

Supplementary Material

## **Changes in Environmental Footprints Associated with Dietary Intake of Lebanese Adolescents between the Years 1997 and 2009**

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**Table S1.** Environmental footprints (water, energy and GHG) of various food groups per kg.

<b>Food Group</b>	<b>Food Group Components</b>	<b>Water L/kg</b>	<b>Energy MJ/kg</b>	<b>GHGs kg CO<sub>2</sub>eq/kg</b>
	Breads	507.968	16.1	0.86
Breads and Cereals	Cereals/cereal-based product	484.323	16.1	0.86
	Rice and rice-based dishes	1332.836	19.09	2.55
	Pasta, pasta-based dishes and noodles	521.339	17.77	1.33
	Bulgur, bulgur-based dishes and wheat-based dishes and foods	584.1	16.1	0.86
Meat	Meat/organ meat/meat-based traditional dishes/cured meat	8938.708	43	20.4
Poultry	Poultry/organs/poultry-based traditional dishes	3256.508	22	3.65
Fish	Seafood/seafood based dishes	1245.997	79.83	3.49
Eggs	Eggs/egg-based dishes	2709.95	11	3.46
Milk	Milk (non-sweetened)	547.744	31.73	3.7
Milk derivates	Dairy products	2308.813	5.8	0.406
	Yogurt-based dishes	920.586	5.8	0.406
Sweetened dairy products	Sweetened dairy products	740.93	31.73	3.8
Legumes	Legumes and legume-based dishes	2072.51	2.01	0.51
Starchy Vegetables	Starchy vegetables	248.7	0.5	0.12
	Salad and raw vegetables	228.261	21.47	1.401
Vegetables	Cooked vegetables/vegetable based traditional dishes	237.211	25.09	0.97
	Canned vegetables	259.997	20.704	1.468
Fruits	Mahashi (stuffed vegetables)	3468.613	29.663	7.91
	Fruits (not dried)	632.856	5.3	0.42
	Dried Fruits	3764.766	86.15	6.42
Fresh fruit juices	Fresh fruit juices	572.893	11.9	0.75
Nuts	Nuts /seeds	4942.693	5	0.42
Salty snacks	Salty snacks	1244.367	6	0.54
SSB	Sweetened fruit juices/beverages, fruit drinks	2855.683	92	4.85
	Regular soft drinks	626.992	13.71	0.434
Hot beverages	Tea/coffee/coffee with creamer	117.473	1	0.35
	Pastries, cakes and desserts	484.323	12.05	1.02
Sweets	Sugar, jams	631.91	8	0.71
	Candies/biscuits/wafers/chocolate bars, chocolate-based biscuits and wafer/cocoa powder	8897.743	51.38	3.08
	Traditional sweets	453.868	12.05	1.02
	Ice-cream	740.93	31.73	3.8
Fast food	Pizzas and pies	507.968	11.6	0.822
	Ready to eat sandwiches/burgers	3482.069	20.713	8.513
Added fats / oils	Olive oil/olives/avocado	4134.232	21.34	3.9
	Oil and salad dressings	1971.662	44	1.56
Soups / broth / condiments / Pickles /	Animal-based fat	4915.254	90	6.04
	Condiments (ex. mayonnaise), spices, and pickles	2303.026	32.9	2.78
	Soups/broth	481.732	23.002	18

Abbreviations: GHG: greenhouse gases; SSB: sugar-sweetened beverages.

**Table S2.** Daily environmental footprints contributed by various food groups according to survey years in the study population, Lebanon, 1997 and 2009 among adolescents aged 10–19 years.

