

Simple dietary substitutions can reduce carbon footprints and improve dietary quality across diverse segments of the US population

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Online Supplementary Materials

Contents

Supplementary Table 1. Sample characteristics, overall and among those simulated to have a protein, mixed dish, milk or dairy, or non-alcoholic beverage substitution

Supplementary Table 2. Descriptions of high-carbon-impact protein foods and their lower-carbon-impact substitutes

Supplementary Table 3. Descriptions of high-carbon-impact mixed dishes and their lower-carbon-impact substitutes

Supplementary Table 4. Descriptions of high-carbon-impact milk and dairy items and their substitutes

Supplementary Table 5. Descriptions of high-carbon-impact non-alcoholic beverages and their lower-carbon-impact substitutes

Supplementary Table 6. Impact of protein, mixed dish, milk and dairy, and beverage substitutions on dietary carbon footprint, secondary analyses examining replacing high-carbon-impact foods with the highest-carbon-intensity lower-carbon-impact substitutes

Supplementary Table 7. Changes in personal dietary carbon footprint and overall dietary quality after protein, mixed dish, milk and dairy, and beverage substitutions, by age group

Supplementary Table 8. Changes in personal dietary carbon footprint and overall dietary quality after protein, mixed dish, milk and dairy, and beverage substitutions, by gender

Supplementary Table 9. Changes in personal dietary carbon footprint and overall dietary quality after protein, mixed dish, milk and dairy, and beverage substitutions, by race/ethnicity

Supplementary Table 10. Impact of protein, mixed dish, milk and dairy, and beverage substitutions on Healthy Eating Index component scores and nutrient intakes among those with substitutions, primary analyses

Supplementary Table 11. Impact of protein, mixed dish, milk and dairy, and beverage substitutions on dietary quality among those with substitutions, secondary analyses examining replacing high-carbon-impact foods with the highest-carbon-intensity lower-carbon-impact substitutes

Supplementary Table 12. 47 protein foods that were highest ranked on overall dietary GHGE impact and on consumed intensity of GHGE

Supplementary Table 13. 26 mixed dishes that were highest ranked on overall dietary GHGE impact and on consumed intensity of GHGE

Supplementary Table 14. 60 milk and dairy foods that were highest ranked on overall dietary GHGE impact and on consumed intensity of GHGE

Supplementary Table 15. 55 non-alcoholic beverages that were highest ranked on overall dietary GHGE impact and on consumed intensity of GHGE

Supplementary Figure 1. Contribution of population subgroups to changes in total dietary carbon footprint (i.e., scaled to the entire US population) after protein, mixed dish, milk and dairy, and beverage substitutions

Supplementary Table 1. Sample characteristics, overall and among those simulated to have a protein, mixed dish, milk or dairy, or non-alcoholic beverage substitution

Sample characteristic	Overall sample n=7,753	Had a protein substitution n=1,281		Had a mixed dish substitution n=1,653		Had a milk or dairy substitution n=3,534		Had a non-alcoholic beverage substitution n=1,614	
	%	%	p-value	%	p-value	%	p-value	%	p-value
Gender									
Female	51.5	48.2	0.151	42.2	<0.001	51.8	0.658	55.3	0.012
Male	48.5	51.8		57.8		48.2		44.7	
Age in years									
2-5	4.4	3.1	0.009	3.7	0.493	7.9	<0.001	8.9	<0.001
6-11	7.3	5.5		8.4		11.2		9.7	
12-17	9.2	7.3		9.3		11.0		9.1	
18-25	9.7	7.1		10.8		7.1		9.2	
26-39	18.9	19.6		18.3		14.1		18.3	
40-49	13.9	15.4		14.8		12.9		14.1	
50-59	14.5	17.5		14.0		13.0		13.2	
60+	22.1	24.6		20.7		22.7		17.5	
Race/ethnicity									
Non-Hispanic White	62.9	64.7	0.444	63.2	0.002	66.5	<0.001	56.9	0.012
Non-Hispanic Black	11.7	10.1		11.9		7.5		13.1	
Mexican American / Other Hispanic	16.8	16.1		19.2		16.8		20.8	
Non-Hispanic Asian	4.7	4.7		2.4		4.9		5.5	
Other race/ethnicity	4.0	4.5		3.3		4.2		3.7	
Highest education attainment in household									
Less than high school	11.9	9.4	0.067	12.6	0.010	12.3	0.072	11.8	<0.001
High school graduate or GED	16.4	17.6		18.3		14.9		11.9	
Some college	32.9	37.1		35.7		32.0		32.1	
College degree or higher	38.8	35.9		33.4		40.8		44.1	
Income to poverty ratio									
Missing income	6.4	6.3	0.431	4.5	0.107	6.8	0.924	6.8	0.274
<1.0	14.1	14.0		14.3		13.7		14.8	
1.0 to <2.0	19.7	17.2		21.7		19.7		20.0	
2.0 to <5.0	37.1	37.5		38.2		37.2		33.0	
5.0 or higher	22.8	24.9		21.4		22.6		25.4	

Note. The proportions shown here account for NHANES sample weights. Income to poverty ratio is the total family income divided by the poverty threshold. *P*-values are from Pearson Chi-Squared tests (corrected for survey design), comparing participants simulated to make dietary substitutions to those without simulated substitutions.

Supplementary Table 2. Descriptions of high-carbon-impact protein foods and their lower-carbon-impact substitutes

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
21000100	Beef, NS as to cut, cooked, NS as to fat eaten	4.21	24100000	Chicken, NS as to part and cooking method, NS as to skin eaten	0.51	24100000	Chicken, NS as to part and cooking method, NS as to skin eaten	0.51
21000110	Beef, NS as to cut, cooked, lean and fat eaten	4.21	24100010	Chicken, NS as to part and cooking method, skin eaten	0.51	24100010	Chicken, NS as to part and cooking method, skin eaten	0.51
21000120	Beef, NS as to cut, cooked, lean only eaten	4.21	24100020	Chicken, NS as to part and cooking method, skin not eaten	0.51	24100020	Chicken, NS as to part and cooking method, skin not eaten	0.51
21003000	Beef, NS as to cut, fried, NS to fat eaten	4.10	24107070	Chicken, NS as to part, fried, coated, skin / coating eaten	0.38	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49
21101000	Beef steak, NS as to cooking method, NS as to fat eaten	4.21	24100000	Chicken, NS as to part and cooking method, NS as to skin eat	0.51	24100000	Chicken, NS as to part and cooking method, NS as to skin eat	0.51
21101010	Beef steak, NS as to cooking method, lean and fat eaten	4.21	24100010	Chicken, NS as to part and cooking method, skin eaten	0.51	24100010	Chicken, NS as to part and cooking method, skin eaten	0.51
21101020	Beef steak, NS as to cooking method, lean only eaten	4.21	24100020	Chicken, NS as to part and cooking method, skin not eaten	0.51	24100020	Chicken, NS as to part and cooking method, skin not eaten	0.51
21101110	Beef steak, broiled or baked, NS as to fat eaten	4.21	24102000	Chicken, NS as to part, baked, broiled, or roasted, NS as to skin eaten	0.51	24102000	Chicken, NS as to part, baked, broiled, or roasted, NS as to skin eaten	0.51
21101120	Beef steak, broiled or baked, lean and fat eaten	4.21	24102010	Chicken, NS as to part, baked, broiled, or roasted, skin eaten	0.51	24102010	Chicken, NS as to part, baked, broiled, or roasted, skin eaten	0.51
21101130	Beef steak, broiled or baked, lean only eaten	4.21	24102020	Chicken, NS as to part, baked, broiled, or roasted, skin not eaten	0.51	24102020	Chicken, NS as to part, baked, broiled, or roasted, skin not eaten	0.51
21102110	Beef steak, fried, NS as to fat eaten	4.11	24107070	Chicken, NS as to part, fried, coated, skin / coating eaten	0.38	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49
21102120	Beef steak, fried, lean and fat eaten	4.11	24107070	Chicken, NS as to part, fried, coated, skin / coating eaten	0.38	24107070	Chicken, NS as to part, fried, coated, skin / coating eaten	0.38

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
21102130	Beef steak, fried, lean only eaten	4.10	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49
21103120	Beef steak, breaded or floured, baked or fried, lean and fat	3.14	24107070	Chicken, NS as to part, fried, coated, skin / coating eaten	0.38	24107070	Chicken, NS as to part, fried, coated, skin / coating eaten	0.38
21103130	Beef steak, breaded or floured, baked or fried, lean only ea	3.13	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49
21104110	Beef steak, battered, fried, NS as to fat eaten	3.22	24107070	Chicken, NS as to part, fried, coated, skin / coating eaten	0.38	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49
21104130	Beef steak, battered, fried, lean only eaten	3.20	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49	24107071	Chicken, NS as to part, fried, coated, skin / coating not eaten	0.49
21105110	Beef steak, braised, NS as to fat eaten	4.21	22210350	Pork, tenderloin, braised	0.79	22210350	Pork, tenderloin, braised	0.79
21105120	Beef steak, braised, lean and fat eaten	4.21	22210350	Pork, tenderloin, braised	0.79	22210350	Pork, tenderloin, braised	0.79
21105130	Beef steak, braised, lean only eaten	4.21	22210350	Pork, tenderloin, braised	0.79	22210350	Pork, tenderloin, braised	0.79
21301000	Beef, oxtails, cooked	4.21	24143220	Chicken drumstick, stewed, skin not eaten	0.51	24143220	Chicken drumstick, stewed, skin not eaten	0.51
21304110	Beef, shortribs, cooked, lean and fat eaten	4.21	22701010	Pork, spareribs, cooked, lean and fat eaten	0.79	22701010	Pork, spareribs, cooked, lean and fat eaten	0.79
21304120	Beef, shortribs, cooked, lean only eaten	4.21	22701020	Pork, spareribs, cooked, lean only eaten	0.79	22701020	Pork, spareribs, cooked, lean only eaten	0.79
21304210	Beef, shortribs, barbecued, with sauce, lean and fat eaten	3.14	22701040	Pork, spareribs, barbecued, with sauce, lean and fat eaten	0.56	22701040	Pork, spareribs, barbecued, with sauce, lean and fat eaten	0.56
21304220	Beef, shortribs, barbecued, with sauce, lean only eaten	2.46	22701050	Pork, spareribs, barbecued, with sauce, lean only eaten	0.56	22701050	Pork, spareribs, barbecued, with sauce, lean only eaten	0.56
21401000	Beef, roast, roasted, NS as to fat eaten	4.21	24201330	Turkey, light and dark meat, roasted, skin eaten	0.40	22400100	Pork roast, NS as to cut, cooked, NS as to fat eaten	0.79
21401110	Beef, roast, roasted, lean and fat eaten	4.21	24201330	Turkey, light and dark meat, roasted, skin eaten	0.40	22400110	Pork roast, NS as to cut, cooked, lean and fat eaten	0.79

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
21401120	Beef, roast, roasted, lean only eaten	4.21	24201320	Turkey, light and dark meat, roasted, skin not eaten	0.40	22400120	Pork roast, NS as to cut, cooked, lean only eaten	0.79
21407000	Beef, pot roast, braised or boiled, NS as to fat eaten	4.21	22210350	Pork, tenderloin, braised	0.79	22210350	Pork, tenderloin, braised	0.79
21407110	Beef, pot roast, braised or boiled, lean and fat eaten	4.21	22210350	Pork, tenderloin, braised	0.79	22210350	Pork, tenderloin, braised	0.79
21407120	Beef, pot roast, braised or boiled, lean only eaten	4.21	22210350	Pork, tenderloin, braised	0.79	22210350	Pork, tenderloin, braised	0.79
21416000	Corned beef, cooked, NS as to fat eaten	4.15	25230800	Turkey ham, prepackaged or deli, luncheon meat	0.35	22311000	Ham, smoked or cured, cooked, NS as to fat eaten	0.79
21416110	Corned beef, cooked, lean and fat eaten	4.15	25230800	Turkey ham, prepackaged or deli, luncheon meat	0.35	22311010	Ham, smoked or cured, cooked, lean and fat eaten	0.79
21416120	Corned beef, cooked, lean only eaten	4.17	25230800	Turkey ham, prepackaged or deli, luncheon meat	0.35	22311010	Ham, smoked or cured, cooked, lean and fat eaten	0.79
21416150	Corned beef, canned, ready-to-eat	4.17	24198570	Chicken, canned, meat only	0.50	25230530	Ham and pork, canned luncheon meat, chopped, minced, pressed	0.76
21417100	Beef brisket, cooked, NS as to fat eaten	4.21	24100000	Chicken, NS as to part and cooking method, NS as to skin eaten	0.51	22411010	Pork roast, shoulder, cooked, lean and fat eaten	0.79
21417110	Beef brisket, cooked, lean and fat eaten	4.21	24100010	Chicken, NS as to part and cooking method, skin eaten	0.51	22411010	Pork roast, shoulder, cooked, lean and fat eaten	0.79
21417120	Beef brisket, cooked, lean only eaten	4.21	24100020	Chicken, NS as to part and cooking method, skin not eaten	0.51	22411020	Pork roast, shoulder, cooked, lean only eaten	0.79
21420100	Beef, sandwich steak, flaked, formed, thinly sliced	4.21	25230320	Chicken, prepackaged or deli, luncheon meat	0.46	25230210	Ham, prepackaged or deli, luncheon meat	0.78
21500100	Ground beef, cooked	4.21	24207000	Turkey, ground	0.40	24198720	Chicken, ground	0.51
21500310	Ground beef patty, cooked	4.21	41811890	Vegetarian burger or patty, meatless, no bun	0.20	24198720	Chicken, ground	0.51
21602100	Beef jerky	5.40	22002800	Pork jerky	4.73	22002800	Pork jerky	4.73
23000100	Lamb, NS as to cut, cooked	4.75	24100000	Chicken, NS as to part and cooking method, NS as to skin eaten	0.51	22000100	Pork, NS as to cut, cooked, NS as to fat eaten	0.79

