

AUGUST 2018



WAP SCORING MECHANISM

LEBANON WATER SECTOR



Overlay weighted criteria

Total vulnerability of a site is being calculate according to 5 main criteria (Social, Water, Sanitation, Solid Waste and Environment). Each Criteria is divided into several sub-criteria which carry out its own weight as a part of the total vulnerability.

Sub criteria is then divided into several criterions where considered as indicators of vulnerability and related directly to questions in the inducted survey. Below is the table showing the weights of criterions.

Every Criterion is calculated according to a defined formula then multiplied by its weight to get their scores in terms of vulnerability. Some of formulas has limitations according to the situation of the site case. Restriction and limitation are mentioned when relevant.

Criteria	Sub-Criteria	Criterion	Criterion Weight	Sub-Criteria Weight
Social	Special Needs	Female-headed households	0.75	3
		Children	0.75	
		Elderly	0.75	
		Physically Disabled	0.75	
	Community Structures	WaSH Structure	1	2
		Community Structure	1	
	Crowdedness	Crowdedness (distance)	1	3
		Crowdedness (density)	2	
	Seasonality	Seasonality (quantity)	1	2
		Seasonality (duration)	1	
Water	Access	Water Storage Capacity	3	15
		Source type	12	
	Availability	Quantity when accessed	4	9
		Frequency of access	2	
		Seasonality	3	
	Quality	Fecal Coliform	4.5	6
		Turbidity	0.75	
Nitrates		0.75		
Sanitation	Access	Latrine access (structures)	9	12
		Latrine access (expansion)	3	
	Wastewater Disposal	Grey Water Disposal	2	11
		Black Water Disposal	3	
		Desludging (frequency)	3	
		Desludging (seasonality)	3	
	Treatment	On-site treatment	2	2
Solid Waste	Storage	Waste_storage_score	6	6
	Handling	Collection_waste_score	3	10
		Collection_freq_score	3	
		Cost_burden_score	4	
Environment	Vector	insects_score	2	4
		Rodents_score	2	
	Cleanliness	Littering_score	2.5	5.5
		Open_defecation_score	3	
	Location	Proximity_hazards_score	5	9.5
		Flooding_area_score	2.5	
Flooding_duration_score		2		



Social

When a site is maximum “social” vulnerable though the score is 100. Knowing that the social criteria carrying a weight equal to 10 from 100, the maximum social score will be 10. Below the table showing the formulas of each criterion (indicators) followed the restrictions considered if any.

	Weight	Criterion	Description
Social	10	Female_headed_score	#FemaleHeadedHouseholds/#Households 0 scores 0 40+ scores 100 Between 0 & 40 scores 0 to 100 (linear)
		Children_score	#Children/#Individuals 25- scores 0 75+ scores 100 Between 25 & 75 scores 0 to 100 (linear)
		Elderly_score	#Elderly/#Individuals 0 scores 0 10+ scores 100 Between 0 & 10 scores 0 to 100 (linear)
		Physically_disabled_score	#Disabled/#Individuals 0 scores 0 10+ scores 100 Between 0 & 10 scores 0 to 100 (linear)
		WaSH_structure_score	Selection Yes scores 0 No scores 100
		Community_structure_score	Selection Yes scores 0 No scores 100
		Crowdedness_distance_score	Selection Lessthan2 scores 100 2to4 scores 50 Morethan4 scores 0
		Crowdedness_density_score	#Households/#Shelters 100- scores 0 200+ scores 100 Between 100 & 200 scores 0 to 100 (linear)
		Seasonality_quantity_score	#SeasonallnHouseholds/#Households Between 0 & 100 scores 0 to 100 (linear)
		Seasonality_duration_score	#MonthsIn/6 Between 0 & 100 scores 0 to 100 (linear)
	10	Social_Score	Sum of All Above

Restrictions:

- 1- Division formulas are considered as ratios (%)
- 2- If number of households is equal to zero, then female headed score is equal to zero.
- 3- If number of households is equal to zero, then seasonality quantity criterion scores 100.
- 4- If the ration of #Months In divided by 6 is greater than 100, seasonality duration scores 100.

