

Supplemental Material

Comparison of Trihalomethanes in Tap Water and Blood:

A Case Study in the United States

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Supplemental Material, Table 1. Characteristics based on first 24-hour water use diary data of a study population (n = 150) recruited from three metropolitan areas in the U.S. during 2004 and 2005.

| Population Characteristics | <i>n</i> | % | Water | Shower/Bathing | Bathing | ΣTHM | ΣTHM |
|----------------------------|----------|------|---------------|-------------------|-----------------------|-----------------|------------------------------|
| | | | Intake (L) | Self (minutes) | Children (minutes) | Blood (ng/L) | Water (µg/L) ^a |
| Total population | 150 | 100 | 0.90 | 16.4 | 8.5 | 18.7 | 17.2 |
| Maternal race/ethnicity | | | | | | | |
| Nonhispanic white | 104 | 69.3 | 0.98 | 13.4 | 8.3 | 18.7 | 17.0 |
| Nonhispanic black | 19 | 12.7 | 0.86 | 28.1 | 7.1 | 16.3 | 15.7 |
| Hispanic | 12 | 8.0 | 0.46 | 22.3 | 7.1 | 23.7 | 16.3 |
| Other | 7 | 4.7 | 0.63 | 15.2 | 6.7 | 18.5 | 17.4 |
| Missing | 8 | 5.3 | 0.74 | 18.9 | 18.8 | 19.0 | 29.0 |
| Maternal age (years) | | | | | | | |
| < 25 | 24 | 16.0 | 0.67 | 28.3 | 5.4 | 17.5 | 14.6 |

Supplemental Material, Table 1 (cont.)

| Population Characteristics | | | Water Intake (L) | Shower/Bathing Self (minutes) | Bathing Children (minutes) | ΣTHM Blood (ng/L) | ΣTHM Water (μg/L) ^a |
|----------------------------------|----------|------|------------------|-------------------------------|----------------------------|-------------------|--------------------------------|
| | <i>n</i> | % | | | | | |
| 25–29 | 52 | 34.7 | 0.69 | 15.0 | 6.6 | 20.1 | 18.2 |
| 30–34 | 49 | 32.7 | 1.20 | 12.7 | 6.9 | 19.7 | 17.3 |
| ≥ 35 | 17 | 11.3 | 1.20 | 12.5 | 18.5 | 14.2 | 14.4 |
| Missing | 8 | 5.3 | 0.74 | 18.9 | 18.8 | 19.0 | 29.0 |
| Highest maternal education level | | | | | | | |
| High school or less | 22 | 14.7 | 0.68 | 27.0 | 12.2 | 24.2 | 20.4 |
| Some college | 30 | 20.0 | 0.91 | 16.8 | 16.4 | 20.7 | 13.9 |
| College degree or higher | 90 | 60.0 | 0.96 | 13.5 | 13.5 | 17.0 | 17.1 |
| Missing | 8 | 5.3 | 0.74 | 18.9 | 18.8 | 19.0 | 29.0 |

Supplemental Material, Table 1 (cont.)

| Population Characteristics | | <i>n</i> | % | Water Intake (L) | Shower/Bathing Self (minutes) | Bathing Children (minutes) | ΣTHM Blood (ng/L) | ΣTHM Water (μg/L) ^a |
|-------------------------------------|--|----------|------|------------------|-------------------------------|----------------------------|-------------------|--------------------------------|
| Maternal smoking^b | | | | | | | | |
| Yes | | 7 | 4.7 | 1.2 | 33.9 | 4.9 | 19.9 | 18.5 |
| No | | 135 | 90.0 | 0.9 | 15.3 | 8.1 | 18.6 | 16.7 |
| Missing | | 8 | 5.3 | 0.74 | 18.9 | 18.8 | 19.0 | 29.0 |
| Post-pregnancy BMI | | | | | | | | |
| < 19.8 | | 9 | 6.0 | 0.65 | 14.3 | 6.7 | 22.1 | 28.0 |
| 19.8–25.9 | | 57 | 38.0 | 0.94 | 15.4 | 7.9 | 19.7 | 12.8 |
| 26.0–29.9 | | 19 | 12.7 | 0.72 | 15.3 | 2.4 | 16.8 | 20.4 |
| > 29.9 | | 34 | 22.7 | 1.10 | 17.4 | 10.7 | 19.6 | 20.0 |
| Missing | | 31 | 20.7 | 0.77 | 18.4 | 11.4 | 16.5 | 19.8 |

