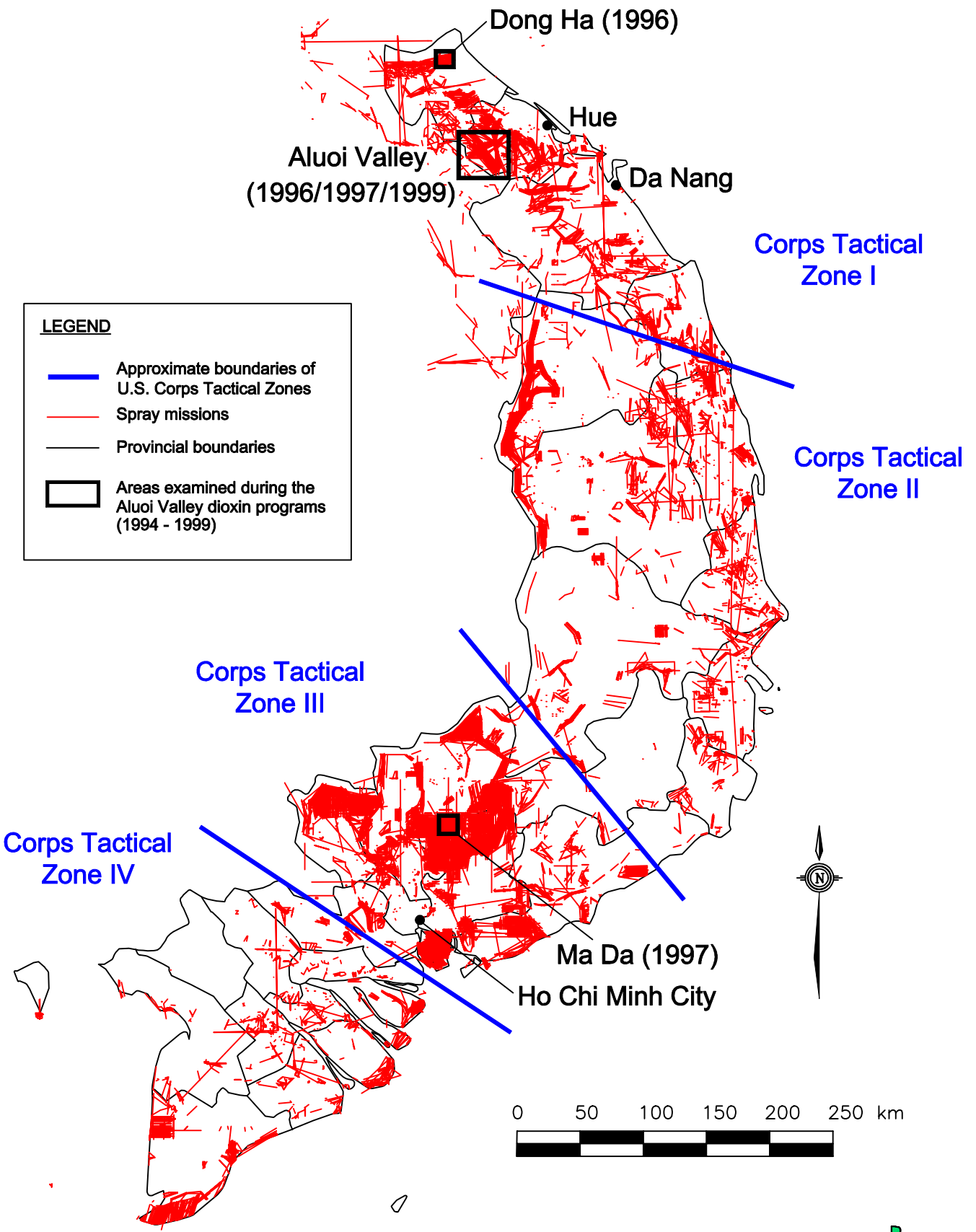
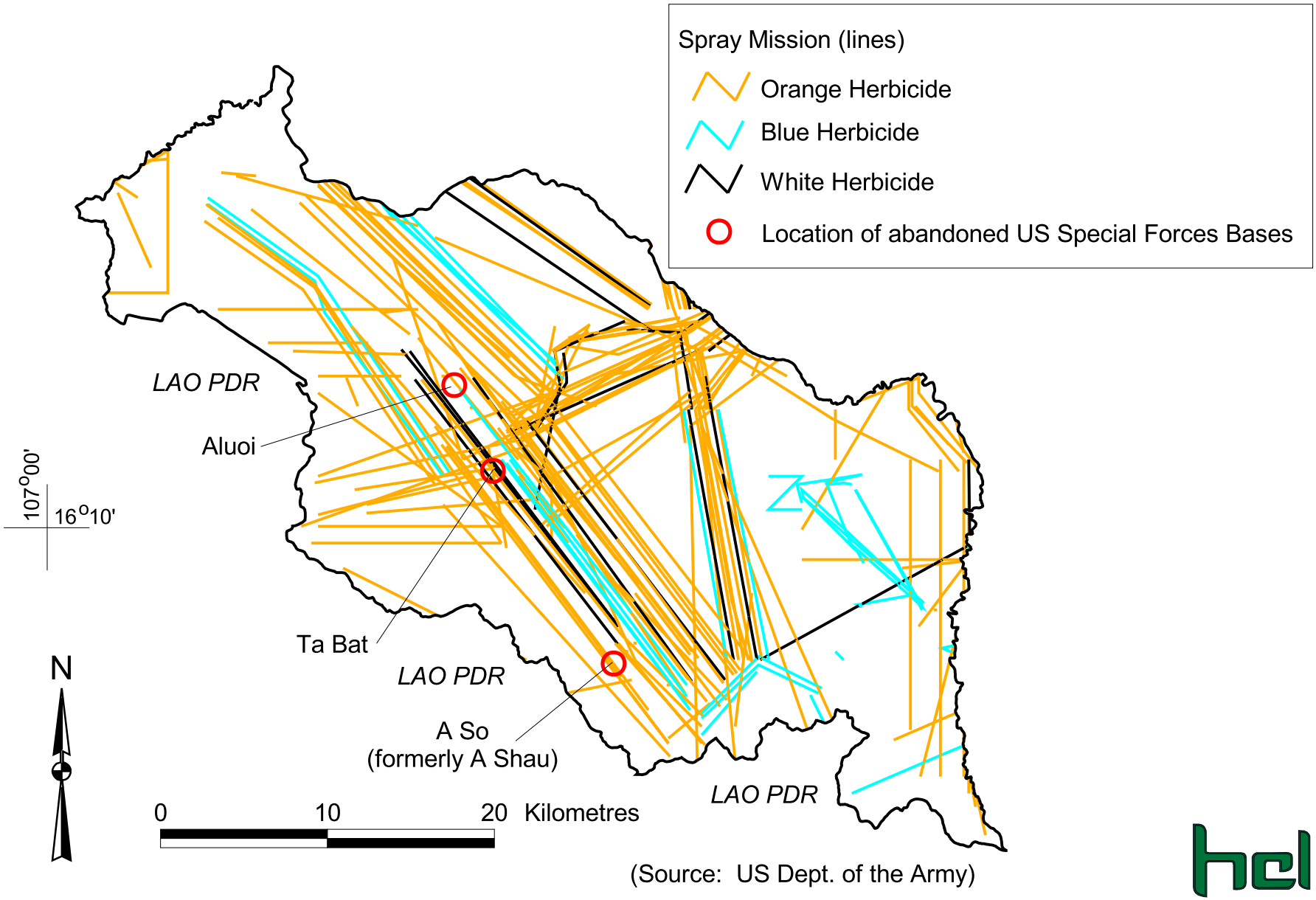
Figure 2.1 Aerial herbicide spray missions in southern Viet Nam, 1965-1971 (Source: US Dept. of the Army).