Food Group	Water Use		Energy Use		GHG Emission	
	L/Day		MJ/Day		kg CO <sub>2</sub> eq/Day	
	1997	2009	1997	2009	1997	2009
Breads and Cereals	<b>113.65 ± 5.34</b>	<b>166.92 ± 9.29</b>	3.05 ± 0.12	<b>3.84 ± 0.16</b>	0.206 ± 0.01	<b>0.309 ± 0.018</b>
Meat	<b>423.29 ± 36.08</b>	<b>545.79 ± 42.26</b>	2.04 ± 0.17	<b>2.63 ± 0.2</b>	0.966 ± 0.082	<b>1.246 ± 0.096</b>
Poultry	<b>45.57 ± 7.18</b>	<b>98.3 ± 11.89</b>	0.31 ± 0.05	<b>0.66 ± 0.08</b>	0.051 ± 0.008	<b>0.11 ± 0.013</b>
Fish	<b>4.06 ± 1.55</b>	<b>13.32 ± 2.96</b>	0.26 ± 0.1	<b>0.85 ± 0.19</b>	0.011 ± 0.004	<b>0.037 ± 0.008</b>
Eggs	48.85 ± 5.29	41.81 ± 9.44	0.2 ± 0.02	0.17 ± 0.04	0.062 ± 0.007	0.053 ± 0.012
Milk	<b>30.12 ± 2.92</b>	<b>7.8 ± 1.3</b>	1.74 ± 0.17	<b>0.45 ± 0.08</b>	0.203 ± 0.02	<b>0.053 ± 0.009</b>
Milk Derivatives <sup>a</sup>	187.65 ± 12.68	175.12 ± 12.2	0.49 ± 0.03	0.48 ± 0.03	0.034 ± 0.002	0.034 ± 0.002
Sweetened Dairy Products	4.35 ± 1.25	5.48 ± 1.67	0.19 ± 0.05	0.23 ± 0.07	0.022 ± 0.006	0.028 ± 0.009
Legumes	77.56 ± 15.77	103.74 ± 14.07	0.08 ± 0.02	0.1 ± 0.01	0.019 ± 0.004	0.026 ± 0.003
Starchy Vegetables	12.02 ± 0.91	14.83 ± 1.13	0.02 ± 0	0.03 ± 0	0.006 ± 0	0.007 ± 0.001
Vegetables	122.1 ± 13.6	128.66 ± 15.39	4.13 ± 0.2	4.52 ± 0.31	0.394 ± 0.032	0.414 ± 0.037
Fruits	<b>118.85 ± 6.77</b>	<b>73.05 ± 4.94</b>	1.04 ± 0.07	<b>0.62 ± 0.04</b>	0.082 ± 0.005	<b>0.049 ± 0.003</b>
Fresh Fruit Juices	1.02 ± 0.74	2.03 ± 0.83	0.02 ± 0.02	0.04 ± 0.02	0.001 ± 0.001	0.003 ± 0.001
Nuts	45 ± 7.65	34.18 ± 6.31	0.05 ± 0.01	0.03 ± 0.01	0.004 ± 0.001	0.003 ± 0.001
Salty Snacks <sup>b</sup>	<b>11.74 ± 1.28</b>	<b>22.28 ± 1.79</b>	0.06 ± 0.01	<b>0.11 ± 0.01</b>	0.005 ± 0.001	<b>0.01 ± 0.001</b>
SSB <sup>c</sup>	276.24 ± 18.12	408.13 ± 21	7.7 ± 0.55	11.66 ± 0.66	0.352 ± 0.028	0.548 ± 0.034
Hot Beverages	<b>13.74 ± 1.02</b>	<b>9.86 ± 0.73</b>	0.12 ± 0.01	<b>0.08 ± 0.01</b>	0.041 ± 0.003	<b>0.029 ± 0.002</b>
Sweets	199.32 ± 16.44	278.22 ± 21.97	2.03 ± 0.13	2.16 ± 0.14	0.174 ± 0.011	0.159 ± 0.011
Fast Food	115.06 ± 11.89	133.24 ± 16.77	1.13 ± 0.09	1.37 ± 0.12	0.259 ± 0.029	0.298 ± 0.041
Added Fats/Oils	<b>35.34 ± 3.26</b>	<b>66.18 ± 5.72</b>	0.27 ± 0.02	<b>0.65 ± 0.05</b>	0.034 ± 0.003	<b>0.063 ± 0.006</b>
Soups/Broth/ Condiments/Pickles	20.45 ± 4.14	21.81 ± 2.9	0.34 ± 0.07	0.45 ± 0.07	0.08 ± 0.024	0.175 ± 0.05
TOTAL	<b>1908.28 ± 52.43</b>	<b>2358.17 ± 62.49</b>	<b>25.31 ± 0.7</b>	<b>31.32 ± 0.91</b>	<b>3.01 ± 0.1</b>	<b>3.66 ± 0.13</b>