Water

When a site is maximum “water” vulnerable though the score is 100. Knowing that the water criteria carrying a weight equal to 30 from 100, the maximum water score will be 30. Water scoring is done on two phases. First phase is to calculate the scores of each criterion separately for each existing source. The 2nd phase is calculating the overall score of the existing sources by weighting each source according to quantity available. The 2nd phase include the addition of the criterion of water storage criterion. Below the table showing the formulas of each criterion (indicators) followed the restrictions considered if any.

1st Phase: repeated x times. X equal to number of existing sources.

	Weight	Criterion	Description
Water Source i	27	Source _i _type_score	Selection Public scores 0 Protected scores 10 Unprotected scores 50 All others score 100
		Quantity _i _score	#TotalTankLiters*LevelFilled/NumberofIndv 35- scores 100 140+ scores 0 Between 35 & 140 scores 100 to 0 (linear)
		Frequency _i _score	#TotalTankLiters*LevelFilled*TimesPerMonth/(NumberofIndv*30) 35- scores 100 140+ scores 0 Between 35 & 140 scores 100 to 0 (linear)
		Seasonality _i _score	#MonthsNotAccessible/6 Between 0 & 100 scores 0 to 100 (linear)
		Fecal_coliform _i _score	Entry 0 scores 0 10+ scores 100 Between 0 & 10 scores 0 to 100
		Turbidity _i _score	Entry 5- scores 0 10+ scores 100 Between 5 & 10 scores 0 to 100
		Nitrates _i _score	Entry 30- scores 0 45+ scores 100 Between 30 & 45 scores 0 to 100
		27	Source _i _score
	Weight _{source_i}	(calculator_watertanks _i)/(calculator_watertanks ₁ +calculator_watertanks ₂ +calculator_watertanks ₃ +calculator_watertanks ₄ +calculator_watertanks ₅)	



2nd Phase: calculating overall score for the existing score and adding it to water storage in order to get the water vulnerability score of a site.

Water	30	27	Sources_weighted_average	$(Source1_score * Weight_source1) + (Source2_score * Weight_source2) + (Source3_score * Weight_source3) + (Source4_score * Weight_source4) + (Source5_score * Weight_source5)$
		3	Water_storage_capacity	$\#TotalTankLiters / \#NumberOfIndv$ 35- scores 100 140+ scores 0 Between 35 & 140 scores 100 to 0 (linear)
		30	Water_Score	$(Sources_Weighted_Average) + (Water_Storage_Capacity)$

Restrictions:

- 1- If source of water is water trucking, bottled water, irrigation/drainage channel, river and or lake, no formulas are considered and the criterions scores as maximum.
- 2- If all sources don't contribute in filling existing tanks, the weights of sources are evenly distributed. (1/number of sources)
- 3- If not case #2, then weight of bottled water source is always equal to zero (will not interfere in vulnerability calculations).

Sanitation

When a site is maximum "sanitation" vulnerable though the score is 100. Knowing that the sanitation criteria carrying a weight equal to 25 from 100, the maximum sanitation score will be 25. Below the table showing the formulas of each criterion (indicators) followed the restrictions considered if any.