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
23101000	Lamb chop, NS as to cut, cooked, NS as to fat eaten	4.75	24100000	Chicken, NS as to part and cooking method, NS as to skin eaten	0.51	22101000	Pork chop, NS as to cooking method, NS as to fat eaten	0.79
23101010	Lamb chop, NS as to cut, cooked, lean and fat eaten	4.75	24100010	Chicken, NS as to part and cooking method, skin eaten	0.51	22101010	Pork chop, NS as to cooking method, lean and fat eaten	0.79
23101020	Lamb chop, NS as to cut, cooked, lean only eaten	4.75	24100020	Chicken, NS as to part and cooking method, skin not eaten	0.51	22101020	Pork chop, NS as to cooking method, lean only eaten	0.78
23104020	Lamb, loin chop, cooked, lean only eaten	4.75	24100020	Chicken, NS as to part and cooking method, skin not eaten	0.51	22401020	Pork roast, loin, cooked, lean only eaten	0.79
23110000	Lamb, ribs, cooked, lean only eaten	4.75	22701020	Pork, spareribs, cooked, lean only eaten	0.79	22701020	Pork, spareribs, cooked, lean only eaten	0.79
23110050	Lamb, ribs, cooked, lean and fat eaten	4.75	22701010	Pork, spareribs, cooked, lean and fat eaten	0.79	22701010	Pork, spareribs, cooked, lean and fat eaten	0.79
23120100	Lamb, roast, cooked, NS as to fat eaten	4.75	24102000	Chicken, NS as to part, baked, broiled, or roasted, NS as to skin eaten	0.51	22400100	Pork roast, NS as to cut, cooked, NS as to fat eaten	0.79
23120110	Lamb, roast, cooked, lean and fat eaten	4.75	24102010	Chicken, NS as to part, baked, broiled, or roasted, skin eaten	0.51	22400110	Pork roast, NS as to cut, cooked, lean and fat eaten	0.79
23120120	Lamb, roast, cooked, lean only eaten	4.75	24102020	Chicken, NS as to part, baked, broiled, or roasted, skin not eaten	0.51	22400120	Pork roast, NS as to cut, cooked, lean only eaten	0.79
23132000	Lamb, ground or patty, cooked	4.75	24207000	Turkey, ground	0.40	24198720	Chicken, ground	0.51
25210110	Frankfurter, wiener, or hot dog, NFS	1.24	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40
25210150	Frankfurter or hot dog, cheese-filled	1.34	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40
25210210	Frankfurter or hot dog, beef	3.62	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40
25210220	Frankfurter or hot dog, beef and pork	2.58	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
25210240	Frankfurter or hot dog, beef and pork, reduced fat or light	2.58	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40
25210250	Frankfurter or hot dog, meat and poultry, fat free	0.66	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40
25210280	Frankfurter or hot dog, meat and poultry	1.74	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40
25220105	Beef sausage	3.64	25221830	Turkey or chicken sausage	0.45	25221830	Turkey or chicken sausage	0.45
25220106	Beef sausage, reduced fat	3.61	25221860	Turkey or chicken sausage, reduced fat	0.40	25221860	Turkey or chicken sausage, reduced fat	0.40
25220108	Beef sausage, reduced sodium	3.64	25221855	Turkey or chicken sausage, reduced sodium	0.45	25221855	Turkey or chicken sausage, reduced sodium	0.45
25220150	Beef sausage with cheese	3.43	25221830	Turkey or chicken sausage	0.45	25221830	Turkey or chicken sausage	0.45
25220350	Bratwurst	0.71	25221830	Turkey or chicken sausage	0.45	25221830	Turkey or chicken sausage	0.45
25220360	Bratwurst, with cheese	0.72	25221830	Turkey or chicken sausage	0.45	25221830	Turkey or chicken sausage	0.45
25221215	Pastrami, NFS	4.09	25230780	Turkey, prepackaged or deli, luncheon meat	0.36	25230320	Chicken, prepackaged or deli, luncheon meat	0.46
25221500	Salami, NFS	2.67	25230780	Turkey, prepackaged or deli, luncheon meat	0.36	25230210	Ham, prepackaged or deli, luncheon meat	0.78
25221505	Salami, made from any type of meat, reduced fat	2.66	25230780	Turkey, prepackaged or deli, luncheon meat	0.36	25230210	Ham, prepackaged or deli, luncheon meat	0.78
25221515	Salami, made from any type of meat, reduced sodium	2.67	25230785	Turkey, prepackaged or deli, luncheon meat, reduced sodium	0.36	25230220	Ham, prepackaged or deli, luncheon meat, reduced sodium	0.79
25221810	Thuringer	3.36	25221830	Turkey or chicken sausage	0.45	25221830	Turkey or chicken sausage	0.45
25231110	Beef, prepackaged or deli, luncheon meat	3.74	25230780	Turkey, prepackaged or deli, luncheon meat	0.36	25230210	Ham, prepackaged or deli, luncheon meat	0.78
26305110	Crab, cooked, NS as to cooking method	5.13	26137110	Salmon, cooked, NS as to cooking method	0.26	26303110	Clams, cooked, NS as to cooking method	0.53
26305120	Crab, baked or broiled, fat added in cooking	4.85	26137121	Salmon, baked or broiled, made with butter	0.29	26213120	Squid, baked or broiled, fat added in cooking	0.52
26305130	Crab, coated, baked or broiled, fat added in cooking	2.76	26137130	Salmon, coated, baked or broiled, made with oil	0.25	26158021	Tilapia, coated, baked or broiled, made with butter	0.54
26305160	Crab, hard shell, steamed	5.13	26137160	Salmon, steamed or poached	0.26	26313160	Mussels, steamed or poached	0.53

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
26311110	Lobster, cooked, NS as to cooking method	5.13	26137110	Salmon, cooked, NS as to cooking method	0.26	26303110	Clams, cooked, NS as to cooking method	0.53
26311120	Lobster, baked or broiled, fat added in cooking	4.98	26137121	Salmon, baked or broiled, made with butter	0.29	26213120	Squid, baked or broiled, fat added in cooking	0.52
26319110	Shrimp, cooked, NS as to cooking method	5.13	26137110	Salmon, cooked, NS as to cooking method	0.26	26158000	Tilapia, cooked, NS as to cooking method	0.49
26319120	Shrimp, baked or broiled, made with oil	4.96	26137120	Salmon, baked or broiled, made with oil	0.26	26109120	Cod, baked or broiled, made with oil	0.49
26319121	Shrimp, baked or broiled, made with butter	4.98	26137121	Salmon, baked or broiled, made with butter	0.29	26109121	Cod, baked or broiled, made with butter	0.51
26319123	Shrimp, baked or broiled, made without fat	5.12	26137123	Salmon, baked or broiled, made without fat	0.25	26109133	Cod, coated, baked or broiled, made without fat	0.49
26319130	Shrimp, steamed or boiled	5.13	26137160	Salmon, steamed or poached	0.26	26213160	Squid, steamed or boiled	0.53
26319140	Shrimp, coated, fried, made with oil	3.51	26137140	Salmon, coated, fried, made with oil	0.25	26158030	Tilapia, coated, fried, made with oil	0.44
26319143	Shrimp, coated, fried, made without fat	3.84	26158033	Tilapia, coated, fried, made without fat	0.46	26158033	Tilapia, coated, fried, made without fat	0.46
26319145	Shrimp, coated, fried, from fast food / restaurant	3.51	26109140	Cod, coated, fried, made with oil	0.43	26213140	Squid, coated, fried	0.45
26319160	Shrimp, coated, baked or broiled, made with oil	3.51	26137130	Salmon, coated, baked or broiled, made with oil	0.25	26109130	Cod, coated, baked or broiled, made with oil	0.46
26319163	Shrimp, coated, baked or broiled, made without fat	3.50	26137133	Salmon, coated, baked or broiled, made without fat	0.25	26109133	Cod, coated, baked or broiled, made without fat	0.49

Note. Intensity refers to the greenhouse gas emissions released in the production of the food per 100g produced.

Supplementary Table 3. Descriptions of high-carbon-impact mixed dishes and their lower-carbon-impact substitutes

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27111000	Beef with tomato-based sauce	2.09	27150310	Fish with tomato-based sauce	0.39	27120100	Ham or pork with tomato-based sauce	0.48
27111100	Beef goulash	2.47	27141000	Chicken or turkey cacciatore	0.33	27141000	Chicken or turkey cacciatore	0.33
27111300	Beef stew, no potatoes, tomato-based sauce, Mexican style	2.54	41812800	Vegetarian stew	0.02	27120130	Pork stew, no potatoes, tomato-based sauce, Mexican style	0.49
27111310	Beef stew, no potatoes, tomato-based sauce, with chili peppers, Mexican style	2.02	41812800	Vegetarian stew	0.02	27120130	Pork stew, no potatoes, tomato-based sauce, Mexican style	0.49
27112000	Beef with gravy	2.92	27142000	Chicken with gravy	0.28	27120020	Ham or pork with gravy	0.40
27112010	Salisbury steak with gravy	2.25	27142000	Chicken with gravy	0.28	27120020	Ham or pork with gravy	0.40
27113100	Beef stroganoff	1.69	27143000	Chicken or turkey with cream sauce	0.29	27143000	Chicken or turkey with cream sauce	0.29
27114000	Beef with mushroom sauce	2.57	27144000	Chicken or turkey with mushroom sauce	0.32	27144000	Chicken or turkey with mushroom sauce	0.32
27115000	Beef with soy-based sauce	1.72	41812510	Tofu and vegetables excluding carrots, broccoli, and dark-green leafy; no potatoes, with soy-based sauce	0.19	27120150	Pork or ham with soy-based sauce	0.53
27115100	Steak teriyaki	2.59	27145000	Chicken or turkey with teriyaki	0.36	27145000	Chicken or turkey with teriyaki	0.36
27116100	Beef curry	1.90	27150320	Fish curry	0.22	27120160	Pork curry	0.44
27116200	Beef with barbecue sauce	3.26	24209000	Turkey with barbecue sauce, skin eaten	0.33	27120030	Ham or pork with barbecue sauce	0.63
27116300	Beef with sweet and sour sauce	0.92	27146100	Sweet and sour chicken or turkey	0.16	27120060	Sweet and sour pork	0.21
27118180	Beef stew, meat with gravy, no potatoes, Puerto Rican style	1.58	41812800	Vegetarian stew	0.02	27120130	Pork stew, no potatoes, tomato-based sauce, Mexican style	0.49
27120210	Frankfurter or hot dog, with chili, no bun	1.59	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27120250	Frankfurters or hot dogs with tomato-based sauce	1.47	41811400	Frankfurter or hot dog, meatless	0.06	25210310	Frankfurter or hot dog, chicken	0.40
27130100	Lamb or mutton curry	2.74	27150320	Fish curry	0.22	27120160	Pork curry	0.44
27211100	Beef stew with potatoes, tomato-based sauce	1.53	41812800	Vegetarian stew	0.02	27221150	Pork stew, with potatoes, tomato-based sauce, Mexican style	0.44
27211110	Beef stew with potatoes, tomato-based sauce, Mexican style	2.17	41812800	Vegetarian stew	0.02	27221150	Pork stew, with potatoes, tomato-based sauce, Mexican style	0.44
27212000	Beef and noodles, no sauce	1.93	27242000	Chicken or turkey and noodles, no sauce	0.22	27220210	Ham and noodles, no sauce	0.33
27212100	Beef and noodles with tomato-based sauce	1.45	27343520	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; tomato-based sauce	0.21	27343520	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; tomato-based sauce	0.21
27212150	Beef goulash with noodles	1.75	27343520	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; tomato-based sauce	0.21	27343520	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; tomato-based sauce	0.21
27212200	Beef and noodles with gravy	1.64	27313020	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; gravy	1.23	27313020	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; gravy	1.23
27212300	Beef and noodles with cream or white sauce	1.20	27343480	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and/or dark-green leafy; cream sauce, white sauce, or mushroom sauce	0.26	27343480	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and/or dark-green leafy; cream sauce, white sauce, or mushroom sauce	0.26
27212350	Beef stroganoff with noodles	1.18	27343480	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and/or dark-	0.26	27343480	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and/or dark-green leafy; cream	0.26

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
				green leafy; cream sauce, white sauce, or mushroom sauce			sauce, white sauce, or mushroom sauce	
27214100	Meat loaf made with beef	2.86	41812900	Vegetarian meat loaf	0.16	27246500	Meat loaf made with chicken or turkey	0.34
27214110	Meat loaf made with beef, with tomato-based sauce	2.36	27246505	Meat loaf made with chicken or turkey, with tomato-based sauce	0.31	27246505	Meat loaf made with chicken or turkey, with tomato-based sauce	0.31
27218210	Beef stew with potatoes, Puerto Rican style	1.63	41812800	Vegetarian stew	0.02	27221150	Pork stew, with potatoes, tomato-based sauce, Mexican style	0.44
27220010	Meat loaf made with ham	0.67	41812900	Vegetarian meat loaf	0.16	27246500	Meat loaf made with chicken or turkey	0.34
27235000	Meat loaf made with venison/deer	0.14	41812900	Vegetarian meat loaf	0.16	27246500	Meat loaf made with chicken or turkey	0.34
27260080	Meat loaf made with beef and pork	1.89	41812900	Vegetarian meat loaf	0.16	27246500	Meat loaf made with chicken or turkey	0.34
27260100	Meat loaf made with beef and pork, with tomato-based sauce	1.56	27246505	Meat loaf made with chicken or turkey, with tomato-based sauce	0.31	27246505	Meat loaf made with chicken or turkey, with tomato-based sauce	0.31
27311310	Beef stew with potatoes and vegetables including carrots, broccoli, and/or dark-green leafy; tomato-based sauce	0.98	41812800	Vegetarian stew	0.02	27141050	Stewed chicken with tomato-based sauce, Mexican style	0.26
27311320	Beef stew with potatoes and vegetables excluding carrots, broccoli, and dark-green leafy; tomato-based sauce	1.11	41812800	Vegetarian stew	0.02	27141050	Stewed chicken with tomato-based sauce, Mexican style	0.26
27311410	Beef stew with potatoes and vegetables including carrots, broccoli, and/or dark-green leafy; gravy	0.98	41812800	Vegetarian stew	0.02	27341310	Chicken or turkey stew with potatoes and vegetables including carrots, broccoli, and/or dark-green leafy; gravy	0.21
27311420	Beef stew with potatoes and vegetables excluding	1.13	41812800	Vegetarian stew	0.02	27341310	Chicken or turkey stew with potatoes and vegetables including	0.21

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
	carrots, broccoli, and dark-green leafy; gravy						carrots, broccoli, and/or dark-green leafy; gravy	
27313010	Beef, noodles, and vegetables including carrots, broccoli, and/or dark-green leafy; no sauce	1.22	27343010	Chicken or turkey, noodles, and vegetables including carrots, broccoli, and/or dark-green leafy; no sauce	0.20	27343010	Chicken or turkey, noodles, and vegetables including carrots, broccoli, and/or dark-green leafy; no sauce	0.20
27313020	Beef, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; no sauce	1.23	27343020	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; no sauce	0.23	27343020	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; no sauce	0.23
27313110	Beef chow mein or chop suey with noodles	1.05	75460900	Chow mein or chop suey, meatless, with noodles	0.22	27320310	Pork chow mein or chop suey with noodles	0.26
27313160	Beef, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; soy-based sauce	0.73	75460900	Chow mein or chop suey, meatless, with noodles	0.22	27320310	Pork chow mein or chop suey with noodles	0.26
27313410	Beef, noodles, and vegetables including carrots, broccoli, and/or dark-green leafy; tomato-based sauce	0.86	27343520	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; tomato-based sauce	0.21	27343520	Chicken or turkey, noodles, and vegetables excluding carrots, broccoli, and dark-green leafy; tomato-based sauce	0.21
27510140	Cheeseburger, 1 miniature patty, plain, on miniature bun, from fast food / restaurant	1.92	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510145	Cheeseburger, 1 miniature patty, with condiments, on miniature bun, from fast food / restaurant	1.14	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510160	Cheeseburger, 1 small patty, plain, on bun, from fast food / restaurant	1.65	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27510165	Cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant	0.97	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510170	Cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant (Burger King cheeseburger)	0.97	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510171	Cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant (Burger King Whopper Jr. with cheese)	0.97	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510172	Cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant (McDonald's Cheeseburger)	0.97	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510174	Cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant (Wendy's Jr. Cheeseburger)	0.97	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510175	Cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant (Wendy's Jr. Cheeseburger Deluxe)	0.97	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510190	Cheeseburger on bun, from school	1.65	27545100	Turkey or chicken burger, plain, on white bun	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510195	Cheeseburger, 1 small patty, plain, on white bun	1.65	27545100	Turkey or chicken burger, plain, on white bun	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27510206	Cheeseburger, 1 small patty, with condiments, on wheat bun	0.97	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16	27540240	Chicken fillet, broiled, sandwich, on whole wheat roll, with lettuce, tomato and spread	0.21
27510215	Cheeseburger, 1 medium patty, plain, on bun, from fast food / restaurant	2.13	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510225	Cheeseburger, 1 medium patty, with condiments, on bun, from fast food / restaurant	1.12	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510231	Cheeseburger, 1 medium patty, with condiments, on bun, from fast food / restaurant (Burger King Whopper with cheese)	1.12	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510232	Cheeseburger, 1 medium patty, with condiments, on bun, from fast food / restaurant (McDonald's Quarter Pounder with cheese)	1.12	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510233	Cheeseburger, 1 medium patty, with condiments, on bun, from fast food / restaurant (Wendy's 1/4 lb single with cheese)	1.12	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510241	Cheeseburger, 1 medium patty, plain, on white bun	2.13	27545100	Turkey or chicken burger, plain, on white bun	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510242	Cheeseburger, 1 medium patty, plain, on wheat bun	2.13	27540240	Chicken fillet, broiled, sandwich, on whole wheat roll, with lettuce, tomato and spread	0.21	27545110	Turkey or chicken burger, plain, on wheat bun	0.22