Abbreviations: GHG: greenhouse gases; SSB: sugar-sweetened beverages. Data are expressed as mean ± standard error (SE). Differences among group means were tested by independent sample *t*-test. Numbers in bold are statistically significant (*p*-value ≤ 0.05). <sup>a</sup> Including dairy products and yoghurt based dishes. <sup>b</sup> Including chips, salty crackers, popcorn. <sup>c</sup> Including sweetened fruit juices/beverages, fruit drinks and regular soft drinks. <sup>d</sup> Ready to eat sandwiches, burgers, pizzas and pies.

**Table S3.** Linear regression for the association between environmental footprint (EFP, water), survey year and sociodemographic characteristics among Lebanese adolescents.

Sociodemographic Characteristics	Water Use (L/1000 Kcal/day)					
	Model 1 (Crude)			Model 2		
	Coef.	95% CI	p-value	Coef.	95% CI	p-value
<b>Survey year</b> <sup>a</sup> 2009	452.56	(289.47; 615.64)	<0.001	267.7	(123.5; 411.91)	<0.001
<b>Age (years)</b>	35.3	(3.57; 67.02)	0.029	16.86	(-10.08; 43.8)	0.220
<b>Energy</b>	1.03	(0.94; 1.12)	<0.001	0.95	(0.85; 1.05)	<0.001
<b>Sex</b> <sup>b</sup> Females	-629.55	(-790.42; -468.69)	<0.001	-117.94	(-266.96; 31.08)	0.121
<b>Governorate</b> <sup>c</sup>						
Bekaa	-190.1	(-433.57; 53.38)	0.126	-32.95	(-237.49; 171.59)	0.752
North	-245.11	(-469.24; -20.98)	0.032	-334.41	(-521.52; -147.29)	<0.001
South	-470.75	(-703.15; -238.35)	<0.001	-242.64	(-442.56; -42.73)	0.017
<b>Mother's education level</b> <sup>d</sup>						
High school or Technical diploma	356.66	(166.33; 546.99)	<0.001	82.62	(-90.32; 255.56)	0.349
University or more	504.73	(273.15; 736.31)	<0.001	328.85	(96.57; 561.13)	0.006
<b>Father's education level</b> <sup>d</sup>						
High school or Technical diploma	9.92	(-205.81; 225.64)	0.928	18.64	(-161.52; 198.79)	0.839
University or more	216.77	(1.05; 432.5)	0.049	-24.79	(-236.11; 186.53)	0.818
<b>Crowding Index</b> <sup>e</sup> ≥2 persons/room	-89.82	(-285.3; 105.66)	0.367			
<b>BMI category</b> <sup>f</sup>						
Overweight	108.5	(-95.96; 312.95)	0.298			
Obese	188.2	(-111.48; 487.87)	0.218			

<sup>a</sup> Compared to 1997. <sup>b</sup> Compared to males. <sup>c</sup> Compared to Beirut and Mount Lebanon. <sup>d</sup> Compared to intermediate level or less. <sup>e</sup> Compared to <2 persons/room. <sup>f</sup> Compared to normal weight/underweight.

**Table S4.** Linear regression for the association between EFP (Energy), survey year and sociodemographic characteristics among Lebanese adolescents.