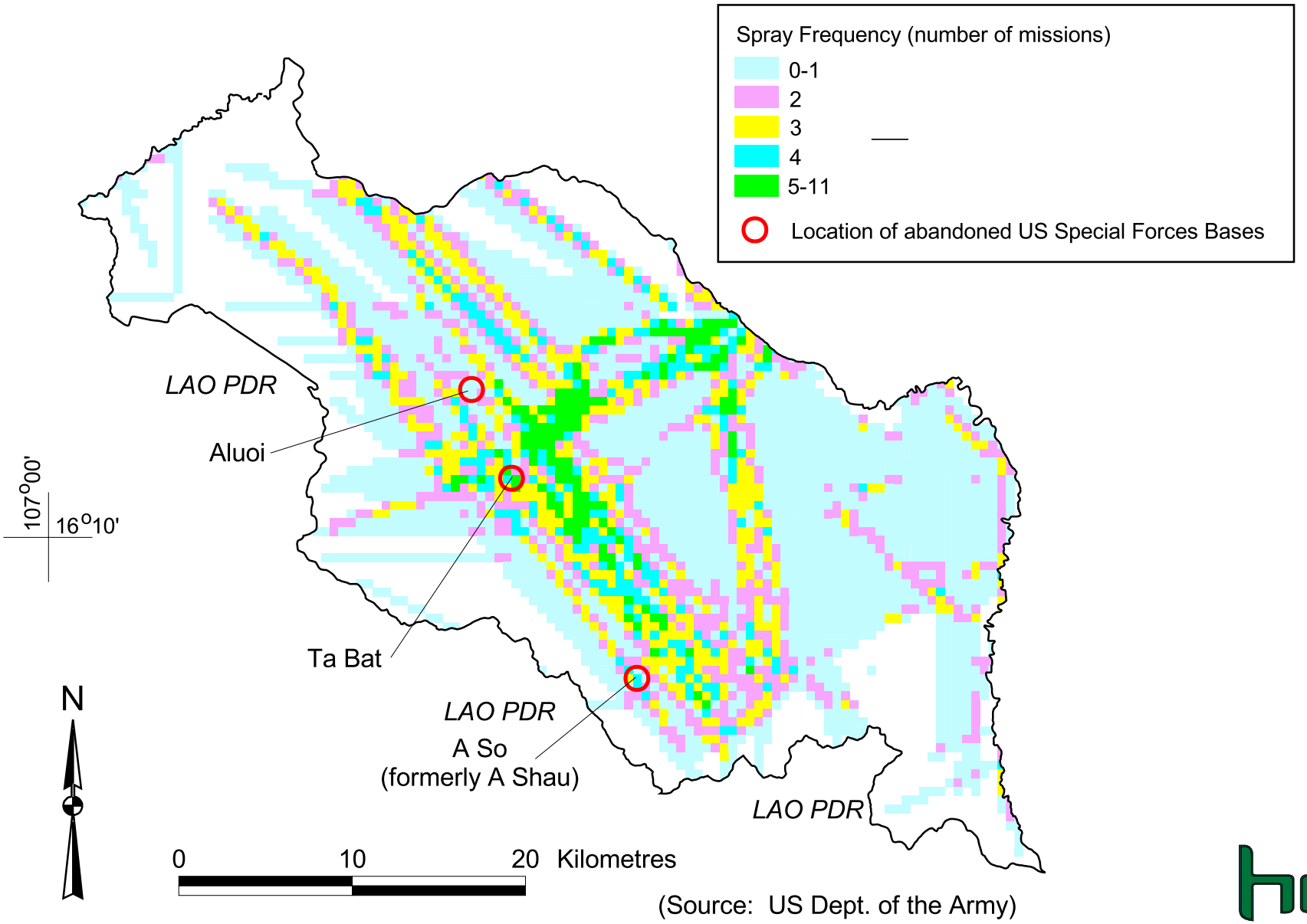
CIDA849: AIRHERB5.DWG

Figure 2.2 Herbicide spray missions, Aluoi Valley, Viet Nam (1965-1970).