Supplemental Material, Table 1 (cont.)

| Population Characteristics | | | Water Intake (L) | Shower/Bathing Self (minutes) | Bathing Children (minutes) | ΣTHM Blood (ng/L) | ΣTHM Water (μg/L) ^a |
|------------------------------|----------|------|------------------|-------------------------------|----------------------------|-------------------|--------------------------------|
| | <i>n</i> | % | | | | | |
| Marital status | | | | | | | |
| Married | 117 | 78.0 | 0.9 | 14.9 | 8.0 | 18.8 | 17.4 |
| Not married | 25 | 16.7 | 0.92 | 22.2 | 7.4 | 18.1 | 14.1 |
| Missing | 8 | 5.3 | 0.74 | 18.9 | 18.8 | 19.0 | 29.0 |
| Parity | | | | | | | |
| Nulliparous | 82 | 54.7 | 0.95 | 17 | 9.9 | 17.4 | 19.7 |
| Parous | 60 | 40.0 | 0.85 | 15.1 | 5.3 | 21.1 | 19.3 |
| Missing | 8 | 5.3 | 0.74 | 18.9 | 18.8 | 19.0 | 29.0 |
| Household income (\$) | | | | | | | |
| < 30,000 | 31 | 20.7 | 0.94 | 21.5 | 7.8 | 21.1 | 16.5 |

Supplemental Material, Table 1 (cont.)

| Population Characteristics | | | Water Intake (L) | Shower/Bathing Self (minutes) | Bathing Children (minutes) | ΣTHM Blood (ng/L) | ΣTHM Water (μg/L) ^a |
|--------------------------------|----------|------|------------------|-------------------------------|----------------------------|-------------------|--------------------------------|
| | <i>n</i> | % | | | | | |
| 30,001–60,000 | 41 | 27.3 | 0.86 | 16.2 | 8.4 | 22.3 | 19.0 |
| 60,001–80,000 | 34 | 22.7 | 0.73 | 16.1 | 6.9 | 15.7 | 17.1 |
| > 80,000 | 35 | 23.3 | 1.1 | 11.9 | 8.7 | 16.5 | 14.4 |
| Missing | 9 | 6.0 | 0.65 | 17.4 | 16.7 | 17.8 | 29.0 |
| Study site | | | | | | | |
| Site 1 | 70 | 46.7 | 0.86 | 14.9 | 9.6 | 23.1 | 24.8 |
| Site 2 | 49 | 32.7 | 0.99 | 17.1 | 7.7 | 12.6 | 4.8 |
| Site 3 | 31 | 20.7 | 0.81 | 18.3 | 7.3 | 23.5 | 24.8 |
| Water consumption ^c | | | | | | | |
| Tap water | 106 | 71 | 0.95 | 16.4 | 9.0 | 19.8 | 28.4 |

Supplemental Material, Table 1 (cont.)

| Population | | Water | Shower/Bathing | Bathing | ΣTHM | ΣTHM | |
|-----------------------|----------|--------|----------------|-----------|-----------|--------|---------------------|
| Characteristics | | Intake | Self | Children | Blood | Water | |
| | <i>n</i> | % | (L) | (minutes) | (minutes) | (ng/L) | (μg/L) ^a |
| Bottled water | 8 | 5.3 | 0.64 | 15.2 | 7.0 | 21.1 | 27.1 |
| Tap and bottled water | 36 | 23.7 | 1.2 | 13.7 | 8.1 | 24.7 | 32.1 |

Abbreviations: THM, trihalomethane; TCM, chloroform; BDCM, bromodichloromethane; DBCM, dibromochloromethane; TBM, bromoform; ΣTHM, sum of TCM, BDCM, DBCM, and TBM. ^aNine water samples were not examined due to unacceptable headspace volume and/or freezing of vials. ^bAny smoking during pregnancy. ^cSample size reflects exclusive use of tap water, exclusive use of bottled water, or a combination of tap and bottled water. All variables reflect demographic characteristics during pregnancy except for post-pregnancy BMI. Blood and water THM concentrations below the limit of detection (LOD) were replaced with $LOD/\sqrt{2}$ for the analysis.

