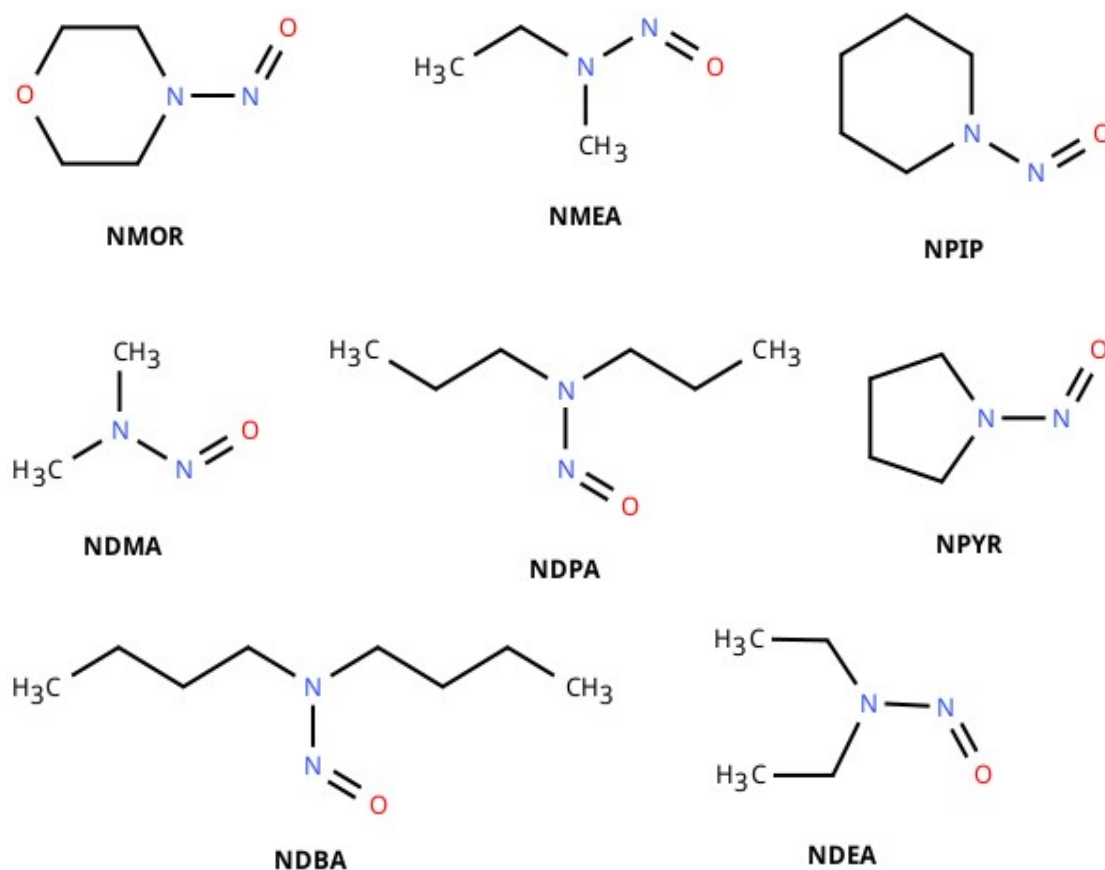


### Supplementary Information



**Fig. S1** Chemical structures of the eight NAMs

**Table S1** Basic information on the eight NAMs

Compound	Abbr	CASN	Formula	Molecular Weight
N-Nitrosodimethylamine	NDMA	62-75-9	C <sub>2</sub> H <sub>6</sub> N <sub>2</sub> O	74.08
N-Nitrosomethylethylamine	NMEA	10595-95-6	C <sub>3</sub> H <sub>8</sub> N <sub>2</sub> O	88.11
N-Nitrosodiethylamine	NDEA	55-18-5	C <sub>4</sub> H <sub>10</sub> N <sub>2</sub> O	102.14
N-Nitrosodipropylamine	NDPA	621-64-7	C <sub>6</sub> H <sub>14</sub> N <sub>2</sub> O	130.19
N-Nitrosomorpholine	NMOR	59-89-2	C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>2</sub>	116.12
N-Nitrosopyrrolidine	NPYR	930-55-2	C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O	100.12
N-Nitrosopiperidine	NPIP	100-75-4	C <sub>5</sub> H <sub>10</sub> N <sub>2</sub> O	114.15
N-Nitrosodibutylamine	NDBA	924-16-3	C <sub>8</sub> H <sub>18</sub> N <sub>2</sub> O	158.24

**Table S2** Baseline characteristics of participants (n = 60)

Characteristic		Mean $\pm$ SD or n (%)
Age, years	Mean $\pm$ SD	10.12 $\pm$ 6.50
	0–6	22 (36.7%)
	6–12	20 (33.3%)
	>12	18 (30.0%)
Sex	Male	31 (51.7%)
	Female	29 (48.3%)
BMI, kg/m <sup>2</sup>	Mean $\pm$ SD	18.26 $\pm$ 4.42
Secondhand smoke exposure (SHS)	Exposed	32 (53.3%)
	Unexposed	28 (46.7%)

**Table S3** Freeze–thaw stability of NDMA and NPYR across three cycles

NAmS	Cycle	Mean $\pm$ SD	CV (%)	Mean change (%)	P value
NDMA	1	2.388 $\pm$ 0.858	3.61	0	0.311
NDMA	2	2.473 $\pm$ 1.009	3.49	2.29	0.311
NDMA	3	2.504 $\pm$ 0.970	3.62	4.04	0.311
NPYR	1	0.390 $\pm$ 0.717	4.47	0	0.779
NPYR	2	0.377 $\pm$ 0.697	4.88	-4.39	0.779
NPYR	3	0.409 $\pm$ 0.757	5.18	0.58	0.779

**Table S4** Individual freeze-thaw stability of NDMA and NPYR across three cycles

subject id	sex	NAMs	cycle 1	cycle 2	cycle 3	P value	BH-adjusted P value
P01	Male	NDMA	1.5594 ± 0.0726	1.7242 ± 0.0884	1.6737 ± 0.0846	0.099	0.149
P01	Male	NPYR	0.1121 ± 0.0049	0.0996 ± 0.0047	0.0990 ± 0.0055	0.066	0.133
P02	Male	NDMA	2.8132 ± 0.1395	3.0355 ± 0.1593	2.9487 ± 0.1394	0.288	0.288
P02	Male	NPYR	0.1057 ± 0.0059	0.1084 ± 0.0045	0.1053 ± 0.0047	0.587	0.587
P03	Male	NDMA	2.9593 ± 0.1428	2.9608 ± 0.1238	3.1719 ± 0.1626	0.288	0.288
P03	Male	NPYR	0.2842 ± 0.0110	0.2671 ± 0.0143	0.3099 ± 0.0157	0.058	0.133
P04	Female	NDMA	1.6706 ± 0.0589	1.5125 ± 0.0415	1.7609 ± 0.0337	0.027	0.082
P04	Female	NPYR	N.D.	N.D.	N.D.	-	-
P05	Female	NDMA	1.7108 ± 0.0440	1.6130 ± 0.0439	1.5688 ± 0.0624	0.051	0.102
P05	Female	NPYR	N.D.	N.D.	N.D.	-	-
P06	Female	NDMA	3.6170 ± 0.0416	3.9936 ± 0.0359	3.8999 ± 0.0360	0.027	0.082
P06	Female	NPYR	1.8386 ± 0.0736	1.7847 ± 0.0954	1.9369 ± 0.1082	0.301	0.402