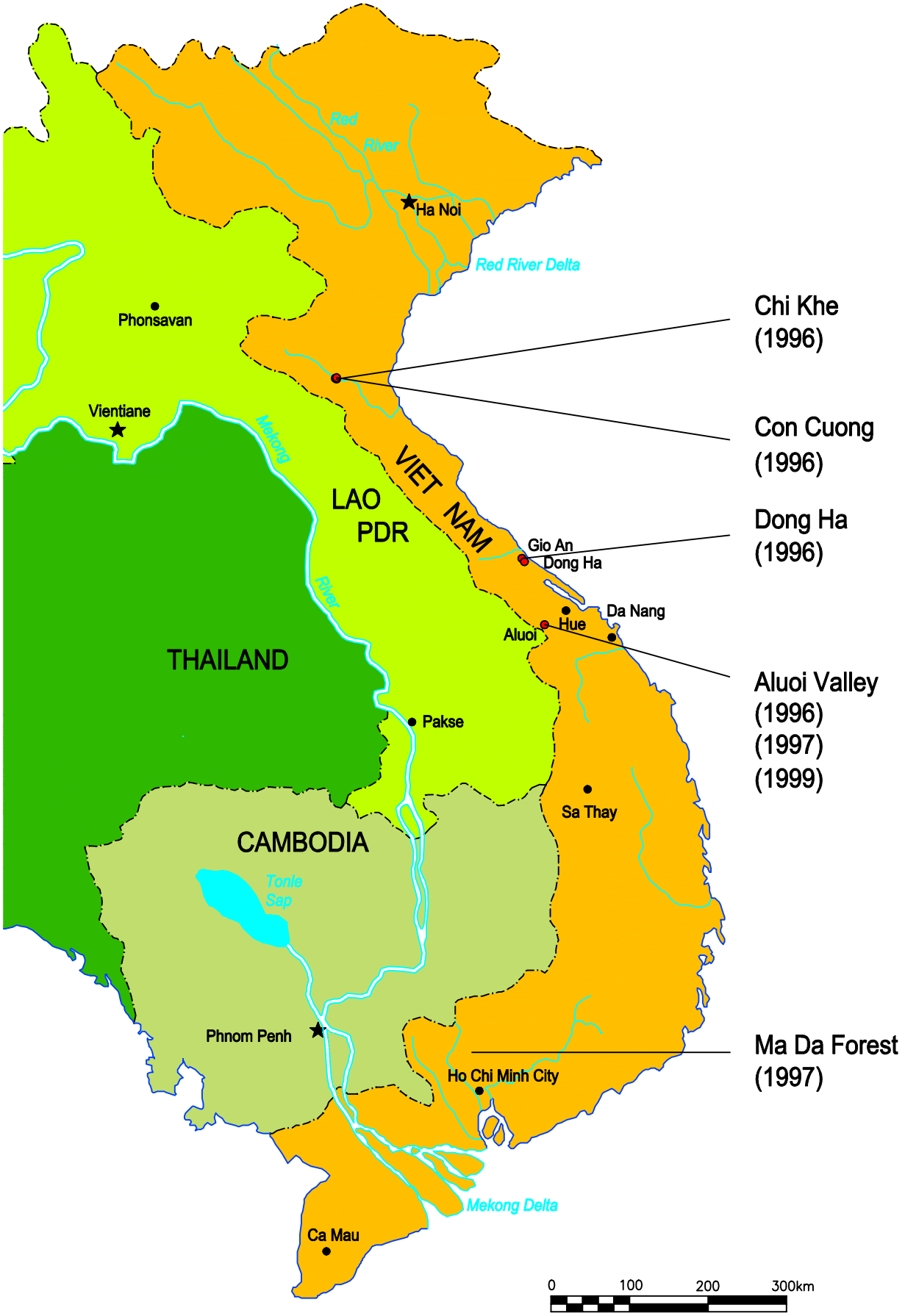
VN849: SPLINE6.APR

Figure 2.3 Herbicide distribution/frequency of spray missions, Aluoi Valley, Viet Nam, (1965-1970).



