

Figure S1. Rainfall (mm), maximum and minimum temperatures (°C), and reference evapotranspiration (mm) for the growing seasons 2019 and 2020.

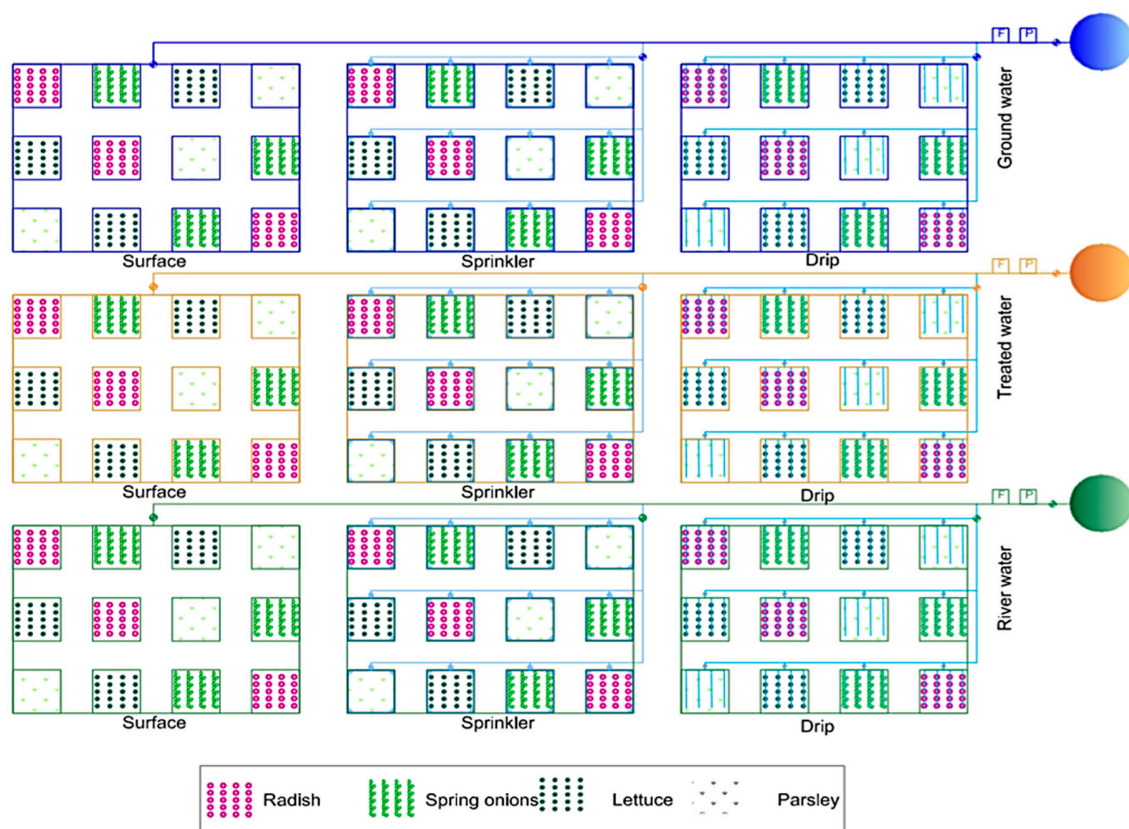


Figure S2. The experimental layout.

Table S1. Heavy metal maximum permissible limits in vegetable crops.

	Heavy metal concentration (mg/kg)				
	Cr	Ni	Zn	Cu	Cd
Maximum permissible limit—WHO =FAO, WHO (2011)	0.5	10	60	40	0.2

Table S2. Parameters used in the calculation of EDI, HRI, and THQ.

Parameters	Units	Values	Reference
Conversion factor (C_f)	-	0.085	(Rehman et al., 2019)
Daily food intake (D_{FI})—Adult	kg/day	0.345	(Amin et al., 2013)
Daily food intake (D_{FI})—Children	kg/day	0.232	(Amin et al., 2013)
Body weight (B_w)—Adult	kg	73.0	(Khan et al., 2008)
Body weight (B_w)—Children	kg	32.7	(Khan et al., 2008)
Exposure frequency (E_f)	days/year	350	(Qureshi et al., 2016; Yang et al., 2011)
Exposure duration (E_D)	years	70	(Abbasi et al., 2013; Yang et al., 2011)
Average exposure time (AT_n)	days/year	10950	(Abbasi et al., 2013; Yang et al., 2011)
Oral reference dose (RfD)			
Cd	mg/kg	0.001	(FAO/WHO, 2013; USEPA, 2013)
Cu	mg/kg	0.04	(FAO/WHO, 2013; USEPA, 2013)
Cr	mg/kg	0.025	(FAO/WHO, 2013; USEPA, 2013)
Ni	mg/kg	1	(FAO/WHO, 2013; USEPA, 2013)
Zn	mg/kg	0.3	(FAO/WHO, 2013; USEPA, 2013)

Table S3. Treated water categories as proposed by the Lebanese guidelines (FAO, 2011).