Supplemental Material, Table 2. Spearman correlation coefficients for blood and tap water THM concentrations by site and season.

| THMs | Overall | Site 1 | | Site 2 ^a | Site 3 ^b | |
|-----------------|-----------|---------------------|--------------------|---------------------|---------------------|----------|
| | (n = 150) | Overall (n = 97) | Winter (n = 47) | Summer (n = 50) | (n = 49) | (n = 29) |
| ΣTHM | 0.36* | 0.12* | 0.03 | -0.25 | -0.04* | 0.51* |
| TCM | 0.37* | -0.02 | -0.14 | -0.24 | -0.05 | 0.57* |
| BDCM | 0.62* | 0.29* | 0.45* | -0.33* | 0.26* | 0.57* |
| DBCM | 0.53* | 0.44* | 0.51* | -0.11 | 0.45* | 0.33 |
| TBM | 0.54* | 0.09 | -0.23 | 0.07 | 0.14* | 0.38* |
| Brominated THMs | 0.53* | 0.35* | 0.44* | -0.20 | 0.20* | 0.44* |

Abbreviations: ΣTHM, sum of TBM, TCM, BDCM, and DBCM; TBM, bromoform; TCM, chloroform; BDCM, bromodichloromethane; DBCM, dibromochloromethane; brominated THMs, sum of BDCM, DBCM, and TBM. ^aAll samples in Site 2 were collected during summer. ^bOnly six samples in Site 3 were collected during summer. Concentrations below the limit of detection (LOD) were replaced with LOD/√2 for the analysis. *P-value for the Spearman rank correlation: $p < 0.05$.

Supplemental Material, Table 3. Blood ΣTHM linear regression coefficients (per ng/L change) for different covariates among the study population ($n = 142$).