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27510243	Cheeseburger, 1 medium patty, plain, on whole wheat bun	2.13	27540240	Chicken fillet, broiled, sandwich, on whole wheat roll, with lettuce, tomato and spread	0.21	27545110	Turkey or chicken burger, plain, on wheat bun	0.22
27510251	Cheeseburger, 1 medium patty, with condiments, on white bun	1.12	27545200	Turkey or chicken burger, with condiments, on white bun	0.16	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510252	Cheeseburger, 1 medium patty, with condiments, on wheat bun	1.12	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16	27540240	Chicken fillet, broiled, sandwich, on whole wheat roll, with lettuce, tomato and spread	0.21
27510253	Cheeseburger, 1 medium patty, with condiments, on whole wheat bun	1.12	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16	27540240	Chicken fillet, broiled, sandwich, on whole wheat roll, with lettuce, tomato and spread	0.21
27510266	Cheeseburger, 1 large patty, with condiments, on bun, from fast food / restaurant	1.32	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510276	Bacon cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant	1.14	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510281	Bacon cheeseburger, 1 small patty, with condiments, on bun, from fast food / restaurant (Wendy's Jr. bacon cheeseburger)	1.14	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510305	Bacon cheeseburger, 1 medium patty, plain, on bun, from fast food / restaurant	2.06	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510312	Bacon cheeseburger, 1 medium patty, with condiments, on bun, from fast food / restaurant	1.43	27545200	Turkey or chicken burger, with condiments, on white bun	0.16	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27510331	Bacon cheeseburger, 1 medium patty, plain, on white bun	2.06	27545100	Turkey or chicken burger, plain, on white bun	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510341	Bacon cheeseburger, 1 medium patty, with condiments, on white bun	1.43	27545200	Turkey or chicken burger, with condiments, on white bun	0.16	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510342	Bacon cheeseburger, 1 medium patty, with condiments, on wheat bun	1.14	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16	27540240	Chicken fillet, broiled, sandwich, on whole wheat roll, with lettuce, tomato and spread	0.21
27510343	Bacon cheeseburger, 1 medium patty, with condiments, on whole wheat bun	1.43	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16	27540240	Chicken fillet, broiled, sandwich, on whole wheat roll, with lettuce, tomato and spread	0.21
27510346	Bacon cheeseburger, 1 large patty, with condiments, on bun, from fast food / restaurant	1.49	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510376	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant	1.81	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510386	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (Burger King double cheeseburger)	1.81	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510387	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (McDonald's double cheeseburger)	1.81	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27510388	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (McDonald's McDouble)	1.81	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510389	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (McDonald's Big Mac)	1.81	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510391	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (Wendy's Double stack)	1.81	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510401	Double cheeseburger, 2 medium patties, plain, on bun, from fast food / restaurant	2.23	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510406	Double cheeseburger, 2 medium patties, with condiments, on bun, from fast food / restaurant	1.52	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510431	Double bacon cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (Burger King bacon double cheeseburger)	2.07	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510446	Double bacon cheeseburger, 2 medium patties, plain, on bun, from fast food / restaurant	2.49	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510451	Double bacon cheeseburger, 2 medium patties, with condiments,	2.69	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
	on bun, from fast food / restaurant							
27510465	Double bacon cheeseburger, 2 medium patties, with condiments, on bun, from fast food / restaurant (Wendy's Baconator)	2.69	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510475	Double bacon cheeseburger, 2 large patties, with condiments, on bun, from fast food / restaurant	2.80	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27540280	Chicken fillet, broiled, sandwich with cheese, on bun, with lettuce, tomato and spread	0.32
27510501	Hamburger, 1 miniature patty, plain, on miniature bun, from fast food / restaurant	2.05	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22
27510506	Hamburger, 1 miniature patty, with condiments, on miniature bun, from fast food / restaurant	1.18	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510511	Hamburger, 1 miniature patty, on miniature bun, from school	2.05	27545100	Turkey or chicken burger, plain, on white bun	0.22	27545100	Turkey or chicken burger, plain, on white bun	0.22
27510531	Hamburger, 1 small patty, plain, on bun, from fast food / restaurant	1.78	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22
27510536	Hamburger, 1 small patty, with condiments, on bun, from fast food / restaurant	1.21	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510551	Hamburger, 1 small patty, with condiments, on bun, from fast food / restaurant (Burger King hamburger)	1.21	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510552	Hamburger, 1 small patty, with condiments, on bun, from fast food / restaurant	1.21	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
	(Burger King Whopper Jr.)							
27510553	Hamburger, 1 small patty, with condiments, on bun, from fast food / restaurant (McDonald's hamburger)	1.21	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510555	Hamburger, 1 small patty, with condiments, on bun, from fast food / restaurant (Wendy's Jr. hamburger)	1.21	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510565	Hamburger, on bun, from school	1.78	27545100	Turkey or chicken burger, plain, on white bun	0.22	27545100	Turkey or chicken burger, plain, on white bun	0.22
27510575	Hamburger, 1 small patty, plain, on white bun	1.78	27545100	Turkey or chicken burger, plain, on white bun	0.22	27545100	Turkey or chicken burger, plain, on white bun	0.22
27510585	Hamburger, 1 small patty, with condiments, on white bun	1.21	27545200	Turkey or chicken burger, with condiments, on white bun	0.16	27545200	Turkey or chicken burger, with condiments, on white bun	0.16
27510601	Hamburger, 1 medium patty, plain, on bun, from fast food / restaurant	2.49	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22
27510606	Hamburger, 1 medium patty, with condiments, on bun, from fast food / restaurant	1.71	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510615	Hamburger, 1 medium patty, with condiments, on bun, from fast food / restaurant (Burger King Whopper)	1.71	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510616	Hamburger, 1 medium patty, with condiments, on bun, from fast food / restaurant (Wendy's 1/4 lb single)	1.71	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510631	Hamburger, 1 medium patty, plain, on white bun	2.49	27545100	Turkey or chicken burger, plain, on white bun	0.22	27545100	Turkey or chicken burger, plain, on white bun	0.22
27510632	Hamburger, 1 medium patty, plain, on wheat bun	2.49	27545110	Turkey or chicken burger, plain, on wheat bun	0.22	27545110	Turkey or chicken burger, plain, on wheat bun	0.22

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27510633	Hamburger, 1 medium patty, plain, on whole wheat bun	2.49	27545110	Turkey or chicken burger, plain, on wheat bun	0.22	27545110	Turkey or chicken burger, plain, on wheat bun	0.22
27510641	Hamburger, 1 medium patty, with condiments, on white bun	1.71	27545200	Turkey or chicken burger, with condiments, on white bun	0.16	27545200	Turkey or chicken burger, with condiments, on white bun	0.16
27510642	Hamburger, 1 medium patty, with condiments, on wheat bun	1.71	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16
27510643	Hamburger, 1 medium patty, with condiments, on whole wheat bun	1.71	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16	27545210	Turkey or chicken burger, with condiments, on wheat bun	0.16
27510667	Double hamburger, 2 small patties, with condiments, on bun, from fast food / restaurant	1.76	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510671	Double hamburger, 2 medium patties, plain, on bun, from fast food / restaurant	2.93	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22	27545000	Turkey or chicken burger, plain, on bun, from fast food / restaurant	0.22
27510676	Double hamburger, 2 medium patties, with condiments, on bun, from fast food / restaurant	2.06	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510681	Double hamburger, 2 medium patties, with condiments, on bun, from fast food / restaurant (Burger King Double Whopper)	2.06	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510682	Double hamburger, 2 medium patties, with condiments, on bun, from fast food / restaurant (Wendy's 1/2 lb double)	2.06	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17	27545010	Turkey or chicken burger, with condiments, on bun, from fast food / restaurant	0.17
27510950	Reuben sandwich, corned beef sandwich with	1.35	27540110	Chicken sandwich, with spread	0.28	27540110	Chicken sandwich, with spread	0.28

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
	sauerkraut and cheese, with spread							
27513010	Roast beef sandwich	2.63	27540110	Chicken sandwich, with spread	0.28	27540110	Chicken sandwich, with spread	0.28
27513040	Roast beef submarine sandwich, with lettuce, tomato and spread	1.38	58127500	Vegetable submarine sandwich, with fat free spread	0.07	27540290	Chicken submarine sandwich, with lettuce, tomato and spread	0.26
27513041	Roast beef submarine sandwich, with cheese, lettuce, tomato and spread	1.50	58127500	Vegetable submarine sandwich, with fat free spread	0.07	27540291	Chicken submarine sandwich, with cheese, lettuce, tomato and spread	0.41
27513050	Roast beef sandwich with cheese	2.38	27520350	Ham and cheese sandwich, with spread, grilled	0.48	27520350	Ham and cheese sandwich, with spread, grilled	0.48
27515020	Steak and cheese submarine sandwich, with lettuce and tomato	1.87	58127500	Vegetable submarine sandwich, with fat free spread	0.07	27540291	Chicken submarine sandwich, with cheese, lettuce, tomato and spread	0.41
27515040	Steak and cheese submarine sandwich, plain, on roll	2.19	58127500	Vegetable submarine sandwich, with fat free spread	0.07	27540291	Chicken submarine sandwich, with cheese, lettuce, tomato and spread	0.41
27515070	Steak and cheese submarine sandwich, with fried peppers and	1.78	58127500	Vegetable submarine sandwich, with fat free spread	0.07	27540291	Chicken submarine sandwich, with cheese, lettuce, tomato and spread	0.41
27564000	Frankfurter or hot dog sandwich, NFS, plain, on white bun	1.49	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27
27564010	Frankfurter or hot dog sandwich, NFS, plain, on white bread	0.72	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564250	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bread	0.25
27564060	Frankfurter or hot dog sandwich, beef, plain, on white bun	2.09	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27
27564061	Frankfurter or hot dog sandwich, beef, plain, on wheat bun	2.10	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564241	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bun	0.27
27564062	Frankfurter or hot dog sandwich, beef, plain, on whole wheat bun	2.10	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564243	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on whole grain white bun	0.27

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27564070	Frankfurter or hot dog sandwich, beef, plain, on white bread	2.09	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564250	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bread	0.25
27564080	Frankfurter or hot dog sandwich, beef, plain, on wheat bread	2.09	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564260	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bread	0.25
27564090	Frankfurter or hot dog sandwich, beef, plain, on whole wheat bread	2.05	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564260	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bread	0.25
27564120	Frankfurter or hot dog sandwich, beef and pork, plain, on white bun	1.49	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27
27564121	Frankfurter or hot dog sandwich, beef and pork, plain, on wheat bun	1.49	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564241	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bun	0.27
27564130	Frankfurter or hot dog sandwich, beef and pork, plain, on white bread	1.45	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564250	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bread	0.25
27564150	Frankfurter or hot dog sandwich, beef and pork, plain, on whole wheat bread	1.45	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564260	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bread	0.25
27564180	Frankfurter or hot dog sandwich, meat and poultry, plain, on white bun	1.05	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27
27564190	Frankfurter or hot dog sandwich, meat and poultry, plain, on white bread	1.00	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564250	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bread	0.25
27564200	Frankfurter or hot dog sandwich, meat and poultry, plain, on wheat bread	1.00	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564260	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bread	0.25

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27564210	Frankfurter or hot dog sandwich, meat and poultry, plain, on whole wheat bread	1.00	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564260	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bread	0.25
27564220	Frankfurter or hot dog sandwich, meat and poultry, plain, on whole grain white bread	1.00	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564260	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bread	0.25
27564300	Frankfurter or hot dog sandwich, reduced fat or light, plain, on white bun	0.60	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27
27564301	Frankfurter or hot dog sandwich, reduced fat or light, plain, on wheat bun	0.60	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564241	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bun	0.27
27564360	Frankfurter or hot dog sandwich, fat free, plain, on white bun	0.60	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27
27564370	Frankfurter or hot dog sandwich, fat free, plain, on white bread	0.55	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564250	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bread	0.25
27564440	Frankfurter or hot dog sandwich, with chili, on white bun	1.26	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27
27564441	Frankfurter or hot dog sandwich, with chili, on wheat bun	1.26	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564241	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on wheat bun	0.27
27564442	Frankfurter or hot dog sandwich, with chili, on whole wheat bun	1.26	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564243	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on whole grain white bun	0.27
27564450	Frankfurter or hot dog sandwich, with chili, on white bread	1.35	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564250	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bread	0.25
27564500	Frankfurter or hot dog sandwich, with meatless chili, on white bun	0.95	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564240	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bun	0.27

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
27564510	Frankfurter or hot dog sandwich, with meatless chili, on white bread	1.03	27564430	Frankfurter or hot dog sandwich, meatless, plain, on bread	0.09	27564250	Frankfurter or hot dog sandwich, chicken and/or turkey, plain, on white bread	0.25
28110310	Salisbury steak with gravy, potatoes, vegetable, frozen meal	0.98	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18
28110330	Salisbury steak with gravy, whipped potatoes, vegetable, dessert, frozen meal	0.92	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18
28110350	Salisbury steak with gravy, potatoes, vegetable, dessert, frozen meal	1.33	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18
28110380	Salisbury steak with gravy, macaroni and cheese, frozen meal	1.28	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18	28145210	Turkey with gravy, dressing, potatoes, vegetable, frozen meal	0.18
28110390	Salisbury steak, potatoes, vegetable, dessert, diet frozen meal	0.71	28145100	Turkey with gravy, dressing, vegetable and fruit, diet frozen meal	0.14	28145100	Turkey with gravy, dressing, vegetable and fruit, diet frozen meal	0.14
58100100	Burrito with meat	2.32	58100320	Burrito with beans, meatless	0.28	58100200	Burrito with chicken	0.34
58100120	Burrito with meat and beans	1.01	58100320	Burrito with beans, meatless	0.28	58100220	Burrito with chicken and beans	0.31
58100125	Burrito with meat and beans, from fast food	1.01	58100325	Burrito with beans, meatless, from fast food	0.28	58100220	Burrito with chicken and beans	0.31
58100135	Burrito with meat and sour cream	1.17	58100330	Burrito with beans, rice, and sour cream, meatless	0.18	58100235	Burrito with chicken and sour cream	0.38
58100140	Burrito with meat, beans, and sour cream	0.94	58100330	Burrito with beans, rice, and sour cream, meatless	0.18	58100260	Burrito with chicken, beans, rice, and sour cream	0.35
58100145	Burrito with meat, beans, and sour cream, from fast food	0.94	58100330	Burrito with beans, rice, and sour cream, meatless	0.18	58100260	Burrito with chicken, beans, rice, and sour cream	0.35
58100160	Burrito with meat, beans, and rice	1.02	58100300	Burrito with beans and rice, meatless	0.05	58100255	Burrito with chicken, beans, and rice	0.34
58100165	Burrito with meat, beans, rice, and sour cream	1.01	58100330	Burrito with beans, rice, and sour cream, meatless	0.18	58100260	Burrito with chicken, beans, rice, and sour cream	0.35

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
58101320	Taco or tostada with meat	1.30	58101720	Taco or tostada with beans	0.13	58101520	Taco or tostada with chicken	0.28
58101323	Taco or tostada with meat, from fast food	2.16	58101720	Taco or tostada with beans	0.13	58101520	Taco or tostada with chicken	0.28
58101345	Soft taco with meat	1.56	58101610	Soft taco with beans	0.09	58101450	Soft taco with chicken	0.31
58101347	Soft taco with meat, from fast food	1.56	58101610	Soft taco with beans	0.09	58101457	Soft taco with chicken, from fast food	0.37
58101350	Soft taco with meat and sour cream	1.09	58101615	Soft taco with beans and sour cream	0.21	58101460	Soft taco with chicken and sour cream	0.31
58101357	Soft taco with meat and sour cream, from fast food	1.35	58101615	Soft taco with beans and sour cream	0.21	58101460	Soft taco with chicken and sour cream	0.31
58101540	Taco or tostada with fish	2.03	58101720	Taco or tostada with beans	0.13	58101520	Taco or tostada with chicken	0.28
58101555	Soft taco with fish	3.37	58101610	Soft taco with beans	0.09	58101450	Soft taco with chicken	0.31
58101620	Soft taco with meat and beans	0.69	58101610	Soft taco with beans	0.09	58101625	Soft taco with chicken and beans	0.22
58101630	Soft taco with meat, beans, and sour cream	0.69	58101615	Soft taco with beans and sour cream	0.21	58101635	Soft taco with chicken, beans, and sour cream	0.23
58101730	Taco or tostada with meat and beans	0.42	58101720	Taco or tostada with beans	0.13	58101735	Taco or tostada with chicken and beans	0.23
58101733	Taco or tostada with meat and beans, from fast food	0.70	58101720	Taco or tostada with beans	0.13	58101735	Taco or tostada with chicken and beans	0.23
58101745	Taco or tostada with meat, beans, and sour cream	0.70	58101725	Taco or tostada with beans and sour cream	0.16	58101750	Taco or tostada with chicken, beans, and sour cream	0.24
58101930	Taco or tostada salad with meat	0.95	58101935	Taco or tostada salad with chicken	0.20	58101940	Taco or tostada salad, meatless	0.20
58101945	Taco or tostada salad with meat and sour cream	1.04	58101950	Taco or tostada salad with chicken and sour cream	0.20	58101955	Taco or tostada salad, meatless with sour cream	0.20
58136150	Lo mein, with beef	1.03	58136120	Lo mein, meatless	0.07	58136140	Lo mein, with pork	0.21
58137250	Pad thai with meat	1.14	58137220	Pad thai, meatless	0.10	58137230	Pad thai with chicken	0.20
58302050	Beef and noodles with meat sauce and cheese, diet frozen meal	0.82	28143080	Chicken with noodles and cheese sauce, diet frozen meal	0.16	58302080	Noodles with vegetables in tomato-based sauce, diet frozen meal	0.21

Note. Intensity refers to the greenhouse gas emissions released in the production of the food per 100g produced.