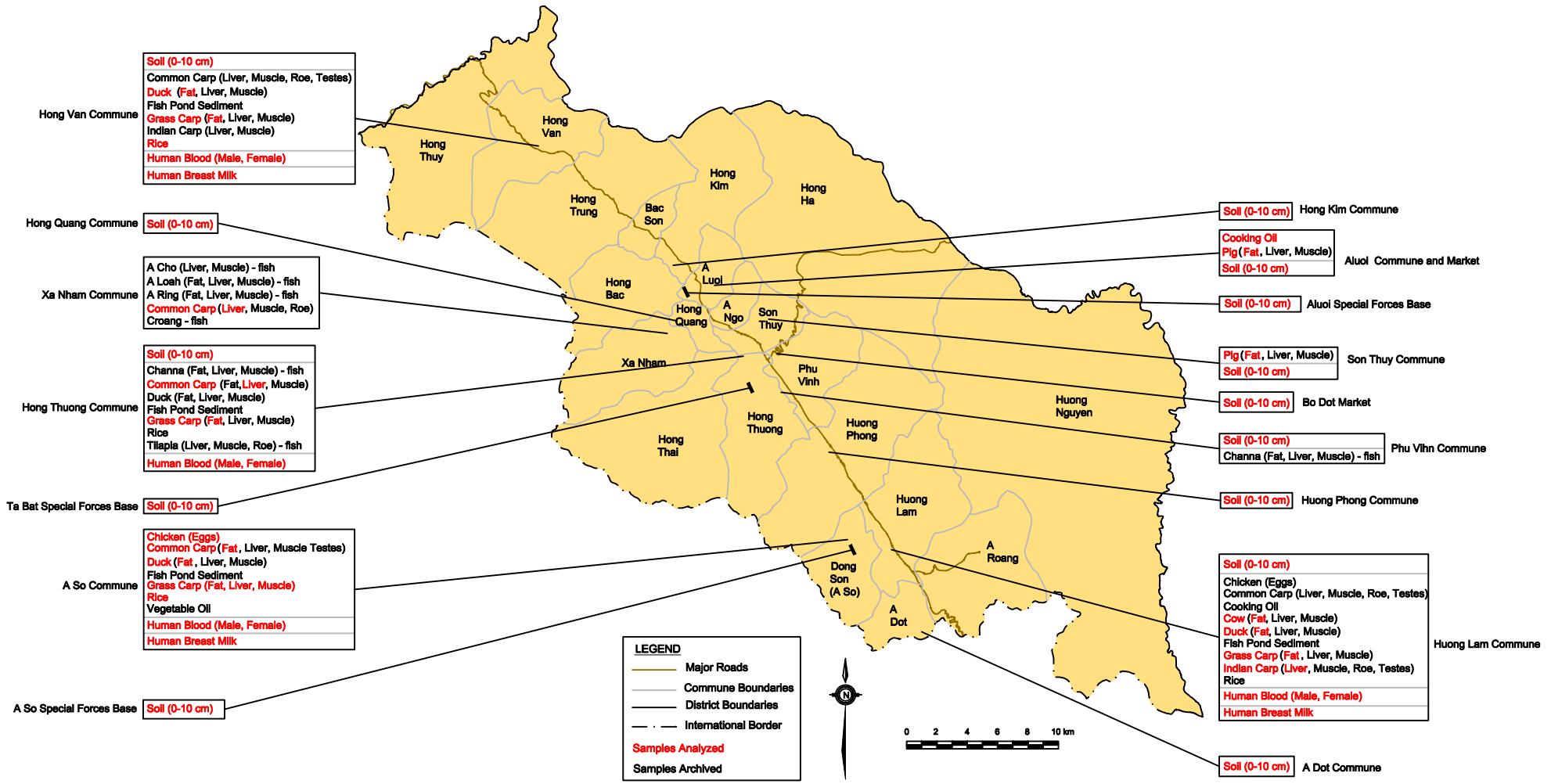
VN849: SPDIST7.APR

Figure 2.4 Dioxin sampling locations, Viet Nam, 1996, 1997 and 1999 (Hatfield Consultants Ltd. and 10-80 Committee).



