

SUPPLEMENTAL DOCUMENT F:  
DAST Sensitivity Analysis

A Monte Carlo sensitivity analysis was performed to estimate the effect of the criteria weights on the target group rankings. The objective of this analysis was to determine the range of prioritization scores each population group received when the criteria weights were simultaneously altered.

**A. Inputs**

The inputs to the analysis are the criteria weights. Given the small number of experts that responded to the DAST survey, there is reasonable uncertainty regarding whether the importance of the weights was accurately measured. Furthermore, the criteria weights serve as the point value of each criterion; large differences in weights can lead to large differences in final prioritization scores.

We assumed the criteria weights follow a normal distribution, with the baseline value equaling the mean weight given by DAST respondents. The standard deviation was also determined by the DAST survey. Table 1 below reviews the model input values.

TABLE 1: Monte Carlo Sensitivity Analysis Inputs			
	Criteria	Baseline Value	Standard Deviation
1	Risk of Complication	6.63636364	2.1574396
2	Risk of Transmission	7.90909091	1.9725387
3	Risk of Infection	5.90909091	2.5477263
4	Vaccine Effectiveness	6.27272727	2.8316394
5	Provides DIRECT Emergency Response Service	8.81818182	1.0787198
6	Provides SUPPORT Emergency Response Service	7.09090909	1.4459976
7	Provides Essential Community Service	6.54545455	1.4396969

All of the criteria had some variability. The criteria with the largest standard deviation will cause the greatest fluctuation in the prioritization score forecast. In this case, vaccine effectiveness had the largest standard deviation (2.83) reflecting the greatest range in point values for this criterion. This was followed by risk of infection (2.55) and risk of complication (2.16). Provides Direct Emergency Response Service had the smallest variability (1.08) indicating that respondents assigned similar point values to this criterion.

**B. Outcomes**

***Prioritization Scores***

The multivariate Monte Carlo simulation varied all criteria weights simultaneously. This simulation was based on 1000 draws from the range of input variables specified in Table 1. Table 2 displays the results of this analysis, including prioritization score forecast (mean score), standard deviation, minimum, and maximum score produced.

**TABLE 2: Monte Carlo Sensitivity Analysis Results**

Target Population	Mean Score	Standard Deviation	Minimum Score	Maximum Score
1. People with Chronic Medical Conditions Ages 2 – 17	14.52	2.39	6.57	20.88
2. People with Chronic Medical Conditions Ages 18 – 64	13.90	2.32	6.32	20.04
3. People with Chronic Medical Conditions Ages 65+	14.53	2.45	6.82	20.89
4. Pregnant Women All Ages	16.52	2.59	9.26	23.13
5. Infants and Toddlers Ages 6-23 months	15.76	2.56	7.06	22.54
6. Household contacts of children <6 months Ages 2 – 17	11.42	2.66	4.07	17.27
7. Household contacts of children <6 months Ages 18 – 64	10.91	2.6	3.79	16.41
8. Household contacts of children <6 months Ages 65+	15.59	2.72	7.91	22.83
9. Household contacts of severely immunocompromised persons Ages 2 – 17	12.77	2.78	4.57	19.14
10. Household contacts of severely immunocompromised persons Ages 18 – 64	11.94	2.68	4.32	17.75
11. Household contacts of severely immunocompromised persons Ages 65+	16.86	2.85	8.44	24.44
12. General medical and surgical hospital setting – Medical Care Practitioners	32.87	3.78	21.31	42.7
13. General medical and surgical hospital setting – Medical Care Technicians and Aides	30.57	3.59	19.87	39.88
14. General medical and surgical hospital setting – Medical Scientists and Laboratory Technicians	23.03	2.88	15.03	30.67
15. General medical and surgical hospital setting – Mental Health and Social Service Providers	27.76	3.5	17.66	36.79
16. General medical and surgical hospital setting – Health Care System Support and General Support	18.97	2.81	11.33	26.01
17. Psychiatric and substance abuse hospitals – Medical Care Practitioners	30.69	3.6	19.71	39.95
18. Psychiatric and substance abuse hospitals – Medical Care Technicians and Aides	27.43	3.46	17.3	36.22
19. Psychiatric and substance abuse hospitals – Medical Scientists and Laboratory Technicians	17.77	2.63	10.32	24.69
20. Psychiatric and substance abuse hospitals – Mental Health and Social Service Providers	26.43	3.26	17.02	34.66
21. Psychiatric and substance abuse hospitals – Health Care System Support and General Support	15.58	2.64	8.62	21.78
22. Ambulatory Care Facilities setting – Medical Care Practitioners	32.89	3.78	21.31	42.73
23. Ambulatory Care Facilities setting – Medical Care Technicians and Aides	30.88	3.7	19.8	40.39
24. Ambulatory Care Facilities setting – Medical Scientists and Laboratory Technicians	22.21	2.81	14.45	29.65
25. Ambulatory Care Facilities setting – Mental Health and Social Service Providers	27.65	3.3	18.12	36.02
26. Ambulatory Care Facilities setting – Health Care System Support and General Support	16.84	2.73	9.45	23.33
27. Nursing and Residential Care Facilities setting – Medical Care Practitioners	32.35	3.77	20.83	42.15
28. Nursing and Residential Care Facilities setting – Medical Care Technicians and Aides	29.46	3.66	18.42	38.8
29. Nursing and Residential Care Facilities setting – Medical Scientists and Laboratory Technicians	19.14	2.67	11.62	26.18
30. Nursing and Residential Care Facilities setting – Mental Health and Social	27.13	3.35	17.19	35.57