Supplementary Table 4. Descriptions of high-carbon-impact milk and dairy items and their substitutes

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
11100000	Milk, NFS	0.16	11320000	Soy milk	0.03	11350020	Almond milk, unsweetened	0.05
11111000	Milk, whole	0.18	11320000	Soy milk	0.03	11350020	Almond milk, unsweetened	0.05
11112110	Milk, reduced fat (2%)	0.16	11320100	Soy milk, light	0.03	11350020	Almond milk, unsweetened	0.05
11112210	Milk, low fat (1%)	0.15	11320100	Soy milk, light	0.03	11350020	Almond milk, unsweetened	0.05
11113000	Milk, fat free (skim)	0.14	11320200	Soy milk, nonfat	0.03	11350020	Almond milk, unsweetened	0.05
11114300	Milk, lactose free, low fat (1%)	0.15	11320100	Soy milk, light	0.03	11350020	Almond milk, unsweetened	0.05
11114320	Milk, lactose free, fat free (skim)	0.14	11320200	Soy milk, nonfat	0.03	11350020	Almond milk, unsweetened	0.05
11114330	Milk, lactose free, reduced fat (2%)	0.16	11320100	Soy milk, light	0.03	11350020	Almond milk, unsweetened	0.05
11114350	Milk, lactose free, whole	0.18	11320000	Soy milk	0.03	11350020	Almond milk, unsweetened	0.05
11116000	Goat's milk, whole	0.19	11320000	Soy milk	0.03	11350020	Almond milk, unsweetened	0.05
11400000	Yogurt, NFS	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11410000	Yogurt, NS as to type of milk or flavor	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411010	Yogurt, NS as to type of milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411100	Yogurt, whole milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411200	Yogurt, low fat milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411300	Yogurt, nonfat milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411390	Yogurt, Greek, NS as to type of milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411400	Yogurt, Greek, whole milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411410	Yogurt, Greek, low fat milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11411420	Yogurt, Greek, nonfat milk, plain	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11430000	Yogurt, NS as to type of milk, fruit	0.13	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11431000	Yogurt, whole milk, fruit	0.13	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11432000	Yogurt, low fat milk, fruit	0.13	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
11433000	Yogurt, nonfat milk, fruit	0.17	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11433990	Yogurt, Greek, NS as to type of milk, fruit	0.13	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11434000	Yogurt, Greek, whole milk, fruit	0.13	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11434010	Yogurt, Greek, low fat milk, fruit	0.13	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11434020	Yogurt, Greek, nonfat milk, fruit	0.13	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11434090	Yogurt, NS as to type of milk, flavors other than fruit	0.32	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11434100	Yogurt, whole milk, flavors other than fruit	0.32	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11434200	Yogurt, low fat milk, flavors other than fruit	0.32	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11434300	Yogurt, nonfat milk, flavors other than fruit	0.30	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11435000	Yogurt, Greek, NS as to type of milk, flavors other than fru	0.32	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11435010	Yogurt, Greek, whole milk, flavors other than fruit	0.32	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11435020	Yogurt, Greek, low fat milk, flavors other than fruit	0.32	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11435030	Yogurt, Greek, nonfat milk, flavors other than fruit	0.32	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11436000	Yogurt, liquid	0.18	41420380	Yogurt, soy	0.07	41420380	Yogurt, soy	0.07
11511000	Chocolate milk, NFS	0.23	11321000	Soy milk, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11511100	Chocolate milk, ready to drink, whole	0.23	11321000	Soy milk, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11511200	Chocolate milk, ready to drink, reduced fat	0.21	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11511300	Chocolate milk, ready to drink, fat free	0.20	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11511400	Chocolate milk, ready to drink, low fat	0.21	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
11511550	Chocolate milk, ready to drink, reduced sugar, NS as to milk	0.21	11321000	Soy milk, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11511600	Chocolate milk, ready to drink, low fat (Nesquik)	0.21	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11511610	Chocolate milk, ready to drink, fat free (Nesquik)	0.20	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11511700	Chocolate milk, ready to drink, low fat, no sugar added (Nesquik)	0.21	11350030	Almond milk, unsweetened, chocolate	0.09	11321100	Soy milk, light, chocolate	0.10
11512010	Hot chocolate / cocoa, ready to drink	0.19	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11512020	Hot chocolate / cocoa, ready to drink, made with nonfat milk	0.17	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11512100	Hot chocolate / cocoa, ready to drink, with whipped cream	0.22	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513000	Chocolate milk, made from dry mix, NS as to type of milk	0.22	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513100	Chocolate milk, made from dry mix with whole milk	0.23	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513150	Chocolate milk, made from dry mix with reduced fat milk	0.22	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513200	Chocolate milk, made from dry mix with low fat milk	0.21	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513355	Chocolate milk, made from reduced sugar mix with whole milk	0.34	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513360	Chocolate milk, made from reduced sugar mix with reduced fat milk	0.33	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513380	Chocolate milk, made from dry mix, NS as to type of milk (Nesquik)	0.19	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
11513381	Chocolate milk, made from dry mix with whole milk (Nesquik)	0.21	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513382	Chocolate milk, made from dry mix with reduced fat milk (Nesquik)	0.19	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513383	Chocolate milk, made from dry mix with low fat milk (Nesquik)	0.18	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513384	Chocolate milk, made from dry mix with fat free milk (Nesquik)	0.17	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513391	Chocolate milk, made from no sugar added dry mix with whole milk (Nesquik)	0.34	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513392	Chocolate milk, made from no sugar added dry mix with reduced fat milk (Nesquik)	0.33	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513400	Chocolate milk, made from syrup, NS as to type of milk	0.19	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513500	Chocolate milk, made from syrup with whole milk	0.21	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513550	Chocolate milk, made from syrup with reduced fat milk	0.19	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513600	Chocolate milk, made from syrup with low fat milk	0.18	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513700	Chocolate milk, made from syrup with fat free milk	0.17	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513803	Chocolate milk, made from light syrup with low fat milk	0.18	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11513804	Chocolate milk, made from light syrup with fat free milk	0.17	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11514110	Hot chocolate / Cocoa, made with dry mix and whole milk	0.26	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11514120	Hot chocolate / Cocoa, made with dry mix and reduced fat milk	0.24	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07

Original food			Substitute 1 (Lowest carbon-intensity)			Substitute 2 (Highest carbon-intensity)		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
11514130	Hot chocolate / cocoa, made with dry mix and low fat milk	0.23	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11514140	Hot chocolate / cocoa, made with dry mix and fat free milk	0.22	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11514320	Hot chocolate / Cocoa, made with no sugar added dry mix and whole milk	0.41	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11514330	Hot chocolate / Cocoa, made with no sugar added dry mix and reduced fat milk	0.39	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07	11513310	Chocolate milk, made from dry mix with non-dairy milk	0.07
11519040	Strawberry milk, NFS	0.18	11321000	Soy milk, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11519050	Strawberry milk, whole	0.18	11321000	Soy milk, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11519105	Strawberry milk, reduced fat	0.15	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11519200	Strawberry milk, low fat	0.14	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11
11519205	Strawberry milk, fat free	0.13	11321100	Soy milk, light, chocolate	0.10	11350010	Almond milk, sweetened, chocolate	0.11

Note. Intensity refers to the greenhouse gas emissions released in the production of the food per 100g produced.

Supplementary Table 5. Descriptions of high-carbon-impact non-alcoholic beverages and their lower-carbon-impact substitutes

Original food			Substitute food		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
11551050	Licuado or batido	0.13	64134030	Fruit smoothie juice drink, no dairy	0.09
11553100	Fruit smoothie, NFS	0.12	64134015	Fruit smoothie, with whole fruit, no dairy	0.05
11553110	Fruit smoothie, with whole fruit and dairy	0.14	64134015	Fruit smoothie, with whole fruit, no dairy	0.05
11553120	Fruit smoothie, with whole fruit and dairy, added protein	0.23	64134020	Fruit smoothie, with whole fruit, no dairy, added protein	0.05
11553130	Fruit smoothie juice drink, with dairy	0.12	64134030	Fruit smoothie juice drink, no dairy	0.09
42403010	Coconut water, unsweetened	0.37	94000100	Water, tap	0.00
42404010	Coconut water, sweetened	0.35	94000100	Water, tap	0.00
61201010	Grapefruit juice, 100%, freshly squeezed	0.19	61101010	Grapefruit, raw	0.16
61201220	Grapefruit juice, 100%, canned, bottled or in a carton	0.19	61101010	Grapefruit, raw	0.16
61201225	Grapefruit juice, 100%, with calcium added	0.19	61101010	Grapefruit, raw	0.16
61213800	Fruit juice blend, citrus, 100% juice	0.14	61119010	Orange, raw	0.05
64100100	Fruit juice, NFS	0.09	63101000	Apple, raw	0.03
64100110	Fruit juice blend, 100% juice	0.16	63101000	Apple, raw	0.03
64100200	Cranberry juice blend, 100% juice	0.18	61119010	Orange, raw	0.05
64100220	Cranberry juice blend, 100% juice, with calcium added	0.18	61119010	Orange, raw	0.05
64101010	Apple cider	0.15	63101000	Apple, raw	0.03
64104010	Apple juice, 100%	0.15	63101000	Apple, raw	0.03
64104030	Apple juice, 100%, with calcium added	0.13	63101000	Apple, raw	0.03
64104600	Blackberry juice, 100%	0.20	63201010	Blackberries, raw	0.08
64105400	Cranberry juice, 100%, not a blend	0.20	61119010	Orange, raw	0.05
64116020	Grape juice, 100%	0.18	63123000	Grapes, raw, NS as to type	0.07
64116060	Grape juice, 100%, with calcium added	0.15	63123000	Grapes, raw, NS as to type	0.07
64124020	Pineapple juice, 100%	0.22	63141010	Pineapple, raw	0.15
64126000	Pomegranate juice, 100%	0.22	63145010	Pomegranate, raw	0.07
64133100	Watermelon juice, 100%	0.27	63149010	Watermelon, raw	0.26

Original food			Substitute food		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
64134100	Fruit smoothie, light	0.10	64134030	Fruit smoothie juice drink, no dairy	0.09
64134200	Fruit smoothie, bottled	0.12	64134030	Fruit smoothie juice drink, no dairy	0.09
64204010	Mango nectar	0.10	63129010	Mango, raw	0.08
78101000	Vegetable and fruit juice, 100% juice, with high vitamin C	0.13	61119010	Orange, raw	0.05
78101100	Fruit and vegetable smoothie	0.11	64134015	Fruit smoothie, with whole fruit, no dairy	0.05
78101110	Fruit and vegetable smoothie, added protein	0.46	64134020	Fruit smoothie, with whole fruit, no dairy, added protein	0.05
78101120	Fruit and vegetable smoothie, bottled	0.11	64134030	Fruit smoothie juice drink, no dairy	0.09
92101850	Coffee, cafe con leche	0.09	92161002	Coffee, cappuccino, with non-dairy milk	0.03
92101851	Coffee, cafe con leche, decaffeinated	0.09	92161002	Coffee, cappuccino, with non-dairy milk	0.03
92101900	Coffee, latte	0.12	92101903	Coffee, latte, with non-dairy milk	0.03
92101901	Coffee, latte, nonfat	0.12	92101903	Coffee, latte, with non-dairy milk	0.03
92101904	Coffee, latte, flavored	0.14	92101906	Coffee, latte, with non-dairy milk, flavored	0.03
92101905	Coffee, latte, nonfat, flavored	0.12	92101906	Coffee, latte, with non-dairy milk, flavored	0.03
92101910	Coffee, latte, decaffeinated	0.12	92101903	Coffee, latte, with non-dairy milk	0.03
92101917	Coffee, latte, decaffeinated, flavored	0.14	92101906	Coffee, latte, with non-dairy milk, flavored	0.03
92101920	Frozen coffee drink	0.11	92102020	Frozen mocha coffee drink, with non-dairy milk	0.06
92101921	Frozen coffee drink, nonfat	0.08	92102020	Frozen mocha coffee drink, with non-dairy milk	0.06
92101925	Frozen coffee drink, with whipped cream	0.14	92102020	Frozen mocha coffee drink, with non-dairy milk	0.06
92101930	Frozen coffee drink, decaffeinated	0.11	92102020	Frozen mocha coffee drink, with non-dairy milk	0.06
92101950	Coffee, cafe mocha	0.18	92101906	Coffee, latte, with non-dairy milk, flavored	0.03
92101955	Coffee, cafe mocha, nonfat	0.16	92101906	Coffee, latte, with non-dairy milk, flavored	0.03
92101965	Coffee, cafe mocha, decaffeinated	0.18	92101906	Coffee, latte, with non-dairy milk, flavored	0.03
92102000	Frozen mocha coffee drink	0.11	92102020	Frozen mocha coffee drink, with non-dairy milk	0.06
92102030	Frozen mocha coffee drink, with whipped cream	0.14	92102020	Frozen mocha coffee drink, with non-dairy milk	0.06

Original food			Substitute food		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
92102040	Frozen mocha coffee drink, nonfat, with whipped cream	0.13	92102020	Frozen mocha coffee drink, with non-dairy milk	0.06
92102450	Iced coffee, pre-lightened and pre-sweetened	0.14	92102602	Coffee, iced cafe mocha, with non-dairy milk	0.10
92102500	Coffee, iced latte	0.12	92101903	Coffee, latte, with non-dairy milk	0.03
92102501	Coffee, iced latte, nonfat	0.09	92101903	Coffee, latte, with non-dairy milk	0.03
92102503	Coffee, iced latte, flavored	0.14	92101906	Coffee, latte, with non-dairy milk, flavored	0.03
92102600	Coffee, iced cafe mocha	0.18	92102602	Coffee, iced cafe mocha, with non-dairy milk	0.10
92161000	Coffee, cappuccino	0.10	92161002	Coffee, cappuccino, with non-dairy milk	0.03
92161001	Coffee, cappuccino, nonfat	0.08	92161002	Coffee, cappuccino, with non-dairy milk	0.03
92162000	Coffee, cappuccino, decaffeinated	0.10	92161002	Coffee, cappuccino, with non-dairy milk	0.03
92162001	Coffee, cappuccino, decaffeinated, nonfat	0.08	92161002	Coffee, cappuccino, with non-dairy milk	0.03
92306800	Tea, hot, chai, with milk	0.08	92302000	Tea, hot, leaf, black	0.00
92510960	Lemonade, fruit flavored drink	0.08	61119010	Orange, raw	0.05
92530510	Cranberry juice drink, with high vitamin C	0.08	61119010	Orange, raw	0.05
92550400	Vegetable and fruit juice drink, with high vitamin C, diet	0.13	61119010	Orange, raw	0.05
92550405	Vegetable and fruit juice drink, with high vitamin C, light	0.13	61119010	Orange, raw	0.05
92610030	Horchata beverage, made with milk	0.16	92610020	Horchata beverage, made with water	0.03
95101000	Nutritional drink or shake, ready-to-drink (Boost)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95101010	Nutritional drink or shake, ready-to-drink (Boost plus)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95102000	Nutritional drink or shake, ready-to-drink (Carnation instant)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95103000	Nutritional drink or shake, ready-to-drink (Ensure)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95103010	Nutritional drink or shake, ready-to-drink (Ensure plus)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95104000	Nutritional drink or shake, ready-to-drink, sugar free (Glucerna)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04

Original food			Substitute food		
Food code	Description	Intensity (kg CO ₂ -eq/100g)	Food code	Description	Intensity (kg CO ₂ -eq/100g)
95105000	Nutritional drink or shake, ready-to-drink (Kellogg's Special K Protein)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95106000	Nutritional drink or shake, ready-to-drink (Muscle Milk)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95106010	Nutritional drink or shake, ready-to-drink, light (Muscle Milk)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95110000	Nutritional drink or shake, ready-to-drink (Slim Fast)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95110010	Nutritional drink or shake, ready-to-drink, sugar free (Slim Fast)	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95120000	Nutritional drink or shake, ready-to-drink, NFS	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95120010	Nutritional drink or shake, high protein, ready-to-drink, NF	0.11	95120050	Nutritional drink or shake, liquid, soy-based	0.04
95120020	Nutritional drink or shake, high protein, light, ready-to-drink, NFS	0.14	95120050	Nutritional drink or shake, liquid, soy-based	0.04

Note. Intensity refers to the greenhouse gas emissions released in the production of the food per 100g produced.