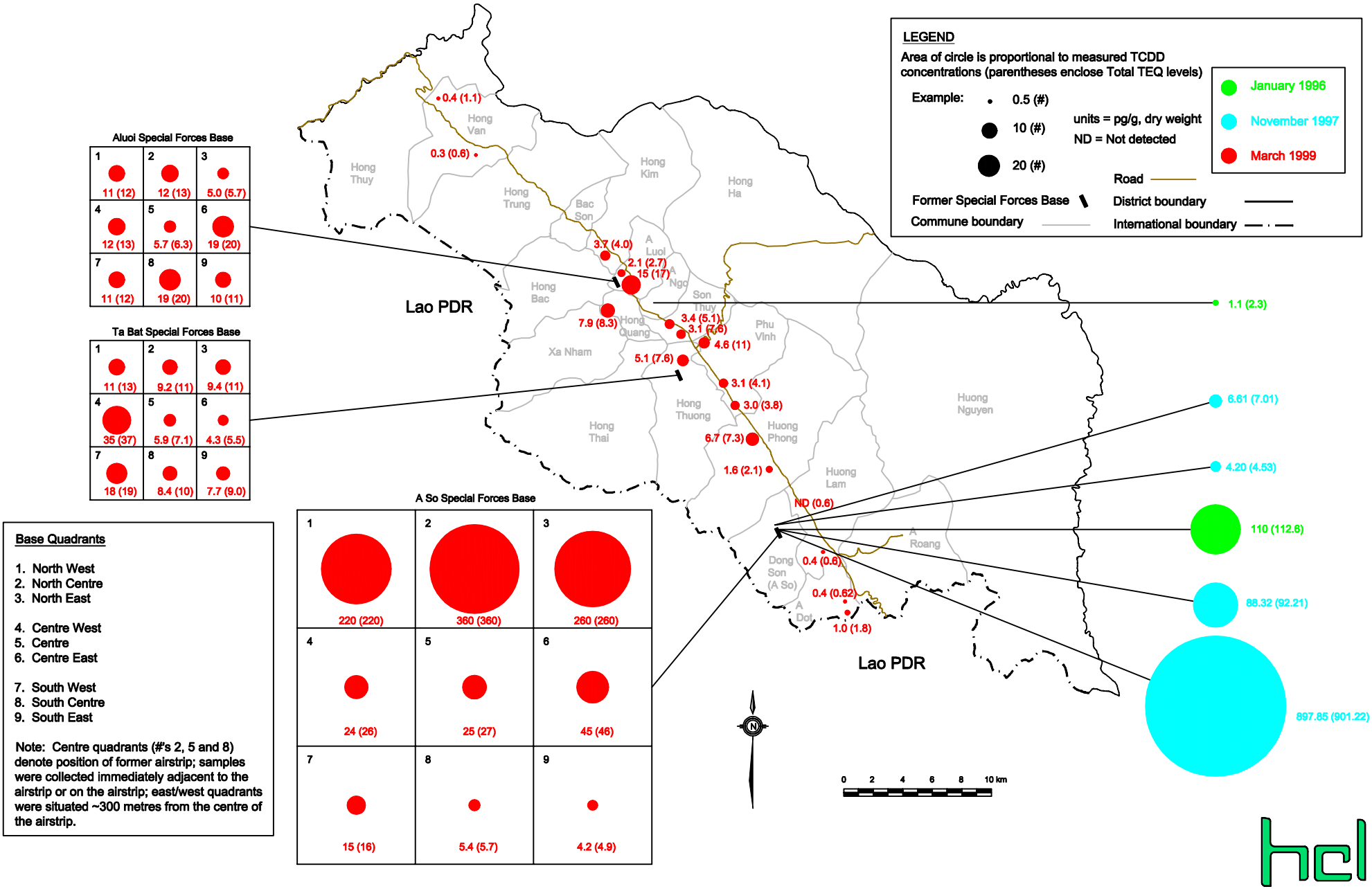
CIDA849: SAMLOC4.DWG

Figure 2.5 Dioxin sampling locations and media sampled in the various communes situated in the Aluoi Valley, Viet Nam, 1999 (Hatfield Consultants Ltd. and 10-80 Committee).



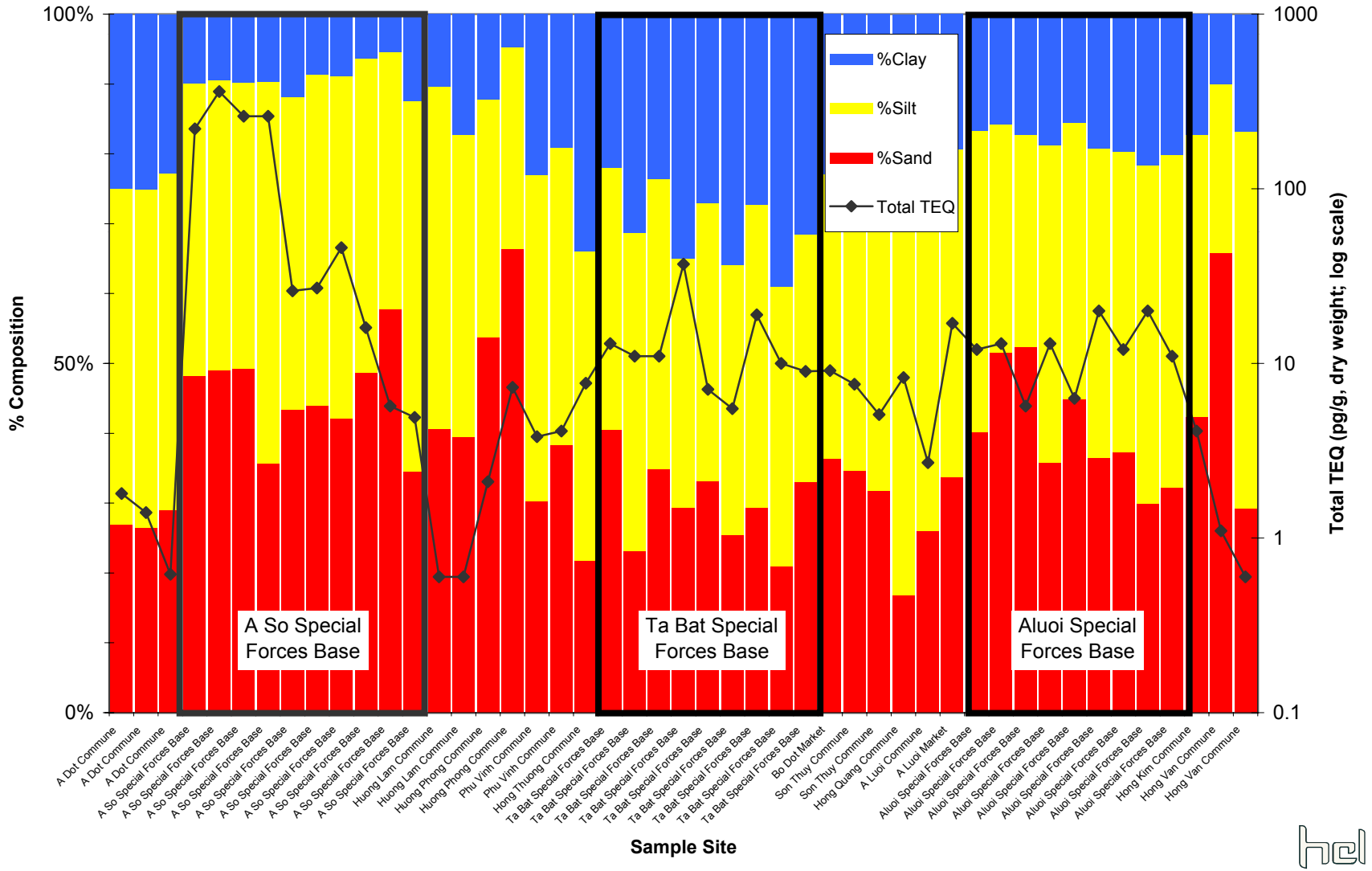
CIDA849: SAMMY10.DWG

Figure 2.6 TCDD concentrations (pg/g [ppt], dry weight) in soils (0-10 cm depth), Aluoi Valley, Viet Nam, 1996-1999; parenthesis enclose Total TEQ levels (Hatfield Consultants Ltd. and 10-80 Committee).



