

Table 1. Evidence from Umbrella Reviews Evaluating Effect of Low- and No-Calorie Sweetener (LNCS) Consumption on Health Outcomes

Umbrella Reviews	Population	Evidence Included	Intervention	Comparator	Main Findings
Body weight (BW)					
Ayoub-Charette et al 2025	Adults, all health backgrounds	RCTs (n=6 SRs) Cohorts (n=5 SRs)	Any type of LNCS	Vs. SSB Vs. lower /higher LNCS dose	RCTs: small reduction in BW (-1.02 [-1.57, -0.46]) Cohorts: no effect in prevalent analysis; Bias -adjusted analysis (LNCS substitution for sugar) indicated trivial effect (-0.12 [-0.12, -0.10])
			Any type of LNCS	Vs. Water Vs. placebo	RCTs: No effect Cohort: No effect
Choi et al 2026	Adults/adolescents/children	RCTS (n=14 primary studies) Cohorts (n=20 SRs)	Any type of artificial LNCS	Vs. SSB	RCTs: modest reduction in BW (-0.73 kg)
Higgins et al 2024	Healthy and clinical populations (obesity, hypertension, hyperlipidemia, T2D, metabolic syndrome); no age restrictions.	RCTs (n=7 Srs) Cohorts (n=3 SRs) NRS (n=10 SRs)	Any type of LCS used alone or in combination with other foods	Multiple comparators	RCTS: replacing sugar with LNCS consistently showed modest reduction in body weight. Cohorts: Prevalent analysis: Mixed cohort evidence on LNCS intake and body weight (lower weight, unfavorable outcomes, or no association). Substitution analysis of 1 cohort study: Replacing SSBs with LNCS was associated with significantly lower BW.

Jeong et al 2026	Mixed population (adults, children, adolescents, pregnant)	RCTs (6 SRs) Observational (s4 SRs)	Any type of LNCS intake	Multiple comparators (highest vs. lowest)	RCTs: NSS consumption significantly decreased body weight in populations with overweight or obesity (SMD, -0.50; 95% CI, -0.70 to -0.30; GRADE, high) Cohorts: LNCS increased the risk of weight gain metabolic syndrome (eOR, 1.31; 95% CI, 1.21 to 1.42; CE, I), type 2 diabetes (eOR, 1.14; 95% CI, 1.02 to 1.29; CE, IV), and hypertension (eOR, 1.13; 95% CI, 1.07 to 1.19; CE, II).
Body Mass Index (BMI)					
Ayoub-Charette et al 2025	Adults, all health backgrounds	RCTs (n=6 SRs) Cohorts (n=5 SRs)	Any type of LNCS	Vs. SSB Vs. lower /higher LNCS dose	RCTs: small reduction in BMI, LNCS substitution for sugar analysis indicated trivial effect (-0.21 [-0.36, -0.06]) Cohorts: Prevalent analysis indicated association between LNCS intake and obesity incidence (HR:1.76 [1.25,2.49]). However, substitution analysis indicated lower obesity risk (RR:0.88 [0.88, 0.89]).
				Vs. water	RCTs: No effect
Choi et al 2026	Adults/adolescents/children	RCTs (n=14 primary studies) Cohorts (n=20 SRs)	Any type of artificial LNCS	Vs. SSB	RCTs: modest reduction in BMI (-0.31) Cohorts: higher intake of SSBs or LNCS increased risks for T2DM, CVD, and mortality (prevalent analysis).

Higgins et al 2024	Healthy and clinical populations (obesity, hypertension, hyperlipidemia, T2D, metabolic syndrome); no age restrictions.	RCTs (n=7 Srs) Cohorts (n=3 SRs) NRS (n=10 SRs)	Any type of LNCS used alone or in combination with other foods	Multiple comparators	
Jeong et al 2026	Mixed population (adults, children, adolescents, pregnant)	RCTs (6 SRs) Observational (s4 SRs)	Any type of LNCS intake	Multiple comparators (highest vs. lowest)	Cohort: NSSs was associated with increased risk of being overweight (OR, 1.84; 95% CI, 1.30 to 2.61). Highest intake of NSS was associated with increased risks of overweight (OR, 1.84; CI, 1.30 to 2.61;). Children: NSS intake slightly reduced BMI z-score changes in children (SMD, -0.08; 95% CI, -0.14 to -0.03; GRADE, moderate). Pregnant: Maternal intake of LNCS was associated with increased BMI z-scores of offsprings in early childhood.
Waist Circumference (WC)					
Ayoub-Charette et al 2025	Adults, all health backgrounds	RCTs (n=6 SRs) Cohorts (n=5 SRs)	Any type of LNCS	Vs. SSB Vs. lower /higher LNCS dose	RCTs: no effect on WC Cohorts: no effect in prevalent analysis and LNCS substitution for sugars. However, modeling LNCS exposure overtime analysis indicates small important change in WC (-1.15 [-2.34, -0.05])
				Vs. water	RCTs: No effect