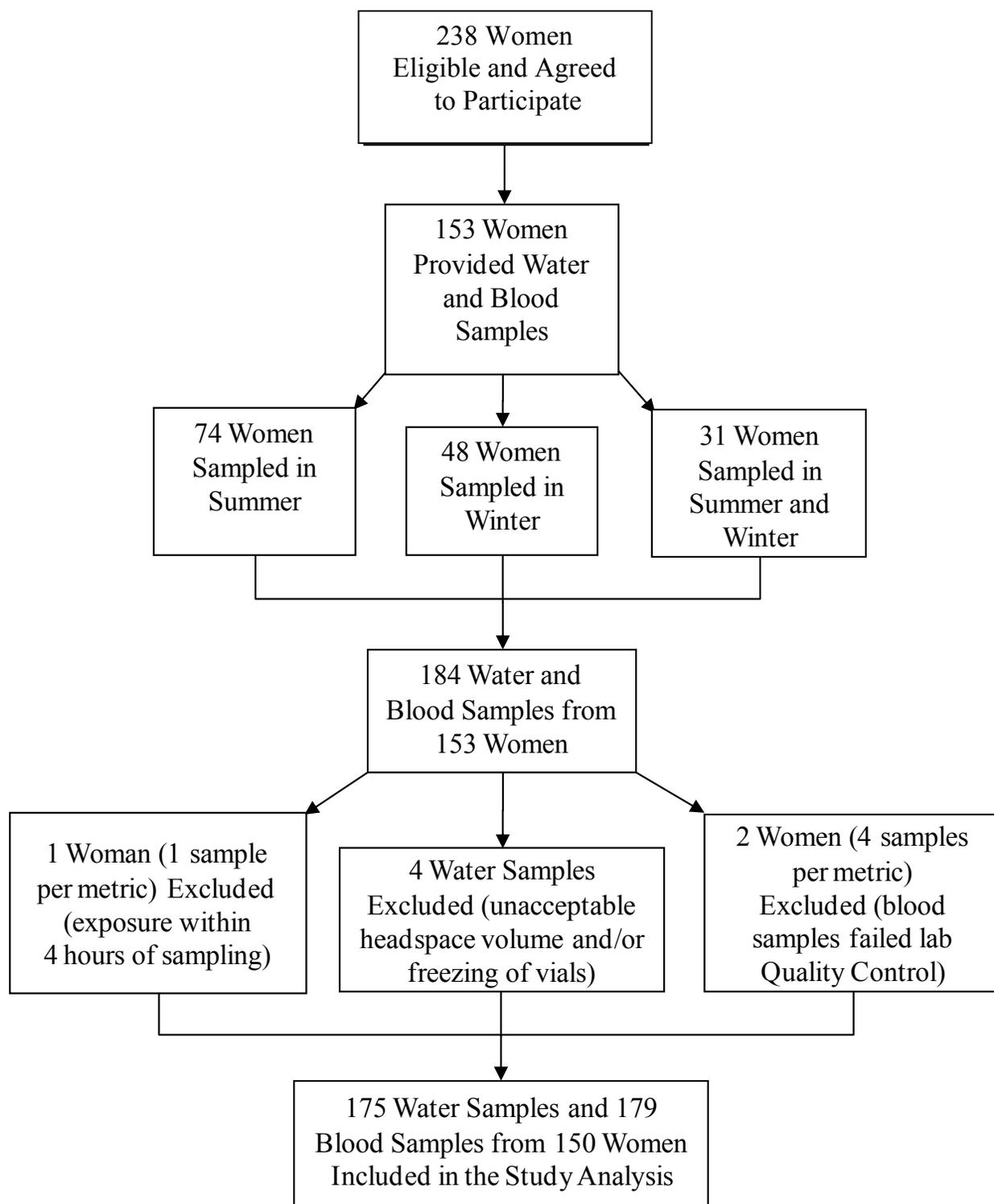
| Variables | Univariate | Multivariate | Multivariate |
|---------------------------------|------------------|----------------------|----------------------|
| | | Model 1 ^a | Model 2 ^b |
| | β (SE) (ng/L) | β (SE) (ng/L) | β (SE) (ng/L) |
| ΣTHM water concentration (μg/L) | 0.206 (0.05)*** | 0.193 (0.05)*** | 0.190 (0.06)** |
| Age (years) | 0.025 (0.07) | 0.003 (0.08) | -0.045 (0.06) |
| Race/ethnicity ^c | 0.029 (0.07) | -0.018 (0.08) | 0.001 (0.09) |
| Education level ^d | -0.239 (0.08)** | -0.245 (0.11)** | -0.219 (0.12)* |
| Smoking (yes/no) | 0.010 (0.28) | 0.039 (0.34) | 0.062 (0.35) |
| Pre-pregnancy BMI ^e | 0.004 (0.06) | 0.004 (0.07) | 0.078 (0.07) |
| Marital status ^f | -0.403 (0.17)* | -0.476 (0.23)** | -0.418 (0.24)* |
| Income ^g | -0.094 (0.06) | -0.068 (0.08) | -0.080 (0.08) |
| Season ^h | -0.014 (0.13) | -0.015 (0.16) | -0.015 (0.17) |
| Site 1 vs. Site 2 | 0.021 (0.09) | 0.023 (0.07) | 0.023 (0.08) |

Supplemental Material, Table 3 (cont.)

| Variables | Multivariate | | Multivariate |
|---|-----------------|----------------------|----------------------|
| | Univariate | Model 1 ^a | Model 2 ^b |
| | β (SE) | β (SE) | β (SE) |
| Site 1 vs. Site 3 | 0.034 (0.08) | 0.051 (0.10) | 0.048 (0.10) |
| Noningestion metric (minute/day) | 0.002 (0.001) | 0.002 (0.004) | – |
| Ingestion metric (L/day) | 0.011 (0.01) | < 0.001(0.002) | – |
| Shower/Bathing (minute/day) | –0.001 (0.01) | – | –0.003 (0.006) |
| Children bath (minute/day) | 0.003 (0.004) | – | 0.007 (0.007) |
| Post-shower/bath bathroom time (minute/day) | 0.005 (0.0001) | – | 0.001 (0.005) |
| Dishwashing by hand (minute/day) | < 0.001 (0.001) | – | 0.000 (0.009) |
| Swimming (minute/day) | 0.007 (0.01) | – | 0.001 (0.01) |
| Tap water intake (L/day) | –0.034 (0.08) | – | 0.403 (0.09) |