Supplementary Table 6. Impact of protein, mixed dish, milk and dairy, and beverage substitutions on personal and total dietary carbon footprints, secondary analyses examining replacing high-carbon-impact foods with the highest-carbon-intensity lower-carbon-impact substitutes

	Impact on personal dietary carbon footprint per person per day, among those with substitutions					Impact on total dietary carbon footprint, scaled to entire US population			
	<i>n</i> (%)	Before substitution (kg CO ₂ -eq) Mean ± SE	Absolute difference (kg CO ₂ -eq) Mean ± SE	Proportional difference	<i>p</i>	Before substitution (metric tons CO ₂ -eq) Total ± SE	Absolute difference (metric tons CO ₂ -eq) Total ± SE	Proportional difference	<i>p</i>
Protein	1,281 (17%)	7.56 ± 0.27	-3.55 ± 0.20	-47.0%	<0.001	1,318,391 ± 80,022	-186,684 ± 15,853	-14.2%	<0.001
Mixed dishes	1,653 (21%)	6.65 ± 0.16	-3.08 ± 0.06	-46.3%	<0.001	1,318,391 ± 80,022	-199,882 ± 17,206	-15.2%	<0.001
Milk and dairy	3,534 (46%)	4.25 ± 0.09	-0.07 ± 0.005	-1.6%	<0.001	1,318,391 ± 80,022	-9,478 ± 1,020	-0.72%	<0.001
Beverages	1,614 (21%)	4.52 ± 0.14	-0.37 ± 0.01	-8.1%	<0.001	1,318,391 ± 80,022	-19,556 ± 1,355	-1.5%	<0.001
All categories	5,676 (73%)	4.99 ± 0.09	-1.89 ± 0.06	-38%	<0.001	1,318,391 ± 80,022	-415,600 ± 27,105	-31.5%	<0.001

Note. Table shows the potential impact of replacing high-carbon-impact foods with lower-carbon-impact substitutes on dietary carbon footprint for those with substitutions (i.e., any individual who consumed one of the high-impact foods on the 24-hour recall day) and scaled to represent the entire US population (including those without substitutes). When there were multiple feasible substitutes for a given high-carbon-impact food, secondary analyses (shown here) assumed respondents replaced the high-carbon-impact food with the higher-carbon-intensity substitute (which still had lower carbon intensity than the high-carbon-impact food). High-carbon-impact beverages had only one substitute, so results for secondary analyses of beverages are identical to primary analyses. *P*-values are from paired two-tailed *t*-tests for per-person impacts and two-tailed *t*-tests for total impacts.

Supplementary Table 7. Changes in personal dietary carbon footprint and overall dietary quality after protein, mixed dish, milk and dairy, and beverage substitutions, by age group

Mean change dietary carbon footprint $\pm$ SE, kg CO₂-eq per person per day								
	2-5 years	6-11 years	12-17 years	18-25 years	26-39 years	40-49 years	50-59 years	60+ years
Protein foods	-1.91 ^a $\pm$ 0.27	-2.63 ^{a,b} $\pm$ 0.28	-4.02 ^{a,b} $\pm$ 0.48	-3.97 ^{a,b} $\pm$ 0.56	-4.30 ^b $\pm$ 0.43	-4.38 ^{a,b} $\pm$ 0.81	-3.88 ^b $\pm$ 0.48	-3.48 ^b $\pm$ 0.19
Mixed dishes	-1.61 ^a $\pm$ 0.10	-2.78 ^b $\pm$ 0.13	-3.43 ^{b,c} $\pm$ 0.19	-3.80 ^{b,c} $\pm$ 0.32	-3.86 ^{b,c} $\pm$ 0.28	-3.67 ^{b,c} $\pm$ 0.26	-3.87 ^c $\pm$ 0.23	-3.38 ^{b,c} $\pm$ 0.16
Milk and dairy	-0.40 ^a $\pm$ 0.01	-0.39 ^a $\pm$ 0.01	-0.37 ^a $\pm$ 0.02	-0.36 ^a $\pm$ 0.02	-0.32 ^a $\pm$ 0.02	-0.35 ^a $\pm$ 0.02	-0.31 ^a $\pm$ 0.04	-0.32 ^a $\pm$ 0.02
Beverages	-0.30 ^{a,b} $\pm$ 0.02	-0.23 ^b $\pm$ 0.01	-0.36 ^a $\pm$ 0.03	-0.48 ^{a,b} $\pm$ 0.06	-0.44 ^a $\pm$ 0.04	-0.46 ^a $\pm$ 0.06	-0.30 ^{a,b} $\pm$ 0.02	-0.33 ^a $\pm$ 0.02
Mean change dietary quality $\pm$ SE, Healthy Eating Index score (0–100)								
	2-5 years	6-11 years	12-17 years	18-25 years	26-39 years	40-49 years	50-59 years	60+ years
Protein foods	4.53 ^a $\pm$ 0.67	2.85 ^{a,b} $\pm$ 0.52	2.52 ^{a,b} $\pm$ 0.32	1.68 ^{a,b} $\pm$ 0.45	1.80 ^{a,b} $\pm$ 0.29	1.95 ^{a,b} $\pm$ 0.31	2.19 ^{a,b} $\pm$ 0.32	1.74 ^b $\pm$ 0.29
Mixed dishes	3.77 ^a $\pm$ 0.67	5.59 ^a $\pm$ 0.67	4.47 ^a $\pm$ 0.79	5.23 ^a $\pm$ 0.61	5.66 ^a $\pm$ 0.56	5.54 ^a $\pm$ 0.80	4.41 ^a $\pm$ 0.72	3.42 ^a $\pm$ 0.60
Milk and dairy	4.40 ^a $\pm$ 0.26	3.32 ^{a,b} $\pm$ 0.16	2.88 ^b $\pm$ 0.19	2.37 ^{b,c} $\pm$ 0.28	2.68 ^{b,c} $\pm$ 0.22	2.84 ^b $\pm$ 0.15	1.87 ^c $\pm$ 0.24	2.40 ^{b,c} $\pm$ 0.18
Beverages	1.94 ^{a,b} $\pm$ 0.22	2.95 ^b $\pm$ 0.25	3.09 ^b $\pm$ 0.32	3.09 ^{a,b} $\pm$ 0.71	2.37 ^b $\pm$ 0.32	1.96 ^{a,b} $\pm$ 0.52	2.10 ^b $\pm$ 0.30	1.06 ^a $\pm$ 0.22

Note. Table shows the potential impact of replacing high-impact target foods with lower-impact substitutes on personal dietary carbon footprint and overall dietary quality for those with substitutions (i.e., any individual who consumed one of the high-impact foods on the 24-hour recall day), by age group. When the respondent consumed the target food more than once, all instances were replaced with the substitute. When there were multiple feasible substitutes for a given target food, primary analyses (shown here) assumed respondents replaced the target food with the lowest-carbon-intensity substitute. Within each row, means with different superscripts are statistically significantly different from one another based on two-tailed *t* tests, corrected $p < 0.05$. P-values were corrected for multiple comparisons using the Bonferroni method (correcting for 28 pairwise comparisons). Corrected p-values were as follows: For mean change in dietary carbon footprint from protein substitutions: age 2-5 vs. 6-11: $p > 0.999$; age 2-5 vs. age 12-17: $p = 0.100$; age 2-5 vs. age 18-25: $p = 0.251$; age 2-5 vs. age 26-39: $p = 0.005$; age 2-5 vs. age 40-49: $p = 0.119$; age 2-5 vs. age 50-59: $p = 0.047$; age 2-5 vs. age 60 and older: $p = 0.002$; age 6-11 vs. age 12-17: $p = 0.441$; age 6-11 vs. age 18-25: $p > 0.999$; age 6-11 vs. age 26-39: $p = 0.250$; age 6-11 vs. age 40-49: $p > 0.999$; age 6-11 vs. age 50-59: $p > 0.999$; age 6-11 vs. age 60 and older: $p > 0.999$; age 12-17 vs. age 18-25: $p > 0.999$; age 12-17 vs. age 26-39: $p > 0.999$; age 12-17 vs. age 40-49: $p > 0.999$; age 12-17 vs. age 50-59: $p > 0.999$; age 12-17 vs. age 60 and older: $p > 0.999$; age 18-25 vs. age 26-39: $p > 0.999$; age 18-25 vs. age 40-49: $p > 0.999$; age 18-25

vs. age 50-59: $p>0.999$; age 18-25 vs. age 60 and older: $p>0.999$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p>0.999$; age 26-39 vs. age 60 and older: $p>0.999$; age 40-49 vs. age 50-59: $p>0.999$; age 40-49 vs. age 60 and older: $p>0.999$. For mean change in dietary carbon footprint from mixed dish substitutions: age 2-5 vs. 6-11: $p=0.001$; age 2-5 vs. age 12-17: $p<0.001$; age 2-5 vs. age 18-25: $p<0.001$; age 2-5 vs. age 26-39: $p<0.001$; age 2-5 vs. age 40-49: $p<0.001$; age 2-5 vs. age 50-59: $p<0.001$; age 2-5 vs. age 60 and older: $p<0.001$; age 6-11 vs. age 12-17: $p=0.872$; age 6-11 vs. age 18-25: $p=0.560$; age 6-11 vs. age 26-39: $p=0.103$; age 6-11 vs. age 40-49: $p=0.105$; age 6-11 vs. age 50-59: $p=0.016$; age 6-11 vs. age 60 and older: $p=0.216$; age 12-17 vs. age 18-25: $p>0.999$; age 12-17 vs. age 26-39: $p>0.999$; age 12-17 vs. age 40-49: $p>0.999$; age 12-17 vs. age 50-59: $p>0.999$; age 12-17 vs. age 60 and older: $p>0.999$; age 18-25 vs. age 26-39: $p>0.999$; age 18-25 vs. age 40-49: $p>0.999$; age 18-25 vs. age 50-59: $p>0.999$; age 18-25 vs. age 60 and older: $p>0.999$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p>0.999$; age 26-39 vs. age 60 and older: $p>0.999$; age 40-49 vs. age 50-59: $p>0.999$; age 40-49 vs. age 60 and older: $p>0.999$. For mean change in dietary carbon footprint from milk and dairy substitutions: age 2-5 vs. 6-11: $p>0.999$; age 2-5 vs. age 12-17: $p>0.999$; age 2-5 vs. age 18-25: $p>0.999$; age 2-5 vs. age 26-39: $p=0.059$; age 2-5 vs. age 40-49: $p>0.999$; age 2-5 vs. age 50-59: $p>0.999$; age 2-5 vs. age 60 and older: $p=0.106$; age 6-11 vs. age 12-17: $p>0.999$; age 6-11 vs. age 18-25: $p>0.999$; age 6-11 vs. age 26-39: $p=0.240$; age 6-11 vs. age 40-49: $p>0.999$; age 6-11 vs. age 50-59: $p>0.999$; age 6-11 vs. age 60 and older: $p=0.464$; age 12-17 vs. age 18-25: $p>0.999$; age 12-17 vs. age 26-39: $p>0.999$; age 12-17 vs. age 40-49: $p>0.999$; age 12-17 vs. age 50-59: $p>0.999$; age 12-17 vs. age 60 and older: $p>0.999$; age 18-25 vs. age 26-39: $p>0.999$; age 18-25 vs. age 40-49: $p>0.999$; age 18-25 vs. age 50-59: $p>0.999$; age 18-25 vs. age 60 and older: $p>0.999$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p>0.999$; age 26-39 vs. age 60 and older: $p>0.999$; age 40-49 vs. age 50-59: $p>0.999$; age 40-49 vs. age 60 and older: $p>0.999$; age 50-59 vs. age 60 and older: $p>0.999$. For mean change in dietary carbon footprint from beverage substitutions: age 2-5 vs. 6-11: $p=0.172$; age 2-5 vs. age 12-17: $p>0.999$; age 2-5 vs. age 18-25: $p=0.440$; age 2-5 vs. age 26-39: $p=0.119$; age 2-5 vs. age 40-49: $p=0.386$; age 2-5 vs. age 50-59: $p>0.999$; age 2-5 vs. age 60 and older: $p>0.999$; age 6-11 vs. age 12-17: $p=0.030$; age 6-11 vs. age 18-25: $p=0.067$; age 6-11 vs. age 26-39: $p=0.009$; age 6-11 vs. age 40-49: $p=0.028$; age 6-11 vs. age 50-59: $p=0.127$; age 6-11 vs. age 60 and older: $p=0.022$; age 12-17 vs. age 18-25: $p>0.999$; age 12-17 vs. age 26-39: $p>0.999$; age 12-17 vs. age 40-49: $p>0.999$; age 12-17 vs. age 50-59: $p>0.999$; age 12-17 vs. age 60 and older: $p>0.999$; age 18-25 vs. age 26-39: $p>0.999$; age 18-25 vs. age 40-49: $p>0.999$; age 18-25 vs. age 50-59: $p=0.507$; age 18-25 vs. age 60 and older: $p=0.674$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p=0.544$; age 26-39 vs. age 60 and older: $p=0.821$; age 40-49 vs. age 50-59: $p=0.636$; age 40-49 vs. age 60 and older: $p=0.819$; age 50-59 vs. age 60 and older: $p>0.999$. For mean change in dietary quality from protein substitutions: age 2-5 vs. 6-11: $p=0.139$; age 2-5 vs. age 12-17: $p=0.322$; age 2-5 vs. age 18-25: $p=0.057$; age 2-5 vs. age 26-39: $p=0.078$; age 2-5 vs. age 40-49: $p=0.125$; age 2-5 vs. age 50-59: $p=0.159$; age 2-5 vs. age 60 and older: $p=0.034$; age 6-11 vs. age 12-17: $p>0.999$; age 6-11 vs. age 18-25: $p>0.999$; age 6-11 vs. age 26-39: $p>0.999$; age 6-11 vs. age 40-49: $p>0.999$; age 6-11 vs. age 50-59: $p>0.999$; age 6-11 vs. age 60 and older: $p>0.999$; age 12-17 vs. age 18-25: $p>0.999$; age 12-17 vs. age 26-39: $p>0.999$; age 12-17 vs. age 40-49: $p>0.999$; age 12-17 vs. age 50-59: $p>0.999$; age 12-17 vs. age 60 and older: $p>0.999$; age 18-25 vs. age 26-39: $p>0.999$; age 18-25 vs. age 40-49: $p>0.999$; age 18-25 vs. age 50-59: $p>0.999$; age 18-25 vs. age 60 and older: $p>0.999$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p>0.999$; age 26-39 vs. age 60 and older: $p>0.999$; age 40-49 vs. age 50-59: $p>0.999$; age 40-49 vs. age 60 and older: $p>0.999$. For mean change in dietary quality from mixed dishes substitutions:

age 2-5 vs. 6-11: $p>0.999$; age 2-5 vs. age 12-17: $p>0.999$; age 2-5 vs. age 18-25: $p>0.999$; age 2-5 vs. age 26-39: $p>0.999$; age 2-5 vs. age 40-49: $p=0.989$; age 2-5 vs. age 50-59: $p>0.999$; age 2-5 vs. age 60 and older: $p>0.999$; age 6-11 vs. age 12-17: $p>0.999$; age 6-11 vs. age 18-25: $p>0.999$; age 6-11 vs. age 26-39: $p>0.999$; age 6-11 vs. age 40-49: $p>0.999$; age 6-11 vs. age 50-59: $p>0.999$; age 6-11 vs. age 60 and older: $p=0.394$; age 12-17 vs. age 18-25: $p>0.999$; age 12-17 vs. age 26-39: $p>0.999$; age 12-17 vs. age 40-49: $p>0.999$; age 12-17 vs. age 50-59: $p>0.999$; age 12-17 vs. age 60 and older: $p>0.999$; age 18-25 vs. age 26-39: $p>0.999$; age 18-25 vs. age 40-49: $p>0.999$; age 18-25 vs. age 50-59: $p>0.999$; age 18-25 vs. age 60 and older: $p=0.305$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p=0.324$; age 26-39 vs. age 60 and older: $p=0.140$; age 40-49 vs. age 50-59: $p>0.999$; age 40-49 vs. age 60 and older: $p>0.999$; age 50-59 vs. age 60 and older: $p>0.999$. For mean change in dietary quality from milk and dairy substitutions: age 2-5 vs. 6-11: $p=0.102$; age 2-5 vs. age 12-17: $p=0.034$; age 2-5 vs. age 18-25: $p=0.001$; age 2-5 vs. age 26-39: $p=0.004$; age 2-5 vs. age 40-49: $p=0.001$; age 2-5 vs. age 50-59: $p<0.001$; age 2-5 vs. age 60 and older: $p<0.001$; age 6-11 vs. age 12-17: $p>0.999$; age 6-11 vs. age 18-25: $p=0.193$; age 6-11 vs. age 26-39: $p=0.309$; age 6-11 vs. age 40-49: $p>0.999$; age 6-11 vs. age 50-59: $p<0.001$; age 6-11 vs. age 60 and older: $p=0.082$; age 12-17 vs. age 18-25: $p>0.999$; age 12-17 vs. age 26-39: $p>0.999$; age 12-17 vs. age 40-49: $p>0.999$; age 12-17 vs. age 50-59: $p=0.011$; age 12-17 vs. age 60 and older: $p>0.999$; age 18-25 vs. age 26-39: $p>0.999$; age 18-25 vs. age 40-49: $p>0.999$; age 18-25 vs. age 50-59: $p>0.999$; age 18-25 vs. age 60 and older: $p>0.999$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p=0.639$; age 26-39 vs. age 60 and older: $p>0.999$; age 40-49 vs. age 50-59: $p=0.049$; age 40-49 vs. age 60 and older: $p>0.999$; age 50-59 vs. age 60 and older: $p>0.999$. For mean change in dietary quality from beverage substitutions: age 2-5 vs. 6-11: $p=0.140$; age 2-5 vs. age 12-17: $p=0.168$; age 2-5 vs. age 18-25: $p>0.999$; age 2-5 vs. age 26-39: $p>0.999$; age 2-5 vs. age 40-49: $p>0.999$; age 2-5 vs. age 50-59: $p>0.999$; age 2-5 vs. age 60 and older: $p=0.060$; age 6-11 vs. age 12-17: $p>0.999$; age 6-11 vs. age 18-25: $p>0.999$; age 6-11 vs. age 26-39: $p>0.999$; age 6-11 vs. age 40-49: $p>0.999$; age 6-11 vs. age 50-59: $p=0.870$; age 6-11 vs. age 60 and older: $p<0.001$; age 12-17 vs. age 18-25: $p>0.999$; age 12-17 vs. age 26-39: $p>0.999$; age 12-17 vs. age 40-49: $p>0.999$; age 12-17 vs. age 50-59: $p>0.999$; age 12-17 vs. age 60 and older: $p=0.006$; age 18-25 vs. age 26-39: $p>0.999$; age 18-25 vs. age 40-49: $p>0.999$; age 18-25 vs. age 50-59: $p>0.999$; age 18-25 vs. age 60 and older: $p=0.468$; age 26-39 vs. age 40-49: $p>0.999$; age 26-39 vs. age 50-59: $p>0.999$; age 26-39 vs. age 60 and older: $p=0.002$; age 40-49 vs. age 50-59: $p>0.999$; age 40-49 vs. age 60 and older: $p>0.999$; age 50-59 vs. age 60 and older: $p=0.036$.

Supplementary Table 8. Changes in personal dietary carbon footprint and overall dietary quality after protein, mixed dish, milk and dairy, and beverage substitutions, by gender

Mean change dietary carbon footprint $\pm$ SE, kg CO₂-eq per person per day		
	Males	Females
Protein foods	-4.52 ^a $\pm$ 0.28	-3.00 ^b $\pm$ 0.19
Mixed dishes	-3.83 ^a $\pm$ 0.12	-3.05 ^b $\pm$ 0.13
Milk and dairy	-0.39 ^a $\pm$ 0.02	-0.31 ^b $\pm$ 0.01
Beverages	-0.40 ^a $\pm$ 0.02	-0.34 ^b $\pm$ 0.02
Mean change dietary quality $\pm$SE, Healthy Eating Index score (0–100)		
	Males	Females
Protein foods	2.34 ^a $\pm$ 0.15	1.81 ^a $\pm$ 0.19
Mixed dishes	4.82 ^a $\pm$ 0.40	4.74 ^a $\pm$ 0.30
Milk and dairy	2.85 ^a $\pm$ 0.17	2.68 ^a $\pm$ 0.11
Beverages	2.29 ^a $\pm$ 0.17	2.14 ^a $\pm$ 0.32

Note. Table shows the potential impact of replacing high-impact target foods with lower-carbon-impact substitutes on personal dietary carbon footprint for those with substitutions (i.e., any individual who consumed one of the high-impact foods on the 24-hour recall day), by gender. When the respondent consumed the target food more than once, all instances were replaced with the substitute. When there were multiple feasible substitutes for a given target food, primary analyses (shown here) assumed respondents replaced the target food with the lowest-carbon-intensity substitute. Within each row, means with different superscripts are statistically significantly different from one another based on a two-tailed *t* test, $p < 0.05$. Corrected *p*-values were as follows: For mean change in dietary carbon footprint from protein substitutions: males vs. females: $p < 0.001$. For mean change in dietary carbon footprint from mixed dish substitutions: males vs. females: $p = 0.003$. For mean change in dietary carbon footprint from milk and dairy substitutions: males vs. females: $p < 0.001$. For mean change in dietary carbon footprint from beverage substitutions: males vs. females: $p = 0.048$. For mean change in dietary quality from protein substitutions: males vs. females: $p = 0.055$. For mean change in dietary quality from mixed dish substitutions: males vs. females: $p = 0.847$. For mean change in dietary quality from milk and dairy substitutions: males vs. females: $p = 0.430$. For mean change in dietary quality from beverage substitutions: males vs. females: $p = 0.681$.

Supplementary Table 9. Changes in personal dietary carbon footprint and overall dietary quality after protein, mixed dish, milk and dairy, and beverage substitutions, by race/ethnicity

Mean change dietary carbon footprint $\pm$ SE, kg CO₂-eq per person per day					
	Non-Hispanic White	Non-Hispanic Black	Mexican American / Other Hispanic	Asian	Other
Protein foods	-3.61 ^a $\pm$ 0.29	-4.30 ^a $\pm$ 0.43	-4.20 ^a $\pm$ 0.25	-3.25 ^a $\pm$ 0.23	-4.40 ^a $\pm$ 1.14
Mixed dishes	-3.49 ^a $\pm$ 0.09	-3.11 ^a $\pm$ 0.17	-3.76 ^a $\pm$ 0.16	-3.78 ^a $\pm$ 0.22	-3.38 ^a $\pm$ 0.55
Milk and dairy	-0.35 ^a $\pm$ 0.02	-0.32 ^a $\pm$ 0.01	-0.34 ^a $\pm$ 0.01	-0.34 ^a $\pm$ 0.02	-0.36 ^a $\pm$ 0.03
Beverages	-0.38 ^a $\pm$ 0.02	-0.38 ^a $\pm$ 0.03	-0.33 ^a $\pm$ 0.01	-0.37 ^a $\pm$ 0.04	-0.26 ^a $\pm$ 0.04
Mean change dietary quality $\pm$ SE, Healthy Eating Index score (0–100)					
	Non-Hispanic White	Non-Hispanic Black	Mexican American / Other Hispanic	Asian	Other
Protein foods	2.24 ^a $\pm$ 0.16	2.17 ^a $\pm$ 0.31	1.77 ^a $\pm$ 0.27	1.55 ^a $\pm$ 0.27	1.67 ^a $\pm$ 0.28
Mixed dishes	4.64 ^{a,b} $\pm$ 0.47	4.29 ^{a,b} $\pm$ 0.33	5.96 ^a $\pm$ 0.33	2.81 ^b $\pm$ 0.33	3.84 ^{a,b} $\pm$ 0.55
Milk and dairy	2.54 ^a $\pm$ 0.15	3.42 ^b $\pm$ 0.16	3.14 ^{a,b} $\pm$ 0.08	2.98 ^{a,b} $\pm$ 0.19	2.88 ^{a,b} $\pm$ 0.34
Beverages	1.94 ^{a,b} $\pm$ 0.34	3.43 ^c $\pm$ 0.21	2.44 ^b $\pm$ 0.15	1.13 ^a $\pm$ 0.30	2.23 ^{a,b,c} $\pm$ 0.53

Note. Table shows the potential impact of replacing high-impact target foods with lower-impact substitutes on personal dietary carbon footprint for those with substitutions (i.e., any individual who consumed one of the high-impact foods on the 24-hour recall day), by race/ethnicity. When the respondent consumed the target food more than once, all instances were replaced with the substitute. When there were multiple feasible substitutes for a given target food, primary analyses (shown here) assumed respondents replaced the target food with the lowest-carbon-intensity substitute. Within each row, means with different superscripts are statistically significantly different from one another based on two-tailed *t* tests, corrected $p < 0.05$. P-values were corrected for multiple comparisons using the Bonferroni method (correcting for 10 pairwise comparisons). Corrected p-values were as follows: For mean change in dietary carbon footprint from protein substitutions: non-Hispanic white vs. non-Hispanic Black: $p > 0.999$; non-Hispanic white vs. Mexican American/Other Hispanic: $p > 0.999$; non-Hispanic white vs. non-Hispanic Asian: $p > 0.999$; non-Hispanic white vs. Other: $p > 0.999$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p > 0.999$; non-Hispanic Black vs. non-Hispanic Asian: $p = 0.319$; non-Hispanic Black vs. Other: $p > 0.999$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p = 0.119$; Mexican American/Other Hispanic vs. Other: $p > 0.999$; non-Hispanic Asian vs. Other: $p > 0.999$. For mean change in dietary carbon footprint from mixed dishes substitutions: non-Hispanic white vs. non-Hispanic Black: $p = 0.798$; non-Hispanic white vs. Mexican American/Other Hispanic: $p > 0.999$; non-Hispanic white vs. non-Hispanic Asian: $p > 0.999$; non-Hispanic white vs. Other: $p > 0.999$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p = 0.158$; non-Hispanic Black vs. non-Hispanic Asian: $p = 0.184$; non-Hispanic Black vs. Other: $p > 0.999$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p > 0.999$; Mexican American/Other Hispanic vs. Other: $p > 0.999$; non-Hispanic Asian vs. Other: $p > 0.999$. For mean

change in dietary carbon footprint from milk and dairy substitutions: non-Hispanic white vs. non-Hispanic Black: $p>0.999$; non-Hispanic white vs. Mexican American/Other Hispanic: $p>0.999$; non-Hispanic white vs. non-Hispanic Asian: $p>0.999$; non-Hispanic white vs. Other: $p>0.999$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p>0.999$; non-Hispanic Black vs. non-Hispanic Asian: $p>0.999$; non-Hispanic Black vs. Other: $p>0.999$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p>0.999$; Mexican American/Other Hispanic vs. Other: $p>0.999$; non-Hispanic Asian vs. Other: $p>0.999$. For mean change in dietary carbon footprint from beverage substitutions: non-Hispanic white vs. non-Hispanic Black: $p>0.999$; non-Hispanic white vs. Mexican American/Other Hispanic: $p=0.121$; non-Hispanic white vs. non-Hispanic Asian: $p>0.999$; non-Hispanic white vs. Other: $p=0.094$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p>0.999$; non-Hispanic Black vs. non-Hispanic Asian: $p>0.999$; non-Hispanic Black vs. Other: $p=0.444$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p>0.999$; Mexican American/Other Hispanic vs. Other: $p>0.999$; non-Hispanic Asian vs. Other: $p=0.530$. For mean change in dietary quality from protein substitutions: non-Hispanic white vs. non-Hispanic Black: $p>0.999$; non-Hispanic white vs. Mexican American/Other Hispanic: $p>0.999$; non-Hispanic white vs. non-Hispanic Asian: $p=0.407$; non-Hispanic white vs. Other: $p>0.999$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p>0.999$; non-Hispanic Black vs. non-Hispanic Asian: $p>0.999$; non-Hispanic Black vs. Other: $p>0.999$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p>0.999$; Mexican American/Other Hispanic vs. Other: $p>0.999$; non-Hispanic Asian vs. Other: $p>0.999$. For mean change in dietary quality from mixed dishes substitutions: non-Hispanic white vs. non-Hispanic Black: $p>0.999$; non-Hispanic white vs. Mexican American/Other Hispanic: $p=0.400$; non-Hispanic white vs. non-Hispanic Asian: $p=0.120$; non-Hispanic white vs. Other: $p>0.999$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p=0.066$; non-Hispanic Black vs. non-Hispanic Asian: $p=0.163$; non-Hispanic Black vs. Other: $p>0.999$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p<0.001$; Mexican American/Other Hispanic vs. Other: $p=0.101$; non-Hispanic Asian vs. Other: $p>0.999$. For mean change in dietary quality from milk and dairy substitutions: non-Hispanic white vs. non-Hispanic Black: $p<0.001$; non-Hispanic white vs. Mexican American/Other Hispanic: $p=0.085$; non-Hispanic white vs. non-Hispanic Asian: $p>0.999$; non-Hispanic white vs. Other: $p>0.999$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p>0.999$; non-Hispanic Black vs. non-Hispanic Asian: $p=0.914$; non-Hispanic Black vs. Other: $p>0.999$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p>0.999$; Mexican American/Other Hispanic vs. Other: $p>0.999$; non-Hispanic Asian vs. Other: $p>0.999$. For mean change in dietary quality from beverage substitutions: non-Hispanic white vs. non-Hispanic Black: $p=0.027$; non-Hispanic white vs. Mexican American/Other Hispanic: $p>0.999$; non-Hispanic white vs. non-Hispanic Asian: $p=0.389$; non-Hispanic white vs. Other: $p>0.999$; non-Hispanic Black vs. Mexican American/Other Hispanic: $p=0.005$; non-Hispanic Black vs. non-Hispanic Asian: $p<0.001$; non-Hispanic Black vs. Other: $p=0.480$; Mexican American/Other Hispanic vs. non-Hispanic Asian: $p=0.008$; Mexican American/Other Hispanic vs. Other: $p>0.999$; non-Hispanic Asian vs. Other: $p=0.854$.