		Weight	Criterion	Description
Sanitation	25	9	Latrine_structures_score	$\#Households / (\#ImpUseLatrinesIn + \#ImpUseLatrinesOut)$ 1- scores 0 Otherwise: $\#Individuals / (\#ImpUseLatrinesIn + \#ImpUseLatrinesOut)$ 7- scores 0 15+ scores 100 Between 7 & 15 scores 0 to 100 (linear)
		3	Latrine_expansion_score	Selection Yes scores 0 No scores based on gap in #Latrines: $1 - (\#ImpUseLatrinesIn + \#ImpUseLatrinesOut) / \#Individuals / 7$ Between 0 & 100 scores 0 to 100 (linear)
		2	Grey_disposal_score	$(\#ConnectedAboveGround + \#ConnectedUncoveredPit + \#ConnectedChannel) / \#Shelters$ Between 0 & 100 scores 0 to 100 (linear)
		3	Black_disposal_score	$[(\#ConnectedAboveGround + \#ConnectedUncoveredPit_Channel_WaterBody) * 0.8 + (\#ConnectedCoveredPit) * 0.6 + (\#ConnectedCesspit) * 0.4 + (\#ConnectedSepticTank) * 0.2] / \#Shelters$ Between 0 & 100 scores 0 to 100 (linear)
		3	Desludging_freq_score	Selection 6month+ scores 10 4month scores 35 3month scores 50 2month scores 60 1month scores 75 2weeks scores 90 1week scores 100 NotAvailable scores 100 NotNeeded scores 0
		3	Desludging_season_score	$(\#LatrinesInaccessible / \#Latrines) * (\#Months / 12)$ Between 0 & 100 scores 0 to 100 (linear)
		2	On_site_treat_score	Selection Yes scores 0 No scores 100
		25	Sanitation_Score	Sum of all above

Restrictions:

- 1- If total number of improved and usable latrines is equal to zero, latrines structure should score 100.
- 2- If Desludging frequency is not needed or not available, desludging seasonality scores zero.



Solid Waste

When a site is maximum ‘Solid Waste’ vulnerable though the score is 100. Knowing that the solid waste criteria carrying a weight equal to 16 from 100, the maximum solid waste score will be 16. Below the table showing the formulas of each criterion (indicators) followed the restrictions considered if any.

	Weight	Criterion	Description
SolidWaste	16	6	Waste_storage_score 14*NumberofIndv/#TotalBinLiters Between 0 & 100 scores 0 to 100 (linear)
		3	Collection_waste_score Selection Yes-All of it scores 0 Yes-part of it scores 50 Nothing is collected scores 100
		3	Collection_freq_score Selection TwiceWeek scores 0 OnceWeek scores 10 OnceTwoWeeks scores 50 OnceMonth scores 75 LessOnceMonth scores 90
		4	Cost_burden_score Selection NGO scores 100 Residents scores 50 NoOne scores 0 I don't know scores 50
	16	SolidWaste_Score	Sum of All Above

Restrictions:

- 1- If total number of Bins is equal to zero, Waste storage should score 100.
- 2- If Collection Waste is “nothing is collected”, then collection frequency scores 100 and cost burden scores zero.

Environment

When a site is maximum “environment” vulnerable though the score is 100. Knowing that the environment criteria carrying a weight equal to 19 from 100, the maximum environment score will be 19. Below the table showing the formulas of each criterion (indicators) followed the restrictions considered if any.

	Weight	Criterion	Description
Environment	19	2	insects_score Selection NotAtAll scores 0 Negligible scores 10 Noticeable scores 50 Prevalent scores 100
		2	Rodents_score Selection NotAtAll scores 0 Negligible scores 10 Noticeable scores 50 Prevalent scores 100
		2.5	Littering_score Selection NotAtAll scores 0 Negligible scores 10 Noticeable scores 50 Prevalent scores 100
		3	Open_defecation_score Selection NotAtAll scores 0 Negligible scores 10 Noticeable scores 50 Prevalent scores 100
		5	Proximity_hazards_score Selection None scores 0 Others score 100
		2.5	Flooding_area_score Selection
		2	Flooding_duration_score HowManyTimes*HowManyDays/30 Between 0 & 100 scores 0 to 100 (linear)
	19	Environment_Score	Sum of All Above

Restrictions:

- 1- If Flooding area scores zero (selection = 0), then flooding duration should scores zero.

Total Vulnerability

When a site is maximum “WaSH” vulnerable though the score is 100. The total vulnerability is obtained by summation of the criteria scores multiplied by their weights. In another words, it is the summation of the 5 section scores as shown below.

	Weight	Criterion	Description
Total Score	100	Total_Score	Social_Score+Water_Score+Sanitation_Score+SolidWaste_Score+Environment_Score