Sociodemographic Characteristics	Energy Use (MJ / 1000 Kcal/Day)					
	Model 1 (Crude)			Model 2		
	Coef.	95% CI	p-value	Coef.	95% CI	p-value
<b>Survey year</b> <sup>a</sup> 2009	6.07	(3.75; 8.38)	<0.001	4.3	(2.09; 6.52)	<0.001
<b>Age (years)</b>	0.47	(0.02; 0.92)	0.043	0.14	(-0.27; 0.56)	0.492
<b>Energy</b>	0.0127	(0.0114; 0.0140)	<0.001	0.0117	(0.0101; 0.0132)	<0.001
<b>Sex</b> <sup>b</sup> Females	-8.03	(-10.32; -5.73)	<0.001	-1.42	(-3.71; 0.87)	0.225
<b>Governorate</b> <sup>c</sup>						
Bekaa	-1.48	(-4.94; 1.97)	0.400	0.59	(-2.55; 3.74)	0.712
North	-2.54	(-5.72; 0.64)	0.117	-3.39	(-6.27; -0.51)	0.021
South	-5.88	(-9.17; -2.58)	<0.001	-3.05	(-6.12; 0.03)	0.052
<b>Mother's education level</b> <sup>d</sup>						
High school or Technical diploma	4.37	(1.64; 7.1)	0.002	0.51	(-2.15; 3.17)	0.708
University or more	4.91	(1.59; 8.24)	0.004	1	(-2.57; 4.57)	0.584
<b>Father's education level</b> <sup>d</sup>						
High school or Technical diploma	0.59	(-2.51; 3.69)	0.707	1.33	(-1.44; 4.1)	0.346
University or more	4.52	(1.42; 7.62)	0.004	3.28	(0.03; 6.53)	0.048
<b>Crowding Index</b> <sup>e</sup> ≥2 persons/room	0.0043	(-2.7776; 2.7689)	0.998			
<b>BMI category</b> <sup>f</sup>						
Overweight	3.37	(0.48; 6.26)	0.023			
Obese	2.13	(-2.11; 6.38)	0.324			

<sup>a</sup> Compared to 1997. <sup>b</sup> Compared to males. <sup>c</sup> Compared to Beirut and Mount Lebanon. <sup>d</sup> Compared to intermediate level or less. <sup>e</sup> Compared to <2 persons/room. <sup>f</sup> Compared to normal weight/underweight.

**Table S5.** Linear regression for the association between EFP (GHG), survey year and sociodemographic characteristics among Lebanese adolescents.

Sociodemographic Characteristics	GHG Emission (kg CO <sub>2</sub> eq/1000 Kcal/Day)					
	Model 1 (Crude)			Model 2		
	Coef.	95% CI	p-value	Coef.	95% CI	p-value
<b>Survey year</b> <sup>a</sup> 2009	0.65	(0.32; 0.97)	<0.001	0.44	(0.11; 0.77)	0.009
<b>Age (years)</b>	0.057	(-0.006; 0.12)	0.078	0.028	(-0.033; 0.09)	0.366
<b>Energy</b>	0.001	(0.001; 0.002)	<0.001	0.001	(0.001; 0.002)	<0.001
<b>Sex</b> <sup>b</sup> Females	-1.165	(-1.48; -0.84)	<0.001	-0.451	(-0.79; -0.11)	0.009
<b>Governorate</b> <sup>c</sup>						
Bekaa	-0.241	(-0.72; 0.24)	0.328	0.06	(-0.41; 0.52)	0.813
North	-0.602	(-1.05; -0.16)	0.008	-0.72	(-1.14; -0.30)	0.001
South	-0.962	(-1.42; -0.5)	<0.001	-0.63	(-1.09; -0.17)	0.007
<b>Mother's education level</b> <sup>d</sup>						
High school or Technical diploma	0.504	(0.12; 0.89)	0.010	0.141	(-0.25; 0.53)	0.484
University or more	0.98	(0.51; 1.45)	<0.001	0.68	(0.15; 1.21)	0.012
<b>Father's education level</b> <sup>d</sup>						
High school or Technical diploma	0.006	(-0.431; 0.443)	0.979	0.001	(-0.41; 0.41)	0.996
University or more	0.53	(0.09; 0.97)	0.017	0.015	(-0.47; 0.49)	0.950
<b>Crowding Index</b> <sup>e</sup> ≥2 persons/room	-0.12	(-0.51; 0.26)	0.539			
<b>BMI category</b> <sup>f</sup>						
Overweight	0.14	(-0.27; 0.55)	0.500			
Obese	0.123	(-0.47; 0.72)	0.684			

Abbreviations: GHG: greenhouse gases. <sup>a</sup> Compared to 1997. <sup>b</sup> Compared to males. <sup>c</sup> Compared to Beirut and Mount Lebanon. <sup>d</sup> Compared to intermediate level or less. <sup>e</sup> Compared to <2 persons/room. <sup>f</sup> Compared to normal weight/underweight.