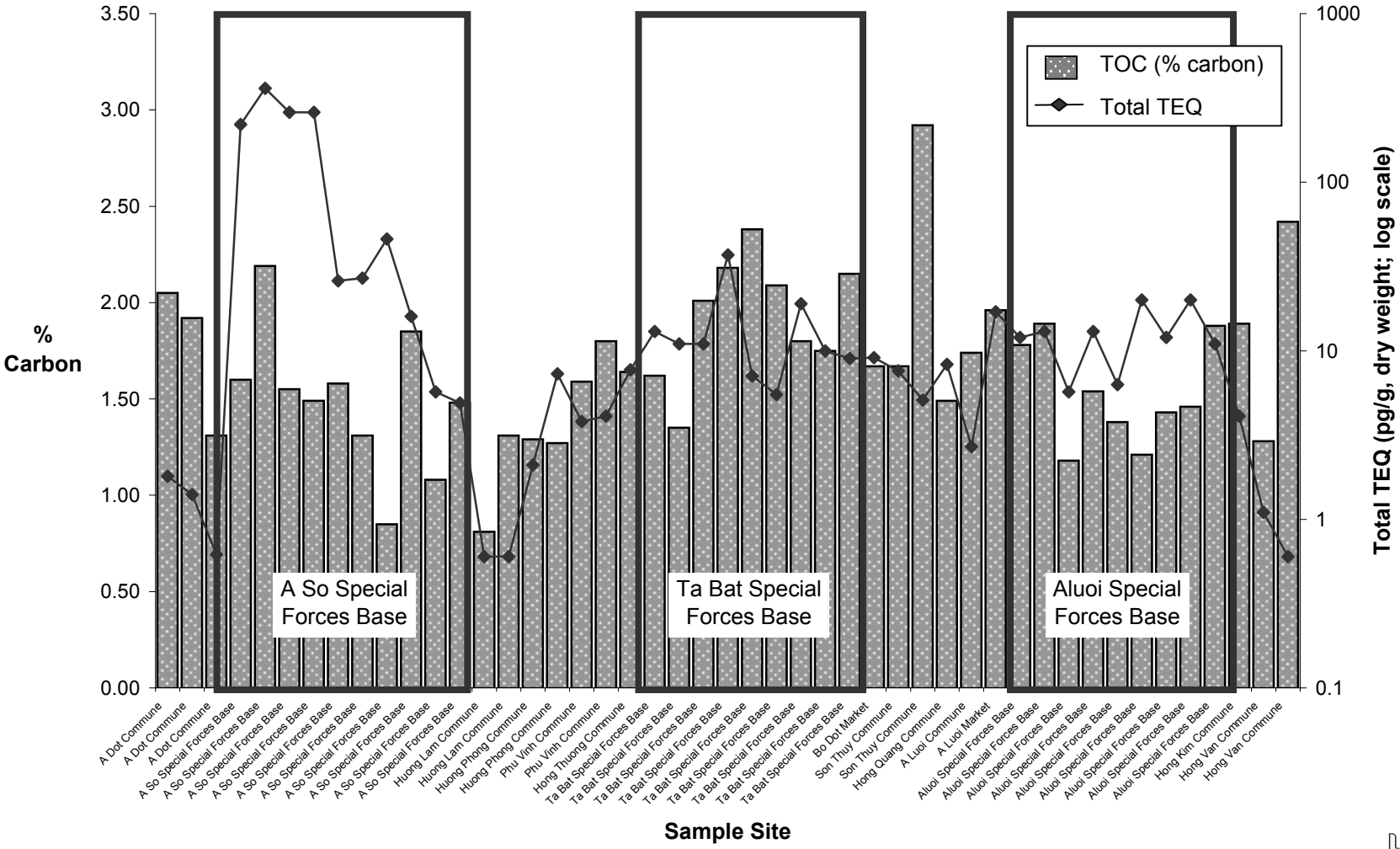
CIDA849: VTCDD14.DWG

Figure 2.7 **Percent composition of particle size fractions (sand, silt and clay) and Total TEQ (pg/g [ppt], dry weight; log scale) in soils (0-10 cm depth) from the Aluoi Valley, Viet Nam, March 1999.**