Supplementary Table 10. Impact of protein, mixed dish, milk and dairy, and beverage substitutions on Healthy Eating Index component scores and nutrient intakes among those with substitutions, primary analyses

	Protein substitutions		Mixed dish substitutions		Milk and dairy substitutions		Beverages substitutions		All substitutions	
	Absolute difference, Mean $\pm$ SE	<i>p</i>	Absolute difference, Mean $\pm$ SE	<i>p</i>	Absolute difference, Mean $\pm$ SE	<i>p</i>	Absolute difference, Mean $\pm$ SE	<i>p</i>	Absolute difference, Mean $\pm$ SE	<i>p</i>
Healthy Eating Index Component										
Total vegetables	0.03 $\pm$ 0.01	0.001	0.42 $\pm$ 0.03	<0.001	0.00 $\pm$ 0.00	-	-0.03 $\pm$ 0.01	0.001	0.12 $\pm$ 0.01	<0.001
Greens and beans	0.00 $\pm$ 0.00	-	0.72 $\pm$ 0.07	<0.001	0.00 $\pm$ 0.00	-	-0.08 $\pm$ 0.02	0.006	0.19 $\pm$ 0.03	<0.001
Total fruit	0.00 $\pm$ 0.00	-	0.00 $\pm$ 0.00	0.665	-0.02 $\pm$ 0.00	<0.001	0.54 $\pm$ 0.04	<0.001	0.12 $\pm$ 0.01	<0.001
Whole fruit	0.00 $\pm$ 0.00	-	0.00 $\pm$ 0.00	0.333	-0.04 $\pm$ 0.01	<0.001	1.48 $\pm$ 0.12	<0.001	0.34 $\pm$ 0.04	<0.001
Whole grains	-0.04 $\pm$ 0.01	<0.001	-0.13 $\pm$ 0.03	0.001	0.00 $\pm$ 0.00	-	0.00 $\pm$ 0.00	-	-0.05 $\pm$ 0.01	0.001
Dairy	-0.01 $\pm$ 0.00	0.082	-0.63 $\pm$ 0.06	<0.001	0.22 $\pm$ 0.04	<0.001	-0.53 $\pm$ 0.06	<0.001	-0.18 $\pm$ 0.03	<0.001
Total protein foods	0.13 $\pm$ 0.01	<0.001	0.14 $\pm$ 0.03	<0.001	0.10 $\pm$ 0.01	<0.001	0.00 $\pm$ 0.00	0.744	0.13 $\pm$ 0.01	<0.001
Seafood and plant proteins	0.39 $\pm$ 0.05	<0.001	1.18 $\pm$ 0.07	<0.001	0.40 $\pm$ 0.04	<0.001	0.02 $\pm$ 0.01	0.175	0.66 $\pm$ 0.03	<0.001
Fatty acids	0.90 $\pm$ 0.05	<0.001	1.82 $\pm$ 0.11	<0.001	1.81 $\pm$ 0.09	<0.001	0.32 $\pm$ 0.04	<0.001	2.00 $\pm$ 0.07	<0.001
Sodium	-0.66 $\pm$ 0.05	<0.001	-0.33 $\pm$ 0.06	<0.001	-0.25 $\pm$ 0.01	<0.001	0.06 $\pm$ 0.02	0.003	-0.39 $\pm$ 0.03	<0.001
Refined grains	-0.01 $\pm$ 0.01	0.480	-0.44 $\pm$ 0.04	<0.001	0.00 $\pm$ 0.00	-	0.00 $\pm$ 0.00	0.161	-0.13 $\pm$ 0.01	<0.001
Saturated fat	1.33 $\pm$ 0.06	<0.001	2.06 $\pm$ 0.10	<0.001	1.30 $\pm$ 0.06	<0.001	0.27 $\pm$ 0.03	<0.001	1.79 $\pm$ 0.06	<0.001
Added sugars	0.00 $\pm$ 0.00	0.011	-0.01 $\pm$ 0.01	0.122	-0.76 $\pm$ 0.04	<0.001	0.17 $\pm$ 0.05	0.004	-0.43 $\pm$ 0.03	<0.001
Nutrients (per day)										
Calcium (mg)	11.45 $\pm$ 2.58	<0.001	-30.02 $\pm$ 5.31	<0.001	165.09 $\pm$ 8.43	<0.001	-0.98 $\pm$ 9.12	0.916	97.28 $\pm$ 6.57	<0.001
Dietary fiber (g)	0.65 $\pm$ 0.07	<0.001	3.04 $\pm$ 0.16	<0.001	1.06 $\pm$ 0.05	<0.001	4.08 $\pm$ 0.18	<0.001	2.71 $\pm$ 0.08	<0.001
Folate (mcg DFE)	16.15 $\pm$ 2.02	<0.001	61.95 $\pm$ 2.14	<0.001	19.94 $\pm$ 1.10	<0.001	39.13 $\pm$ 6.18	<0.001	44.18 $\pm$ 2.23	<0.001
Potassium (mg)	152.94 $\pm$ 18.29	<0.001	75.87 $\pm$ 6.15	<0.001	28.20 $\pm$ 6.33	<0.001	214.64 $\pm$ 45.04	<0.001	128.95 $\pm$ 12.11	<0.001
Iron (mg)	-0.75 $\pm$ 0.10	<0.001	0.36 $\pm$ 0.05	<0.001	1.93 $\pm$ 0.07	<0.001	0.17 $\pm$ 0.03	<0.001	1.18 $\pm$ 0.06	<0.001
Vitamin B12, natural (mcg)	-0.84 $\pm$ 0.09	<0.001	-0.64 $\pm$ 0.06	<0.001	2.04 $\pm$ 0.12	<0.001	-0.01 $\pm$ 0.05	0.914	0.89 $\pm$ 0.09	<0.001
Vitamin B12, added (mcg)	0.32 $\pm$ 0.03	<0.001	0.64 $\pm$ 0.06	<0.001	3.56 $\pm$ 0.16	<0.001	0.32 $\pm$ 0.06	<0.001	2.58 $\pm$ 0.12	<0.001
Vitamin D (mcg)	0.81 $\pm$ 0.17	<0.001	-0.09 $\pm$ 0.02	<0.001	0.91 $\pm$ 0.08	<0.001	-0.15 $\pm$ 0.08	0.095	0.70 $\pm$ 0.07	<0.001
Zinc (mg)	-2.81 $\pm$ 0.19	<0.001	-2.04 $\pm$ 0.05	<0.001	-0.32 $\pm$ 0.02	<0.001	-0.01 $\pm$ 0.04	0.878	-1.48 $\pm$ 0.06	<0.001

Note. DFE: dietary folate equivalents. Table shows the potential impact of replacing high-carbon-impact foods with lower-carbon-impact substitutes on dietary quality (as assessed by Healthy Eating Index 2015 scores) and nutrient intakes. When there were multiple feasible substitutes for a given high-carbon-impact food, primary analyses (shown here) assumed respondents replaced the high-carbon-impact food with the lowest-carbon-intensity substitute. *P*-values are from paired two-tailed *t*-tests.

Supplementary Table 11. Impact of protein, mixed dish, milk and dairy, and beverage substitutions on dietary quality among those with substitutions, secondary analyses examining replacing high-carbon-impact foods with the highest-carbon-intensity lower-carbon-impact substitutes

	Healthy Eating Index Scores (0–100)					
	<i>n</i> (%)	Before substitution, Mean ± SE	After substitution, Mean ± SE	Absolute difference, Mean ± SE	Proportional difference	<i>p</i>
Protein	1,281 (17%)	48.99 ± 0.53	50.26 ± 0.52	1.27 ± 0.10	2.6%	<0.001
Mixed dishes	1,653 (21%)	46.44 ± 0.57	47.92 ± 0.55	1.48 ± 0.13	3.2%	<0.001
Milk and dairy	3,534 (46%)	53.47 ± 0.54	54.60 ± 0.44	1.12 ± 0.13	2.1%	<0.001
Beverages	1,614 (21%)	54.16 ± 0.73	56.37 ± 0.60	2.21 ± 0.19	4.1%	<0.001
All categories	5,676 (73%)	51.02 ± 0.51	52.96 ± 0.43	1.94 ± 0.12	3.8%	<0.001

Note. Table shows the potential impact of replacing high-carbon-impact foods with lower-carbon-impact substitutes on dietary quality for those with substitutions (i.e., any individual who consumed one of the high-carbon-impact foods on the 24-hour recall day). When there were multiple feasible substitutes for a given high-carbon-impact food, secondary analyses (shown here) assumed respondents replaced the high-carbon-impact food with the higher-carbon intensity substitute (which still had lower carbon intensity than the high-carbon-impact food). High-carbon-impact beverages had only one substitute, so results for secondary analyses of beverages are identical to primary analyses. *P*-values are from paired two-tailed *t*-tests.

Supplementary Table 12. 47 protein foods that were highest ranked on overall dietary carbon footprint and on consumed intensity of greenhouse gas emissions

Food code	Food description	Overall carbon footprint (kg CO ₂ -eq)	Intensity (kg CO ₂ -eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
21101130	Beef steak, broiled or baked, lean only eaten	33,734,008	4.21	801,136	1	29
21101120	Beef steak, broiled or baked, lean and fat eaten	21,649,889	4.21	514,155	2	56
21500310	Ground beef patty, cooked	12,412,096	4.21	294,796	3	59
21500100	Ground beef, cooked	10,719,928	4.21	254,606	4	60
21102130	Beef steak, fried, lean only eaten	10,488,688	4.10	255,920	5	71
21105130	Beef steak, braised, lean only eaten	9,360,672	4.21	222,303	6	55
25221500	Salami, NFS	9,254,632	2.67	346,071	7	100
21401000	Beef, roast, roasted, NS as to fat eaten	6,949,759	4.21	165,047	9	37
21102120	Beef steak, fried, lean and fat eaten	6,456,783	4.11	156,978	10	69
26319110	Shrimp, cooked, NS as to cooking method	6,414,592	5.13	125,154	11	7
21420100	Beef, sandwich steak, flaked, formed, thinly sliced	6,256,187	4.21	148,580	12	58
21401120	Beef, roast, roasted, lean only eaten	6,100,533	4.21	144,879	13	47
25231110	Beef, prepackaged or deli, luncheon meat	5,571,662	3.74	148,976	14	75
26319145	Shrimp, coated, fried, from fast food / restaurant	5,414,681	3.51	154,374	15	82
26319130	Shrimp, steamed or boiled	5,185,908	5.13	101,181	16	6
21407120	Beef, pot roast, braised or boiled, lean only eaten	4,752,443	4.21	112,864	17	40
21602100	Beef jerky	4,558,345	5.40	84,345	18	1
25210210	Frankfurter or hot dog, beef	3,598,121	3.62	99,260	24	78
21101000	Beef steak, NS as to cooking method, NS as to fat eaten	3,507,282	4.21	83,293	25	53
23101010	Lamb chop, NS as to cut, cooked, lean and fat eaten	3,440,549	4.75	72,498	26	15
21304120	Beef, shortribs, cooked, lean only eaten	3,375,663	4.21	80,167	27	43
21416150	Corned beef, canned, ready-to-eat	3,182,669	4.17	76,332	28	62
26319120	Shrimp, baked or broiled, made with oil	3,177,633	4.96	64,090	29	12
21000100	Beef, NS as to cut, cooked, NS as to fat eaten	3,152,408	4.21	74,865	30	57
21417120	Beef brisket, cooked, lean only eaten	3,115,582	4.21	73,991	31	51

Food code	Food description	Overall carbon footprint (kg CO₂-eq)	Intensity (kg CO₂-eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
21416000	Corned beef, cooked, NS as to fat eaten	3,067,453	4.15	73,910	32	67
21104110	Beef steak, battered, fried, NS as to fat eaten	2,998,315	3.22	93,230	33	88
21401110	Beef, roast, roasted, lean and fat eaten	2,708,441	4.21	64,322	35	41
21101020	Beef steak, NS as to cooking method, lean only eaten	2,596,703	4.21	61,668	36	36
26305160	Crab, hard shell, steamed	2,444,013	5.13	47,685	37	5
25221215	Pastrami, NFS	2,339,290	4.09	57,258	41	73
23132000	Lamb, ground or patty, cooked	2,271,464	4.75	47,863	42	24
21101110	Beef steak, broiled or baked, NS as to fat eaten	2,263,110	4.21	53,746	43	45
21103130	Beef steak, breaded or floured, baked or fried, lean only eaten	2,104,897	3.13	67,287	47	92
25220105	Beef sausage	2,035,816	3.64	55,878	48	77
21105120	Beef steak, braised, lean and fat eaten	1,874,528	4.21	44,517	52	52
23000100	Lamb, NS as to cut, cooked	1,839,470	4.75	38,761	53	26
21301000	Beef, oxtails, cooked	1,601,792	4.21	38,040	61	33
21304110	Beef, shortribs, cooked, lean and fat eaten	1,342,214	4.21	31,876	67	34
26319123	Shrimp, baked or broiled, made without fat	947,473	5.12	18,501	81	8
26319140	Shrimp, coated, fried, made with oil	931,083	3.51	26,545	82	80
25221810	Thuringer	883,590	3.36	26,296	84	86
21417110	Beef brisket, cooked, lean and fat eaten	859,117	4.21	20,403	88	48
23101020	Lamb chop, NS as to cut, cooked, lean only eaten	851,211	4.75	17,936	89	19
26311120	Lobster, baked or broiled, fat added in cooking	831,550	4.98	16,683	91	10
21105110	Beef steak, braised, NS as to fat eaten	791,459	4.21	18,796	94	39
21417100	Beef brisket, cooked, NS as to fat eaten	770,037	4.21	18,287	97	32

Note. Table shows the total carbon emissions to produce these foods for the total amount consumed by the overall sample expressed in kg of CO₂-eq ('overall carbon footprint'), intensity (greenhouse gas emissions released in the production of the food per 100g produced), amount of the food consumed by the overall sample, the food's ranking on overall carbon footprint and intensity relative to other foods in this food group.

Supplementary Table 13. 26 mixed dishes that were highest ranked on overall dietary carbon footprint and on consumed intensity of greenhouse gas emissions

Food code	Food description	Overall carbon footprint (kg CO ₂ -eq)	Intensity (kg CO ₂ -eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
27214110	Meat loaf made with beef, with tomato-based sauce	10,681,356	2.36	451,658	2	37
27214100	Meat loaf made with beef	10,189,150	2.86	356,614	4	17
58100100	Burrito with meat	9,194,988	2.32	396,308	5	39
27564060	Frankfurter or hot dog sandwich, beef, plain, on white bun	8,966,524	2.09	429,793	6	58
27116200	Beef with barbecue sauce	6,871,869	3.26	210,724	9	8
58101323	Taco or tostada with meat, from fast food	5,265,642	2.16	243,358	14	47
27515020	Steak and cheese submarine sandwich, with lettuce and tomato	4,817,965	1.87	256,996	15	86
58101555	Soft taco with fish	4,474,636	3.37	132,784	19	6
27510241	Cheeseburger, 1 medium patty, plain, on white bun	4,030,988	2.13	189,274	21	51
27510451	Double bacon cheeseburger, 2 medium patties, with condiments	3,998,680	2.69	148,894	22	24
27510387	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (McDonald's Double Cheeseburger)	3,786,898	1.81	209,250	25	94
27510631	Hamburger, 1 medium patty, plain, on white bun	3,085,720	2.49	123,696	30	31
27260080	Meat loaf made with beef and pork	2,503,538	1.89	132,657	43	85
27212000	Beef and noodles, no sauce	2,329,482	1.93	120,974	48	79
27510681	Double hamburger, 2 medium patties, with condiments, on bun, from fast food / restaurant (Burger King Double Whopper)	2,033,016	2.06	98,542	54	62
27510215	Cheeseburger, 1 medium patty, plain, on bun, from fast food	1,968,714	2.13	92,440	56	50
27111000	Beef with tomato-based sauce	1,965,561	2.09	93,887	57	56
27510389	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (McDonald's Big Mac)	1,909,790	1.81	105,528	60	93
27513010	Roast beef sandwich	1,880,167	2.63	71,437	61	25

Food code	Food description	Overall carbon footprint (kg CO₂-eq)	Intensity (kg CO₂-eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
27510388	Double cheeseburger, 2 small patties, with condiments, on bun, from fast food / restaurant (McDonald's McDouble)	1,731,513	1.81	95,677	66	89
27130100	Lamb or mutton curry	1,656,213	2.74	60,418	70	20
27510401	Double cheeseburger, 2 medium patties, plain, on bun, from fast food / restaurant	1,598,568	2.23	71,714	75	43
27564070	Frankfurter or hot dog sandwich, beef, plain, on white bread	1,434,934	2.09	68,781	81	57
27513050	Roast beef sandwich with cheese	1,366,478	2.38	57,301	86	36
27112010	Salisbury steak with gravy	1,299,971	2.25	57,843	92	41
27111310	Beef stew, no potatoes, tomato-based sauce, with chili peppers, Mexican style	1,234,029	2.02	61,154	100	72

Note. Table shows the total carbon emissions to produce these foods for the total amount consumed by the overall sample expressed in kg of CO₂-eq ('overall carbon footprint'), intensity (greenhouse gas emissions released in the production of the food per 100g produced), amount of the food consumed by the overall sample, the food's ranking on overall carbon footprint and intensity relative to other foods in this food group.