HbA1c (%)					
Ayoub-Charette et al 2025	Adults, all health backgrounds	RCTs (n=6 SRs) Cohorts (n=5 SRs)	Any type of LNCS	Vs. SSB Vs. lower /higher LNCS dose	RCTs: No effect in prevalent and LNCS substitution for sugar analysis.
				Vs. water Vs. Placebo	RCTs: Trivial effect was noticed for LNCS vs water/placebo 0.21 [0.02,0.40])
Choi et al 2026	Adults/adolescents/children	RCTS (n=14 primary studies) Cohorts (n=20 SRs)	Any type of Artificial LNCS	Vs. SSB Cohort: highest vs. lowest	RCTs: modest reduction in HbA1c (-0.20 % [-0.39 , -0.01])
Type 2 Diabetes					
Ayoub-Charette et al 2025	Adults, all health backgrounds	RCTs (n=6 SRs) Cohorts (n=5 SRs)	Any type of LNCS	Vs. SSB Vs. lower /higher LNCS dose	Cohorts: Prevalent analysis indicates an association of LNCS intake and T2DM incidence. However, substitution analysis (biased-adjusted) indicated lower T2DM incidence risk.
Beigrezaei et al 2024	Adults, all health backgrounds	Cohort studies (n=6 SRs)	Any type of LNCS	Lower vs higher LNCS dose	Cohorts: Higher LNCS intake associated with relatively small risks of type 2 diabetes and metabolic syndrome.
Choi et al 2026	Adults/adolescents/children	RCTS (n=14 primary studies) Cohorts (n=20 SRs)	Any type of Artificial LNCS	Vs. SSB	Cohorts: higher intake of SSBs or LNCS increased risks for T2DM (prevalent analysis).
Diaz et al 2023	Healthy adults	Cohorts (n=7 SRs)	Any type of Artificial LNCS	Lower vs Higher LNCS dose	Cohorts: High artificial LNCS intake was associated with increased risk for T2DM (prevalent analysis).

All- cause mortality					
Ayoub-Charette et al 2025	Adults, all health backgrounds	RCTs (n=6 SRs) Cohorts (n=5 SRs)	Any type of LNCS	Vs. SSB Vs. lower /higher LNCS dose	Cohorts: Prevalent analysis indicates an association of LNCS intake and all-cause mortality incidence. However, substitution analysis (biased-adjusted) indicated lower all-cause mortality risk.
Beigrezaei et al 2024	Adults, all health backgrounds	Cohort studies (n= 6 SRs)	Any type of LNCS	Lower vs higher LNCS dose	Cohorts: Higher LNCS intake associated with relatively small risks of all-cause mortality (n= 7), stroke (n=5), coronary heart disease (n=4), hypertension (n=3), type 2 diabetes (n=11), metabolic syndrome (n=6), and leukemia (n=3). Higher LNCS consumption was associated with a lower risk of colorectal cancer (n=3). No significant associations for cardiovascular mortality (n=5), cancer mortality (n=4), chronic kidney disease (n=2), or several site-specific cancers.
Choi et al 2026	Adults/adolescents/children	RCTS (n=14 primary studies) Cohorts (n=20 SRs)	Any type of Artificial LNCS	Vs. SSB	Cohorts: higher intake of SSBs or LNCS increased risks for mortality similarly (prevalent analysis).
Diaz et al 2023	Healthy adults	Cohorts (n=7 SRs)	Any type of Artificial LNCS	Lower vs Higher LNCS dose	Cohorts: High artificial LNCS intake was associated with increased risk of all-cause mortality.
Jeong et al 2026	Mixed population (adults, children, adolescents, pregnant)	RCTs (6 SRs) Observational (s4 SRs)	Any type of LNCS intake	Multiple comparators (highest vs. lowest)	Cohort: ASB consumption was associated with increased risks of all-cause mortality (eOR, 1.06; 95% CI, 1.02 to 1.09; CE, III), c