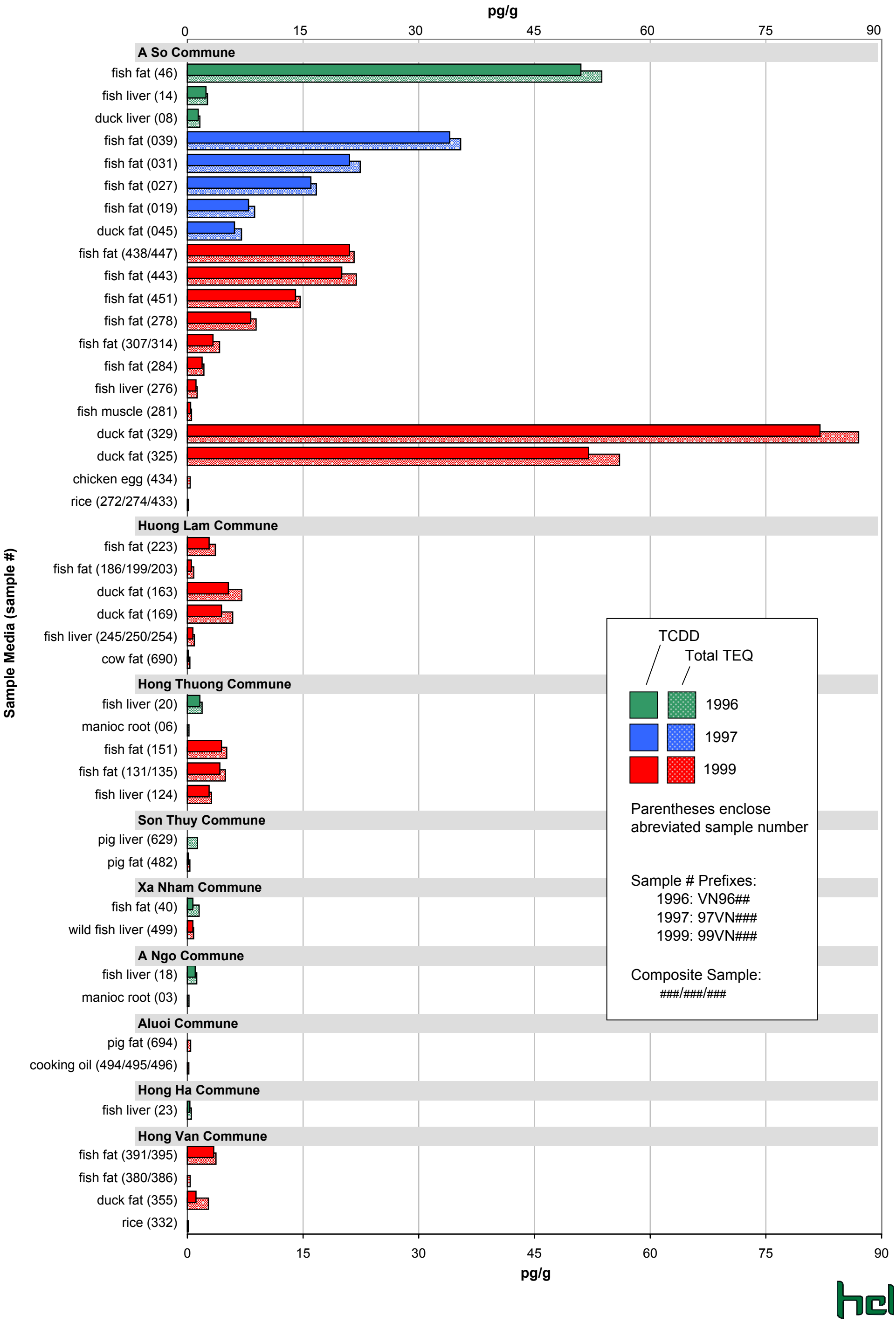
cida849:cida849 fig2.7&2.8.xls:fig 2,7

Figure 2.8 **Total organic carbon (TOC) content (% carbon) and Total TEQ (pg/g [ppt], dry weight; log scale) in soils (0-10 cm depth) from the Aluoi Valley, Viet Nam, March 1999.**