<p>Category I</p> <p>Fruit trees and crops that are eaten cooked</p> <p>Parks, public gardens, lawns, golf courses and other areas with direct public exposure</p> <p>Water treatment expected to meet the criteria: Secondary treatment + filtration + Disinfection.</p>
<p>Category II</p> <p>Fruit trees</p> <p>Lawns, wooded areas, and other areas with limited public access, road sides outside urban areas</p> <p>Landscape impoundments: ponds, water bodies and ornamental streams, where public contact with water is not allowed.</p> <p>Water treatment expected to meet the criteria: Secondary treatment + filtration + disinfection or Secondary treatment + either storage in well-designed series of maturation ponds or infiltration percolation.</p>
<p>Category III</p> <p>Irrigation of cereals and oleaginous seeds, fiber, & seed crops</p> <p>Crops for canning industry, industrial crops</p> <p>Fruit trees (except sprinkler-irrigated)</p> <p>Plant nurseries, ornamental nurseries, wooden areas, green areas with no access to the public</p> <p>Water treatment expected to meet the criteria: Secondary treatment + a few days' storage or Oxidation pond systems.</p>

Table S4. Effects of water sources, irrigation methods, and crops on health risk index.

Treatment	Cr (ppm)		Ni (ppm)		Zn (ppm)		Cu (ppm)		Cd (ppm)	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Water sources										
Groundwater	0.0054± 0.007	0.0114± 0.016 b	0.00002 ± 0.000 b	0.0000081± 0.00002	0.0011± 0.001 a	0.0001± 0.0002 a	0.2027± 0.272	0.0214± 0.053	0.00003 ± 0.000 b	0.000001± 0.000004
River— Litani	0.0046± 0.003	0.0185± 0.020 a	0.00005 ± 0.000 a	0.00001± 0.00004	0.0002± 0.0003 b	0.0001± 0.0001 b	0.0745± 0.058	0.0245± 0.057	0.00006± 0.000 a	0.00001± 0.00002
Treated water— Ablah	0.0061± 0.005	0.0076± 0.0007 c	0.00006 ± 0.0001 a	0.000009 ± 0.00002	0.0002± 0.0002 b	0.0001± 0.0001 c	0.0792 ± 0.073	0.0170± 0.044	0.00004± 0.000 ab	0.000003± 0.00001
Irrigation methods										
Drip	0.0074± 0.008	0.0096± 0.009 b	0.00005 ± 0.0001	0.000± 0.000 b	0.0008± 0.001	0.00009± 0.00009 b	0.1885 ± 0.273	0.000± 0.000 b	0.00005± 0.000	0.000003± 0.000 b
Sprinkler	0.0038± 0.003	0.0085± 0.007 b	0.00004 ± 0.000	0.000008± 0.0002 b	0.0004± 0.0008	0.0001± 0.0001 ab	0.0782 ± 0.084	0.0125± 0.043 b	0.00004± 0.000	0.000005± 0.00001 ab
Surface	0.0048± 0.003	0.193± 0.0023 a	0.00004 ± 0.000	0.00002± 0.00004 a	0.0004± 0.0007	0.0002± 0.0001 a	0.0897 ± 0.064	0.0505± 0.069 a	0.00004± 0.000	0.00001± 0.00002 a
Crops										
Parsley	0.0067± 0.004 b	0.0146± 0.017 a	0.00006± 0.000 a	0.00003± 0.00005 a	0.0007± 0.001 a	0.0002± 0.0002 a	0.01915± 0.218 a	0.0629± 0.073 a	0.00005± 0.000 a	0.00002 ± 0.00003 a
Lettuce	0.0031± 0.003 c	0.0038± 0.004 b	0.00003± 0.00001 b	0.0000003± 0.000001 b	0.0002± 0.0003 b	0.0001± 0.0001 c	0.0583± 0.048 b	0 ± 0 b	0.00003± 0.000 b	0 ± 0 b
Onion	0.01± 0.008 a	0.0162± 0.017 a	0.00007 ± 0.0001 a	0.00001± 0.00003 ab	0.001± 0.001 a	0.0001± 0.0001 b	0.1991± 0.225 a	0 ± 0 b	0.00006 ± 0.000 a	0 ± 0 b
Radish	0.0015± 0.001 d	0.0153± 0.018 a	0.00001 ± 0.000 c	0.0000± 0.000 b	0.0002± 0.0005 c	0.00009± 0.00007 c	0.0263± 0.016 c	0 ± 0 b	0.00002± 0.000 c	0 ± 0 b
Significance										
Water sources (W)	ns	***	*	ns	*	***	ns	ns	*	ns
Irrigation methods (I)	ns	*	ns	****	ns	*	ns	****	ns	**
W x I	ns	ns	ns	ns	ns	ns	*	***	ns	*
Crops (C)	****	****	****	****	****	****	****	****	****	****
C x W	*	****	*	***	ns	****	ns	***	ns	****
C x I	**	**	*	****	ns	ns	ns	****	ns	****
C x W x I	*	***	*	****	ns	***	*	****	ns	****

ns, *, **, ***, ****: Non significant, significant at $P \leq 0.05$, 0.01, 0.001, and 0.0001, respectively. Means followed by different letter in each column are significantly different according to the LSD test ($P = 0.05$).