**TABLE 2: Monte Carlo Sensitivity Analysis Results**

Target Population	Mean Score	Standard Deviation	Minimum Score	Maximum Score
Service Providers				
31. Nursing and Residential Care Facilities setting – Health Care System Support and General Support	16.46	2.76	8.87	23.08
32. Public Health Department – Pre-event Public Health Emergency Responders	26.94	3.20	17.91	35.51
33. Public Health Department – Event Oriented Public Health Emergency Responders	28.87	3.33	19.18	37.88
34. Public Health Department – Non-emergency Public Health Professionals	22.16	2.83	14.53	29.45
35. Commercial Health Industry – Medical and Diagnostic Laboratories	20.23	2.76	12.21	27.85
36. Commercial Health Industry – Medical and Pharmaceutical Manufacturing	18.68	2.65	11.11	25.7
37. Commercial Health Industry – Pharmacies	29.07	3.40	19.36	38.33
38. Commercial Health Industry – Other Health and Personal Care Stores	12.66	2.59	5.94	18.32
39. Commercial Health Industry – Death Care Services	21.05	3.02	12.60	28.55
40. Public Administration – Executive Offices	17.07	3.05	7.51	24.88
41. Public Administration – Legislative Bodies and Offices	14.50	2.50	7.75	20.38
42. Public Administration – Tribal Governments	14.14	2.48	7.45	19.91
43. Public Administration – Public Finance Services	16.46	2.57	9.43	22.8
44. Public Safety and Justice – Judicial and Legal Services	15.83	2.66	8.29	22.4
45. Public Safety and Justice – Police Protection/Law Enforcement	29.71	3.71	19.04	39.34
46. Public Safety and Justice – Fire Protection/EMT	31.60	3.78	20.43	41.41
47. Public Safety and Justice – Corrections	23.82	3.36	14.00	32.3
48. Public Safety and Justice – Emergency and Disaster Management	24.00	2.99	16.26	32.85
49. Agriculture Industry	9.31	2.41	2.91	14.59
50. Information Industry	12.62	2.45	5.9	18.2
51. Educational Services Industry	14.88	2.74	7.40	21.5
52. Financial and Insurance Services Industry	10.81	2.45	4.35	16.29
53. Community Services – Religious Organizations	14.61	2.76	7.31	20.91
54. Community Services – Emergency Relief Organizations	21.77	3.01	13.17	29.29
55. Community Services – Non-emergency Social Assistance Services	16.22	2.88	8.08	22.94
56. Transportation and Warehousing – Postal Services	10.04	2.41	3.97	15.12
57. Transportation and Warehousing – Air Rail Water Pipeline and Truck Transportation & Support Activities	11.05	2.42	4.82	16.41
58. Transportation and Warehousing – Transit and Ground Passenger Transport	13.92	2.65	6.98	19.81
59. Transportation and Warehousing – Couriers and Messengers	9.10	2.40	3.11	14.02
60. Transportation and Warehousing – Warehousing and Storage	8.59	2.37	2.43	13.29
61. Manufacturing – Food Manufacturing	9.11	2.41	2.75	14.32
62. Retail Trade – Food Beverage and Grocery Stores	14.51	2.70	7.12	20.73
63. Retail Trade – Gasoline Stations	10.52	2.43	4.34	15.63
64. Utility Industries	11.67	2.45	5.07	17.34
65. Waste Management and Remediation Services	9.49	2.39	3.20	14.58
66. Healthy Children Ages 2 - 5	15.33	2.61	6.64	22.15
67. Healthy Children Ages 6 -17	11.89	2.92	3.95	18.64

