:** These countries have a low risk to the safety and other conditions combined with a low opportunity to provide medical services. MSF should consider possible countries to cease operations.
- **Low Threat/ High Opportunity:** The threat level is lower in these countries and opportunities to provide support in line with the MSF mission is high. MSF would be welcomed and should consider remaining.



6. Radar Chart

When looking at the Scatter Plot you can see countries that are clearly standing out has high risk and high opportunities. China seems to be an outlier in this report. It is not in the top five of countries to consider abandoning or remaining in. It would require additional analysis of what factors cause this result. China has a large population; many are rural and thus would create opportunities for MSF. Conversely as China has a tight control over their people and has health care in the urban areas that could be adding to the higher threat.



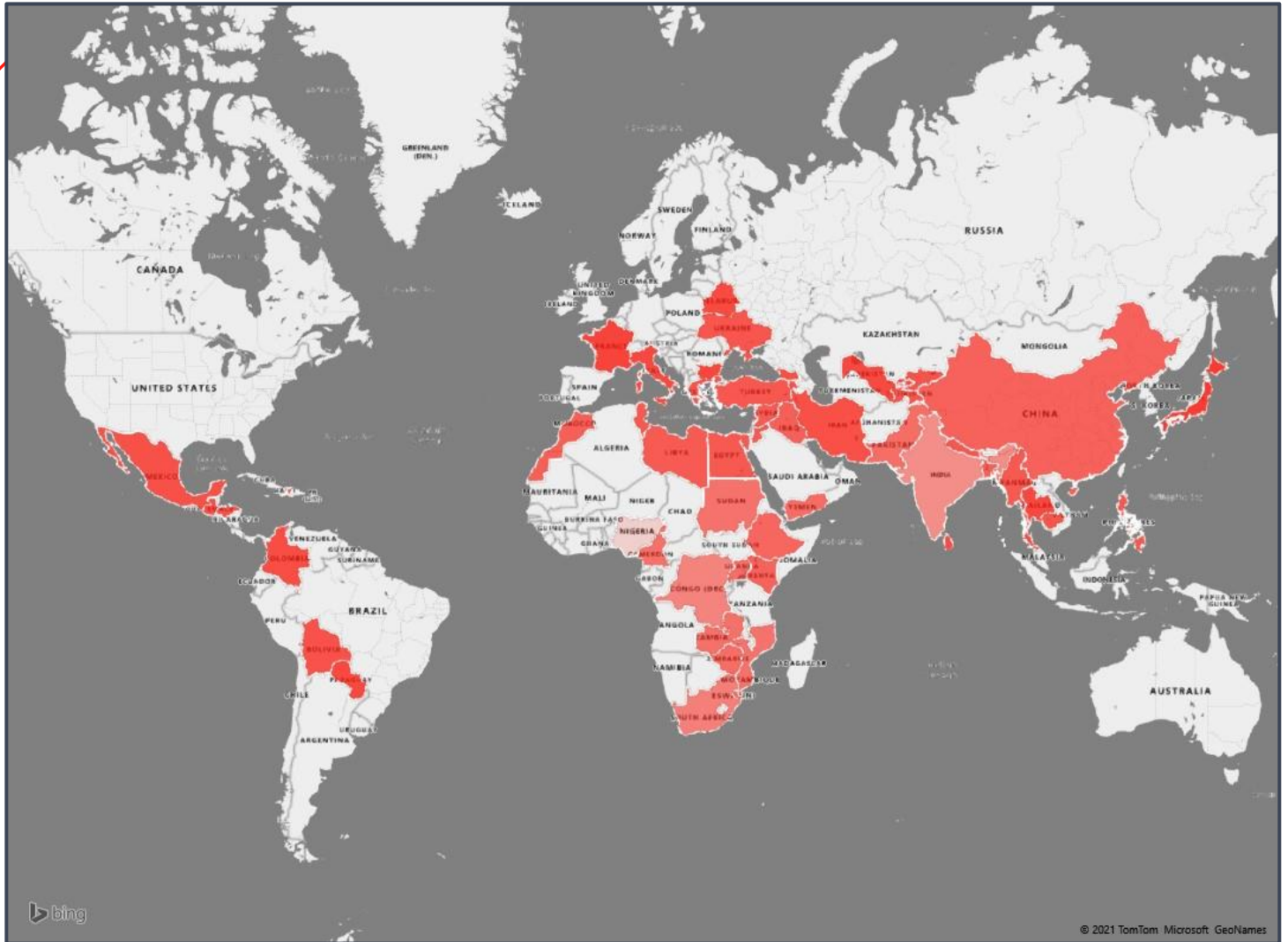
Top Five Countries for High Threat/ Low Opportunity:

1. Japan
2. France
3. Bulgaria
4. Italy
5. Thailand

Top Five Countries for Low Threat/ High Opportunity:

1. Nigeria
2. India
3. Congo
4. South Africa
5. Eswatini

7. World Health Map



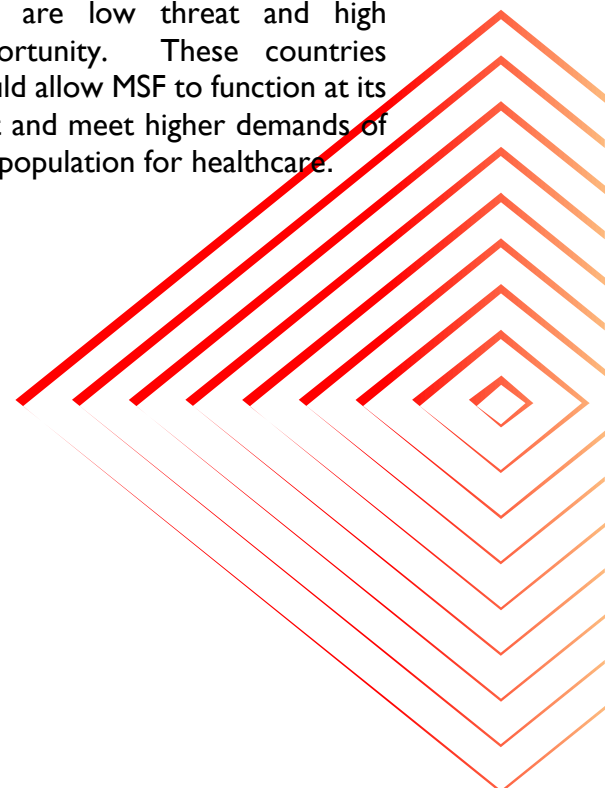
Country	Average Opportunity	Average Threat	Euclidean Distance	Rank
Nigeria	0.41	0.28	0.649	1
India	0.45	0.38	0.665	2
Congo	0.37	0.28	0.687	3
South Africa	0.39	0.34	0.702	4
Eswatini	0.34	0.29	0.725	5
Haiti	0.31	0.25	0.731	6
Sudan	0.33	0.30	0.737	7
Mozambique	0.31	0.26	0.741	8
Cameroon	0.31	0.28	0.744	9
Zambia	0.33	0.32	0.744	10
Uganda	0.30	0.28	0.753	11
Zimbabwe	0.32	0.33	0.755	12
Pakistan	0.30	0.28	0.756	13
Yemen	0.30	0.29	0.761	14
Ethiopia	0.28	0.31	0.780	15
Kenya	0.27	0.30	0.789	16
China	0.38	0.50	0.791	17
Bangladesh	0.28	0.34	0.797	18
Iraq	0.27	0.32	0.799	19
Morocco	0.26	0.32	0.801	20
Syrian Arab Republic	0.26	0.34	0.815	21
Libya	0.24	0.29	0.815	22
Jordan	0.25	0.32	0.818	23
Tunisia	0.24	0.32	0.821	24
Myanmar	0.24	0.33	0.823	25
Egypt	0.25	0.34	0.824	26
Turkey	0.26	0.37	0.827	27
Philippines	0.24	0.32	0.828	28
Nepal	0.25	0.36	0.830	29
Tajikistan	0.23	0.33	0.834	30
Ukraine	0.22	0.31	0.836	31
Cambodia	0.24	0.36	0.839	32
Greece	0.25	0.37	0.840	33
Honduras	0.24	0.35	0.841	34
Kyrgyz Republic	0.22	0.32	0.841	35
Armenia	0.25	0.38	0.842	36
Bolivia	0.22	0.32	0.845	37
Lebanon	0.21	0.29	0.845	38
Mexico	0.23	0.37	0.851	39
Iran	0.24	0.39	0.855	40
Guatemala	0.21	0.34	0.857	41
Georgia	0.24	0.39	0.857	42
Colombia	0.24	0.41	0.859	43
Belarus	0.20	0.35	0.870	44
Sri Lanka	0.20	0.34	0.871	45
Uzbekistan	0.21	0.37	0.875	46
Paraguay	0.21	0.38	0.878	47
Thailand	0.20	0.37	0.878	48
Italy	0.22	0.41	0.881	49
Bulgaria	0.20	0.37	0.885	50
France	0.24	0.47	0.896	51
Japan	0.21	0.48	0.924	52
AVERAGE	0.27	0.34		
IDEAL	1.00	0		

8. Euclidean Distance & Overall Rankings

The Euclidean Distance and ranking, opportunities and threats are shown in this table. Countries that are ranked lower Euclidean Distances have higher opportunities and low threats for MSF to fulfill their mission of medical care where there are large groups of the population that would benefit. This would possibly provide safer environments for the volunteers to operate.

Countries that are ranked high in the Euclidean Distance have lower opportunities and higher threat scores. These countries are more developed and have struggles but are countries that MSF could likely abandon their support for time being.

The most desirable places for MSF to continue operating are those that are low threat and high opportunity. These countries would allow MSF to function at its best and meet higher demands of the population for healthcare.



9. Recommendations and Conclusions

Médecins Sans Frontières (MSF), also known as Doctors Without Borders, is the largest non-governmental organization in the world providing humanitarian support. In reviewing 52 of the chosen countries for review it shows that Japan, France, Bulgaria, and Italy have good potential for withdrawal of support. They are developed countries, have healthcare systems, educational systems, and low political turmoil. Conversely, when looking at high opportunity scores and lower risk that you would consider remaining in Nigeria, India, Congo, South Africa and Eswatini. They are not as developed have large populations of rural and less educated people. Healthcare availability in these regions is less formalized and good healthcare would be in the big urban areas.

There is an outlier with China and though it is not currently recommended to withdraw due to the high opportunity score, it would be good to keep on a watch list of countries to pull from if there are increased threats.