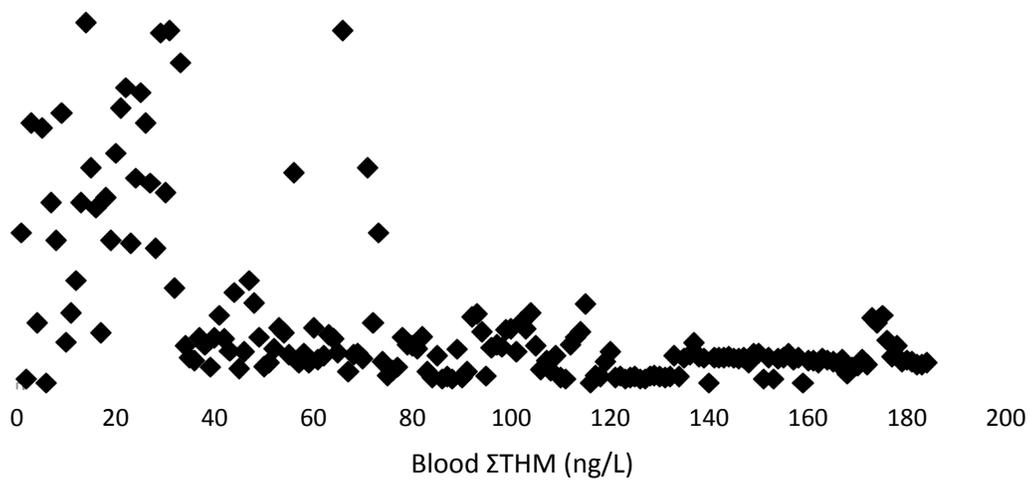
Abbreviations: SE, standard error. ^aIngestion vs. noningestion metrics. ^bIndividual activities. ^cNonhispanic white vs. all other races combined. ^dSome college or higher vs. high school or less. ^eBody Mass Index before pregnancy (continuous). ^fReference group is

“Married”. ^sUS\$ (continuous). ^hWinter vs. summer. Concentrations below the limit of detection (LOD) were replaced with LOD/ $\sqrt{2}$ for the analysis. Two-tailed p -value for t-statistics: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.001$.



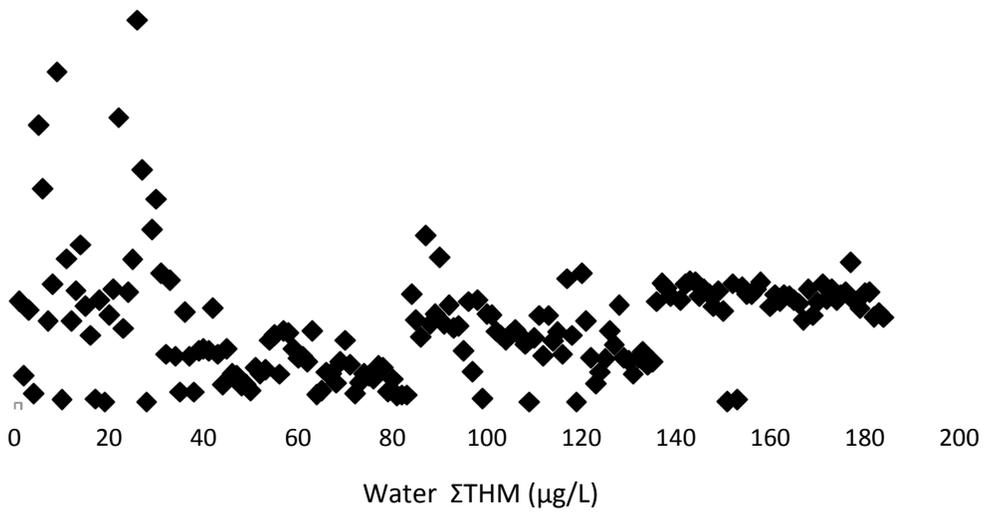
Supplemental Material, Figure 1. Study population based on blood, water, and questionnaire data inclusion criteria.

□



Supplemental Material, Figure 2. Distribution of blood ΣTHM concentrations.

□



Supplemental Material, Figure 3. Distribution of water ΣTHM concentrations.