TABLE 2: Monte Carlo Sensitivity Analysis Results				
Target Population	Mean Score	Standard Deviation	Minimum Score	Maximum Score
68. Healthy Adults Ages 18 - 64	7.71	2.49	1.2	12.76
69. Healthy Adults Ages 65+	11.15	2.49	3.67	17.02

**Rankings**

The Monte Carlo simulation revealed that simultaneously varying the criteria weights over a range of plausible values has a small impact on the rankings. Sixteen target groups (23.2 percent of the total) changed their rank-order. The majority of these (11 target groups) moved only one spot. Three groups moved two spots, one group moved three spots, and one group moved four spots. The remaining groups had minor differences in their final prioritization score, but maintained their original rank. Table 3 shows the original DAST ranking, the forecasted ranking, and the difference between the two for the sixteen target groups which changed ranking.

TABLE 3: Changes in DAST Rankings				
#	Target Population	Original DAST Rank	Forecasted Rank	Difference
1	Public Administration – Executive Offices	34	30	+ 4
2	Pregnant Women, All Ages	30	33	- 3
3	People with Chronic Medical Conditions, Ages 2 – 17	43	45	- 2
4	Nursing and Residential Care Facilities setting – Health Care System Support and General Support	33	35	- 2
5	Public Safety and Justice – Judicial and Legal Services	39	37	+ 2
6	People with Chronic Medical Conditions Ages 18 – 64	49	50	- 1
7	People with Chronic Medical Conditions Ages 65+	45	44	+ 1
8	Infants and Toddlers Ages 6-23 months	37	38	- 1
9	Household contacts of children <6 months Ages 18 – 64	59	60	- 1
10	Household contacts of children <6 months Ages 65+	38	39	- 1
11	Public Administration – Public Finance Services	35	34	+ 1
12	Community Services – Religious Organizations	44	43	+ 1
13	Transportation and Warehousing – Air Rail Water Pipeline and Truck Transportation & Support Activities	60	59	+ 1
14	Transportation and Warehousing – Transit and Ground Passenger Transport	50	49	+ 1
15	Transportation and Warehousing – Couriers and Messengers	66	67	- 1
16	Manufacturing – Food Manufacturing	67	66	+ 1

**C. Discussion**

Conducting Monte Carlo analysis on the criteria weights shows that the DAST prioritization list is fairly robust. Meaning, using a plausible range of criteria weights in the DAST model will produce virtually the same prioritization list every time. However, this confidence in the DAST list should be viewed cautiously.

A number of factors could change the DAST prioritization list. First, if we were to ask the survey respondents to rate the relative importance of the criteria in a different way (thereby forcing a wider gap between the highest and lowest rank), the DAST prioritization list will surely change. Second, the criteria weights are not the only point of uncertainty in the DAST model. Other inputs including the “value of a dominant question” and the “average survey question answer” are also quite uncertain. Further analysis regarding how these inputs affect the model is necessary in order to truly test the robustness of the DAST prioritization list. This analysis will be conducted during the second round of DAST surveying.