Cardiovascular Disease					
Ayoub-Charette et al 2025	Adults, all health backgrounds	RCTs (n=6 SRs) Cohorts (n=5 SRs)	Any type of LNCS	Vs. SSB Vs. lower /higher LNCS dose	Cohorts: Prevalent analysis indicates an association of LNCS intake and all-cause mortality incidence. However, substitution analysis (biased-adjusted) was associated with lower cardiovascular mortality risk (RR 0.94 [95% CI 0.90, 0.99]). Substitution analysis (biased-adjusted) was associated with lower CHD lower CHD risk (RR 0.89 [95% CI 0.81, 0.98]).
Beigrezaei et al 2024	Adults, all health backgrounds	Cohort studies (n=6 SRs)	Any type of LNCS	Lower vs higher LNCS dose	Cohorts: Higher LNCS intake is associated with relatively small risks of stroke and coronary heart disease.
Choi et al 2026	Adults/adolescents/children	RCTS (n=14 primary studies) Cohorts (n=20 SRs)	Any type of Artificial LNCS	Vs. SSB	Cohorts: higher intake of SSBs or LNCS increased risks for incidence of CVD and CVD mortality similarly (prevalent analysis).
Diaz et al 2023	Healthy adults	Cohorts (n=7 SRs)	Any type of Artificial LNCS	Lower vs Higher LNCS dose	Cohorts: High artificial LNCS intake was associated with increased risk of CVD incidence (prevalent analysis).
Jeong et al 2026	Mixed population (adults, children, adolescents, pregnant)	RCTs (6 SRs) Observational (s4 SRs)	Any type of LNCS intake	Multiple comparators (highest vs. lowest)	ASB consumption was associated with increased risks of CVDs (OR, 1.17; 95% CI, 1.04 to 1.31; CE, IV)

Cancer					
Abu-Zaid et al 2025	Adults, all health backgrounds	Cohort studies (n=10 SRs)	Any type of LNCS	Lower vs higher LNCS dose	Cohort: No significant association between overall artificial sweetener intake and overall cancer risk (RR: 0.99; 95% CI: 0.96–1.01). Higher LNCS consumption was associated with reduced risk only for gynecological cancers (RR: 0.87; 95% CI: 0.79–0.96).
Beigrezaei et al 2024	Adults, all health backgrounds	Cohort studies (n=6 SRs)	Any type of LNCS	Lower vs higher LNCS dose	Cohorts: Higher LNCS intake was associated with relatively small risks of leukemia. Higher LNCS consumption was associated with a lower risk of colorectal cancer. No significant associations for cancer mortality (n=4) or several site-specific cancers.
Choi et al 2026	Adults/adolescents/children	RCTS (n=14 primary studies) Cohorts (n=20 SRs)	Any type of Artificial LNCS	Vs. SSB	Cohorts: Cancer mortality estimates generally close to null (RR, 1.01 to 1.04)
Diaz et al 2023	Healthy adults	Cohorts (n=7 SRs)	Any type of Artificial LNCS	Lower vs Higher LNCS dose	Cohorts: Weak evidence indicated that high artificial LNCS intake was associated with higher risk for all-cause cancer (prevalent analysis).
Total energy intake					
Jeong et al 2026	Mixed population (adults, children, adolescents, pregnant)	RCTs (6 SRs) Observational (s4 SRs)	Any type of LNCS intake	Multiple comparators (highest vs. lowest)	Observational studies: Compared with water or placebo, LCS slightly increased energy intake (SMD, 0.24; 95% CI, 0.08 to 0.40; CE, IV)

Sugar intake					
Jeong et al 2026	Mixed population (adults, children, adolescents, pregnant)	RCTs (6 SRs) Observational (s4 SRs)	Any type of LNCS intake	Multiple comparators (highest vs. lowest)	increased the risk of weight gain (eOR, 1.21; 95% CI, 1.14 to 1.30; CE, IV) and Type 2 diabetes (eOR, 1.03; 95% CI, 1.02 to 1.04; CE, IV), while slightly reducing daily sugar intake (SMD, -0.09; 95% CI, -0.17 to -0.01; CE, IV).