Supplementary Table 14. 60 milk and dairy items that were highest ranked on overall dietary carbon footprint and on consumed intensity of greenhouse gas emissions

Food code	Food description	Overall carbon footprint (kg CO ₂ -eq)	Intensity (kg CO ₂ -eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
14410110	Cheese, American	10,457,725	1.36	766,555	3	53
14104100	Cheese, cheddar	10,383,971	1.36	761,149	4	52
14204010	Cheese, cottage, low fat	7,674,509	1.36	562,545	5	9
14010000	Cheese, NFS	5,548,394	1.36	406,700	7	51
14201010	Cheese, cottage, creamed, large or small curd	4,282,395	1.36	313,901	9	5
14107030	Cheese, mozzarella, part skim	3,280,001	1.36	240,425	10	8
14108400	Cheese, provolone	2,515,137	1.36	184,361	11	6
14109010	Cheese, Swiss	1,831,718	1.36	134,266	12	10
14660200	Mozzarella sticks, breaded, baked, or fried	1,630,932	0.71	231,149	13	56
11511550	Chocolate milk, ready to drink, reduced sugar, NS as to milk	1,625,737	0.21	774,403	14	98
11511200	Chocolate milk, ready to drink, reduced fat	1,558,078	0.21	738,550	15	94
14203020	Cheese, cottage, salted, dry curd	1,421,653	1.36	104,208	17	40
14107010	Cheese, mozzarella, NFS	1,384,227	1.36	101,464	18	13
11435020	Yogurt, Greek, low fat milk, flavors other than fruit	1,354,441	0.32	429,973	19	68
14200100	Cheese, cottage, NFS	1,342,262	1.36	98,388	20	22
14104250	Cheese, Colby jack	1,302,274	1.36	95,457	21	2
11511100	Chocolate milk, ready to drink, whole	1,282,539	0.23	553,205	22	83
11511000	Chocolate milk, NFS	1,139,536	0.23	491,523	24	82
14106200	Cheese, Monterey	1,123,690	1.36	82,367	25	17
14108010	Cheese, parmesan, dry grated	1,090,065	1.36	79,902	26	4
11511400	Chocolate milk, ready to drink, low fat	905,655	0.21	429,293	27	96
11542100	Milk shake, fast food, chocolate	830,128	0.21	386,783	29	92
14420100	Cheese spread, American or cheddar cheese base	809,453	1.36	59,333	30	14
14104400	Cheese, feta	790,308	1.36	57,930	31	7
11435030	Yogurt, Greek, nonfat milk, flavors other than fruit	720,907	0.32	228,855	32	72

Food code	Food description	Overall carbon footprint (kg CO ₂ -eq)	Intensity (kg CO ₂ -eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
14104110	Cheese, cheddar, reduced fat	693,309	1.36	50,820	34	19
14133000	Queso fresco	677,627	1.36	49,670	35	16
14104200	Cheese, Colby	641,631	1.36	47,032	36	18
14410120	Cheese, American, reduced fat	567,881	1.36	41,626	39	1
11541110	Milk shake, home recipe, chocolate	541,872	0.29	188,993	40	75
11434090	Yogurt, NS as to type of milk, flavors other than fruit	498,090	0.32	158,121	42	69
14131500	Queso asadero	494,518	1.36	36,248	44	12
11434200	Yogurt, low fat milk, flavors other than fruit	486,483	0.32	154,436	45	67
14105010	Cheese, Gouda or Edam	453,881	1.36	33,270	49	20
14120010	Cheese, Mexican blend	449,772	1.36	32,968	50	15
14107200	Cheese, Muenster	415,506	1.36	30,457	55	11
14109030	Cheese, Swiss, reduced fat	363,758	1.36	26,664	57	31
14610520	Cheese with nuts	351,990	0.88	40,080	59	54
11435000	Yogurt, Greek, NS as to type of milk, flavors other than fruit	336,399	0.32	106,791	61	73
14102010	Cheese, brick	288,762	1.36	21,166	67	26
14108020	Cheese, parmesan, hard	274,374	1.36	20,112	68	3
11513381	Chocolate milk, made from dry mix with whole milk (Nesquik)	267,576	0.21	128,548	69	99
11514110	Hot chocolate / cocoa, made with dry mix and whole milk	251,697	0.26	97,822	70	78
11434300	Yogurt, nonfat milk, flavors other than fruit	248,278	0.30	82,302	71	74
11220000	Milk, condensed, sweetened	246,543	0.47	52,683	72	57
14201200	Cottage cheese, Farmer's	236,616	1.36	17,344	73	28
14420160	Cheese spread, Swiss cheese base	229,143	1.36	16,796	74	39
11514310	Hot chocolate / Cocoa, made with no sugar added dry mix and water	197,030	0.24	81,403	77	80
11514120	Hot chocolate / Cocoa, made with dry mix and reduced fat milk	190,427	0.24	78,836	79	81
14101010	Cheese, blue or Roquefort	184,082	1.36	13,493	80	25

Food code	Food description	Overall carbon footprint (kg CO₂-eq)	Intensity (kg CO₂-eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
11514320	Hot chocolate / Cocoa, made with no sugar added dry mix and whole milk	178,869	0.41	44,012	81	58
11511600	Chocolate milk, ready to drink, low fat (Nesquik)	173,038	0.21	82,022	82	95
11434100	Yogurt, whole milk, flavors other than fruit	138,326	0.32	43,912	85	71
14108420	Cheese, provolone, reduced fat	123,611	1.36	9,061	87	42
14420300	Cheese spread, pressurized can	119,553	1.36	8,763	89	35
14410330	Cheese spread, American or cheddar cheese base, reduced fat	106,503	1.36	7,807	92	27
14502000	Imitation cheese	99,994	1.36	7,330	93	32
14104600	Cheese, fontina	99,049	1.36	7,260	94	34
14104700	Cheese, goat	94,048	1.36	6,894	97	24
11526000	Milk, malted	93,810	0.23	40,581	98	85

Note. Table shows the total carbon emissions to produce these foods for the total amount consumed by the overall sample expressed in kg of CO₂-eq ('overall carbon footprint'), intensity (greenhouse gas emissions released in the production of the food per 100g produced), amount of the food consumed by the overall sample, the food's ranking on overall carbon footprint and intensity relative to other foods in this food group.

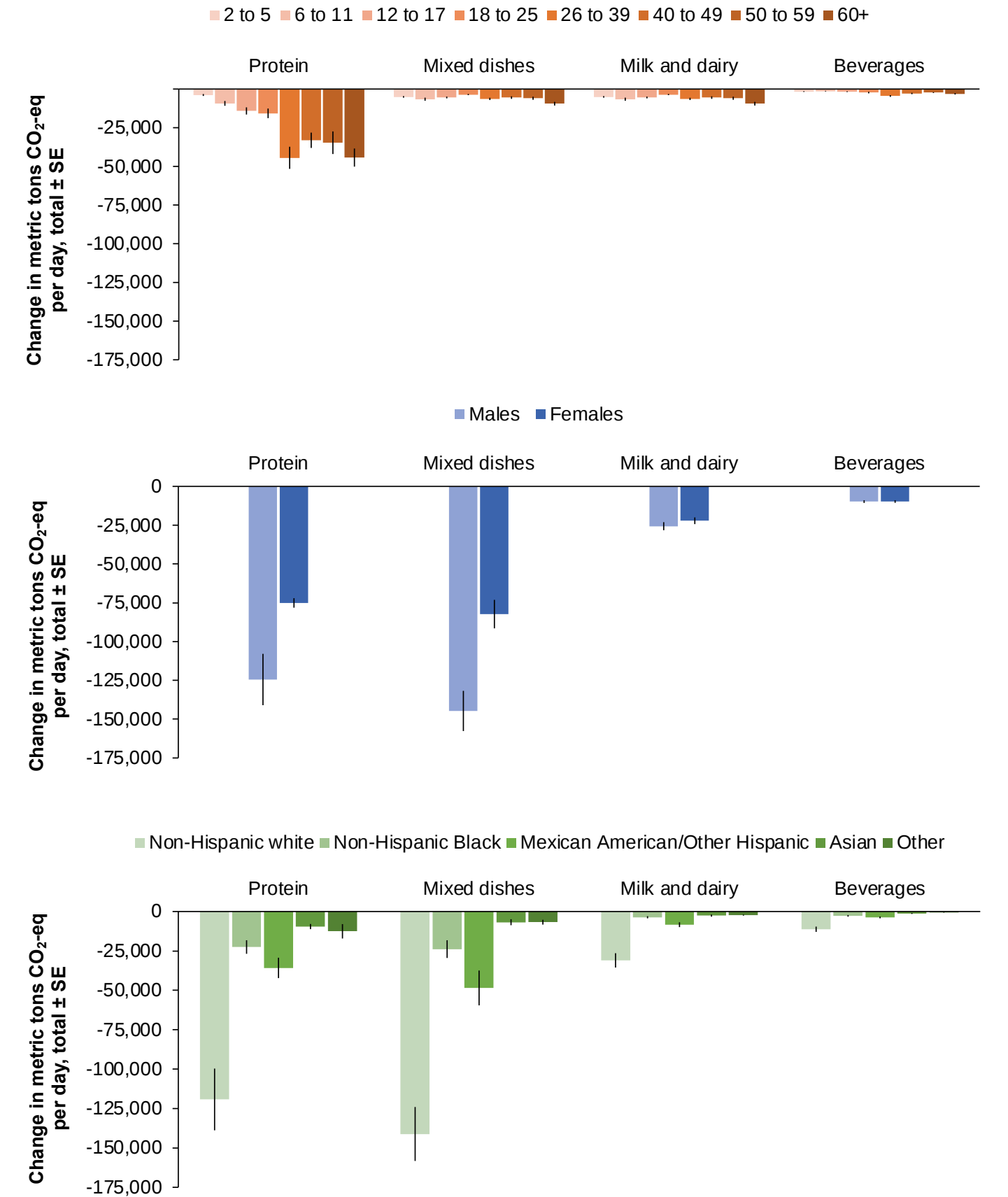
Supplementary Table 15. 55 non-alcoholic beverages that were highest ranked on overall dietary carbon footprint and on consumed intensity of greenhouse gas emissions

Food code	Food description	Overall carbon footprint (kg CO ₂ -eq)	Intensity (kg CO ₂ -eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
64104010	Apple juice, 100%	4,621,987	0.15	3,074,099	2	30
64100200	Cranberry juice blend, 100% juice	1,838,320	0.18	1,037,260	4	24
11553110	Fruit smoothie, with whole fruit and dairy	1,776,120	0.14	1,236,782	6	32
64100110	Fruit juice blend, 100% juice	1,609,322	0.16	997,369	7	25
11553120	Fruit smoothie, with whole fruit and dairy, added protein	1,585,821	0.23	704,667	8	6
92510960	Lemonade, fruit flavored drink	1,585,030	0.08	1,876,977	9	98
64116020	Grape juice, 100%	1,173,148	0.18	637,400	11	16
78101110	Fruit and vegetable smoothie, added protein	965,759	0.46	210,604	12	1
92102450	Iced coffee, pre-lightened and pre-sweetened	832,309	0.14	611,968	14	52
64124020	Pineapple juice, 100%	651,337	0.22	300,661	17	8
42403010	Coconut water, unsweetened	647,540	0.37	176,710	18	2
64104030	Apple juice, 100%, with calcium added	632,054	0.13	470,808	19	55
95103000	Nutritional drink or shake, ready-to-drink (Ensure)	620,133	0.14	455,473	20	49
95322200	Sports drink, low calorie (Gatorade G2)	559,570	0.11	532,220	22	81
78101100	Fruit and vegetable smoothie	514,341	0.11	470,045	24	79
64100220	Cranberry juice blend, 100% juice, with calcium added	506,353	0.18	283,681	25	20
92306800	Tea, hot, chai, with milk	441,067	0.08	536,924	31	99
92102600	Coffee, iced cafe mocha	414,114	0.18	232,686	32	22
92101950	Coffee, cafe mocha	379,437	0.18	213,201	34	21
64101010	Apple cider	334,855	0.15	222,713	37	29
92101900	Coffee, latte	329,467	0.12	271,128	38	67
92101850	Coffee, cafe con leche	322,603	0.09	360,953	40	93
92101904	Coffee, latte, flavored	304,759	0.14	224,079	42	53
64204010	Mango nectar	271,028	0.10	264,965	44	82
92530510	Cranberry juice drink, with high vitamin C	268,162	0.08	316,729	45	97
92161000	Coffee, cappuccino	265,944	0.10	266,636	46	85
92101920	Frozen coffee drink	263,360	0.11	236,780	47	78
64126000	Pomegranate juice, 100%	254,963	0.22	114,783	48	7
64104600	Blackberry juice, 100%	247,627	0.20	122,746	49	12

Food code	Food description	Overall carbon footprint (kg CO ₂ -eq)	Intensity (kg CO ₂ -eq/100g)	Amount consumed (kg)	Overall carbon footprint rank	Intensity rank
95120010	Nutritional drink or shake, high protein, ready-to-drink, NF	232,766	0.11	203,330	50	74
92101925	Frozen coffee drink, with whipped cream	225,296	0.14	160,423	52	33
92102030	Frozen mocha coffee drink, with whipped cream	198,016	0.14	141,903	57	36
78101000	Vegetable and fruit juice, 100% juice, with high vitamin C	196,530	0.13	148,839	58	58
92101960	Coffee, cafe mocha, with non-dairy milk	193,464	0.31	63,269	59	4
61213800	Fruit juice blend, citrus, 100% juice	190,520	0.14	137,403	60	38
92101901	Coffee, latte, nonfat	189,984	0.12	156,343	61	68
64116060	Grape juice, 100%, with calcium added	182,279	0.15	122,799	62	31
64134100	Fruit smoothie, light	173,642	0.10	171,949	64	83
11551050	Licuado or batido	167,166	0.13	129,517	65	59
92610030	Horchata beverage, made with milk	144,871	0.16	90,007	70	26
95103010	Nutritional drink or shake, ready-to-drink (Ensure plus)	131,332	0.14	96,460	72	44
61201220	Grapefruit juice, 100%, canned, bottled or in a carton	120,121	0.19	62,495	76	13
95101010	Nutritional drink or shake, ready-to-drink (Boost plus)	120,034	0.14	88,162	77	46
61201225	Grapefruit juice, 100%, with calcium added	119,033	0.19	61,929	78	14
64100100	Fruit juice, NFS	115,411	0.09	126,163	79	90
64133100	Watermelon juice, 100%	109,554	0.27	40,925	81	5
92101910	Coffee, latte, decaffeinated	109,310	0.12	89,954	82	70
11553130	Fruit smoothie juice drink, with dairy	108,195	0.12	88,834	83	66
95101000	Nutritional drink or shake, ready-to-drink (Boost)	103,616	0.14	76,104	86	47
64134200	Fruit smoothie, bottled	101,272	0.12	83,150	87	64
95120000	Nutritional drink or shake, ready-to-drink, NFS	97,716	0.14	71,770	89	48
95105000	Nutritional drink or shake, ready-to-drink (Kellogg's Special K Protein)	96,016	0.14	70,521	90	45
42404010	Coconut water, sweetened	95,408	0.35	27,079	91	3
92101851	Coffee, cafe con leche, decaffeinated	88,284	0.09	98,779	97	94
92101917	Coffee, latte, decaffeinated, flavored	80,125	0.14	58,913	99	51

Note. Table shows the total carbon emissions to produce these foods for the total amount consumed by the overall sample expressed in kg of CO₂-eq ('overall carbon footprint'), intensity (greenhouse gas emissions released in the production of the food per 100g produced), amount of the food consumed by the overall sample, the food's ranking on overall carbon footprint and intensity relative to other foods in this food group.

Supplementary Figure 1. Contribution of population subgroups to changes in total dietary carbon footprint (i.e., scaled to the entire US population) after protein, mixed dish, milk and dairy, and beverage substitutions



Note. Figure shows the potential impact of replacing high-carbon-impact foods with lower-carbon-impact substitutes on the total dietary carbon footprint of the entire US population (i.e., scaling individual reductions to the represent the US non-institutionalized civilian population aged 2 and older based on survey weights supplied with the NHANES data; for 2015-2016 NHANES, this was 302,664,256 individuals). We derived estimates using the NHANES 2015-2016 data, which included the following sample sizes for each demographic group: age 2-5: n=654; age 6-11: n=1025; age 12-17: n=933; age 18-25: n=682; age 26-39: n=1178; age 40-49: n=818; age 50-59: n=802; age 60 and over: n=1661; gender: male: n=3793; female: n=3960; race/ethnicity: non-Hispanic white: n=2509; non-Hispanic Black: n=1676; Mexican American/Other Hispanic: n=2480; non-Hispanic Asian: n=718; Other: n=370). Reductions are shown for age, gender, and race/ethnic groups based on these groups' contribution to total carbon footprint reductions from adopting the simulated substitutions. Results are presented in metric tons of carbon dioxide equivalents per day. Data are presented as means $\pm$ 1 SE. When respondents consumed the high-carbon-impact food more than once, all instances were replaced with the substitute. When there were multiple feasible substitutes for a given high-carbon-impact food, primary analyses (shown here) assumed respondents replaced the high-carbon-impact food with the lowest-carbon-intensity substitute. The "Other" race/ethnicity category included respondents who reported their race as non-Hispanic American Indian or Alaska Native, Native Hawaiian or Pacific Islander, or "Other."