Table S5. Effects of water sources, irrigation methods, and crops on target health quotient.

Treatment	Cr (ppm)		Ni (ppm)		Zn (ppm)		Cu (ppm)		Cd (ppm)	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Water sources										
Groundwater	0.4124± 0.270 b	0.6086± 0.366 b	0.0036± 0.002 b	0.0012± 0.002	0.0093± 0.006 a	0.0055± 0.029 a	0.0012± 0.0008 a	0.0002± 0.0004	0.0259± 0.000019 b	0.0017± 0.005 b
River—Litani	0.4375± 0.166 ab	0.8612± 0.504 a	0.007± 0.003 a	0.0018± 0.004	0.0053± 0.001 b	0.0044± 0.002 b	0.0009± 0.0004 ab	0.0002± 0.0005	0.0622± 0.00002 a	0.0164± 0.037 a
Treated water—Ablah	0.4449± 0.163 a	0.5237± 0.275 c	0.0072± 0.002 a	0.0011± 0.002	0.0054± 0.002 b	0.0042± 0.019 b	0.0008± 0.0003 b	0.0001± 0.0004	0.0704± 0.000031 a	0.0051± 0.018 ab
Irrigation methods										
Drip	0.4616± 0.273 ab	0.6934 ± 0.521 b	0.0062± 0.003	0.000± 0.00 b	0.0081± 0.006	0.0037± 0.001 b	0.0012± 0.0008 a	0.000± 0.00 b	0.0563± 0.026 a	0.000± 0.00 b
Sprinkler	0.3706± 0.129 b	0.5756± 0.261 c	0.0053± 0.003	0.001± 0.003 b	0.0056± 0.002	0.0049± 0.002 ab	0.0008± 0.0002 b	0.0001± 0.0003 b	0.0471± 0.032 b	0.0074± 0.025 ab
Surface	0.4626± 0.175 a	0.7245± 0.418 a	0.0062± 0.003	0.0032± 0.004 a	0.0064± 0.002	0.0054± 0.002 a	0.0009± 0.0003 a	0.0004± 0.0006 a	0.0550± 0.039 a	0.0159 ± 0.034 a
Crops										
Parsley	0.4968± 0.131 b	0.7504± 0.545 b	0.0069± 0.003 b	0.0037± 0.004 a	0.0086± 0.004 a	0.0063± 0.002 a	0.0013± 0.0006 a	0.0005± 0.0006 a	0.0593± 0.029 b	0.0311± 0.043 a
Lettuce	0.3362± 0.127 c	0.3607 ± 0.166 c	0.005± 0.002 c	0.0001± 0.0005 b	0.0049± 0.001 b	0.0036± 0.001 c	0.007± 0.17 b	0.007± 0 ± 0 b	0.0449± 0.024 c	0 ± 0 b
Onion	0.6116± 0.240 a	0.8007± 0.298 a	0.0084± 0.003 a	0.0018± 0.003 ab	0.0094± 0.005 a	0.0052± 0.002 b	0.0013± 0.0006 a	0.0013± 0 ± 0 b	0.0784± 0.037 a	0 ± 0 b
Radish	0.2817± 0.099 d	0.7462± 0.408 b	0.34.92± 0.001 d	0.000± 0.00b	0.0038± 0.001 c	0.0036± 0.001 c	0.005± 0.0001 c	0.005± 0 ± 0 b	0.0287± 0.017 d	0 ± 0 b
Significance										
Water sources (W)	ns	***	**	ns	*	**	*	ns	***	**
Irrigation methods (I)	*	***	ns	****	ns	*	*	****	*	**
W x I	*	*	**	**	**	ns	*	***	****	*
Crops (C)	****	****	****	***	****	****	****	****	****	****
C x W	****	****	****	***	ns	****	***	***	****	****
C x I	****	****	***	****	****	****	****	****	****	****
C x W x I	****	****	****	****	***	****	****	****	****	****

Ns, *, **, ***, ****: Non significant, significant at $P \leq 0.05$, 0.01, 0.001, and 0.0001, respectively. Means followed by different letter in each column are significantly different according to the LSD test ($P = 0.05$).

References

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