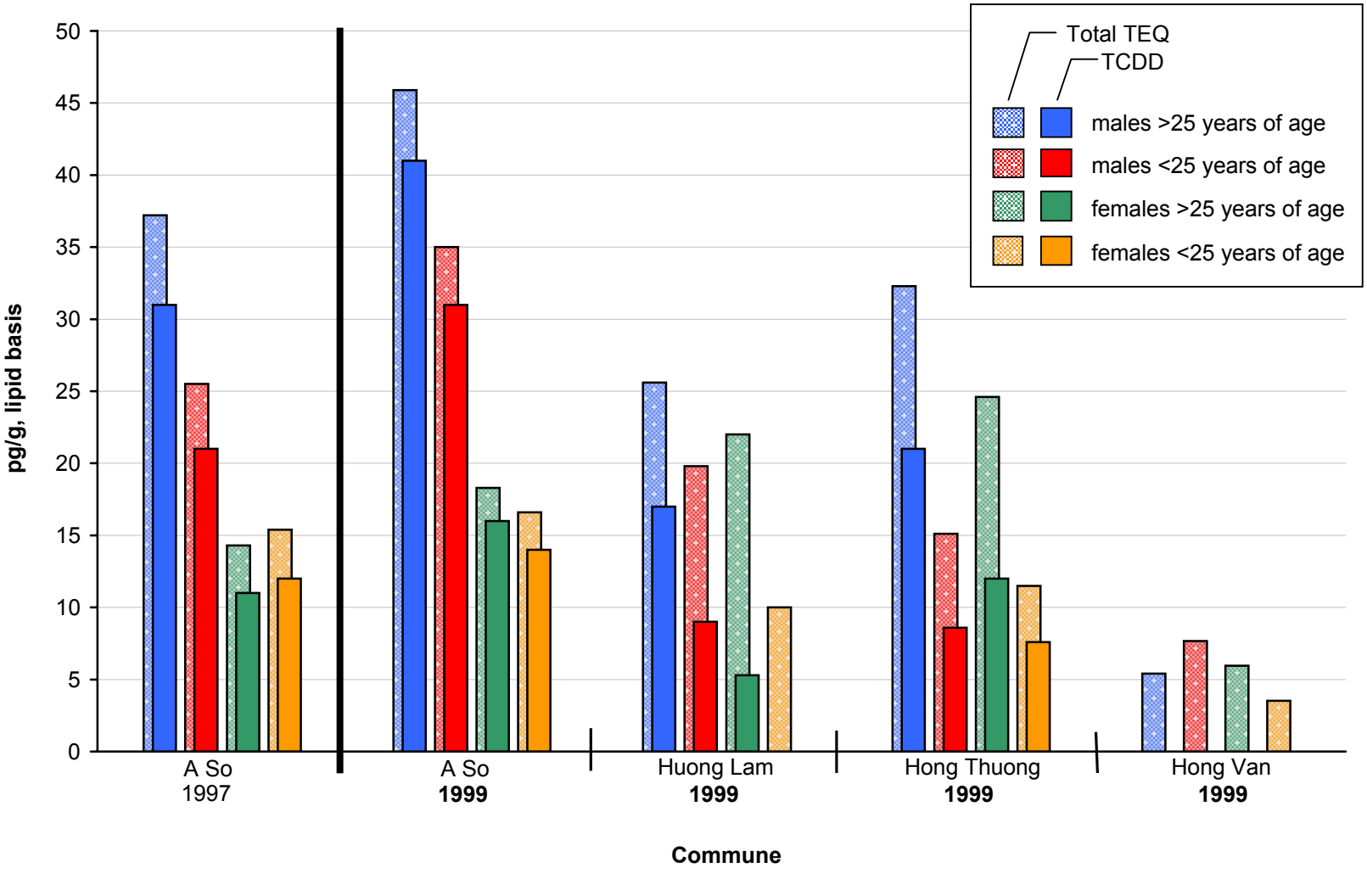
cida849:cida849 fig2.7&2.8.xls:fig 2.8

Figure 2.9 **TCDD and Total TEQ concentrations in vegetation and animal tissues (pg/g [ppt], dry weight [vegetation]; pg/g, wet weight [animal tissues]), Aluoi Valley, Viet Nam (1996, 1997 and 1999).**



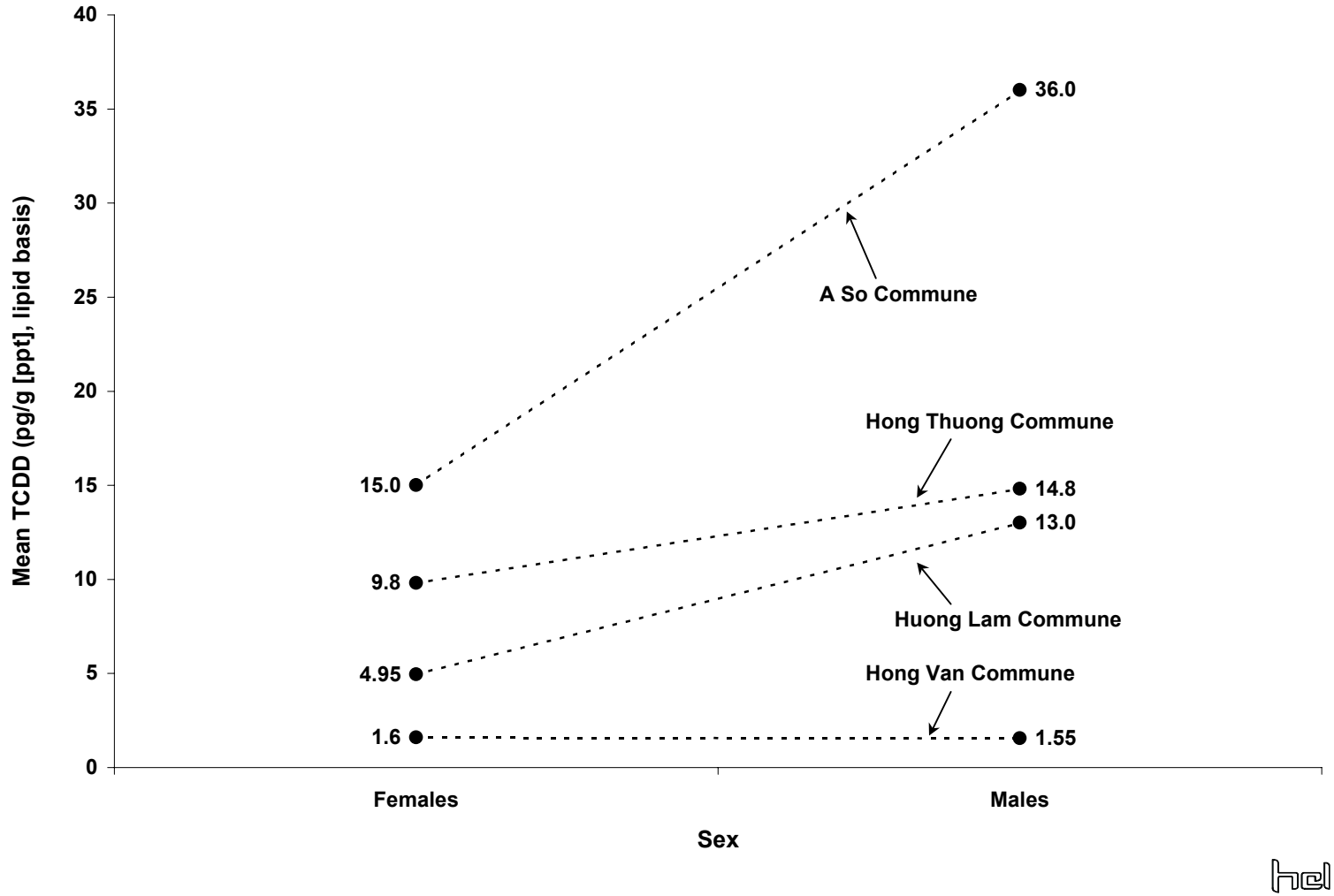
cida849:cida849 fig2.9.xls;96 97 99 Chart

Figure 2.10 **TCDD and Total TEQ (pg/g [ppt], lipid basis) for whole human blood, Aluoi Valley, Viet Nam, 1997 and 1999.**



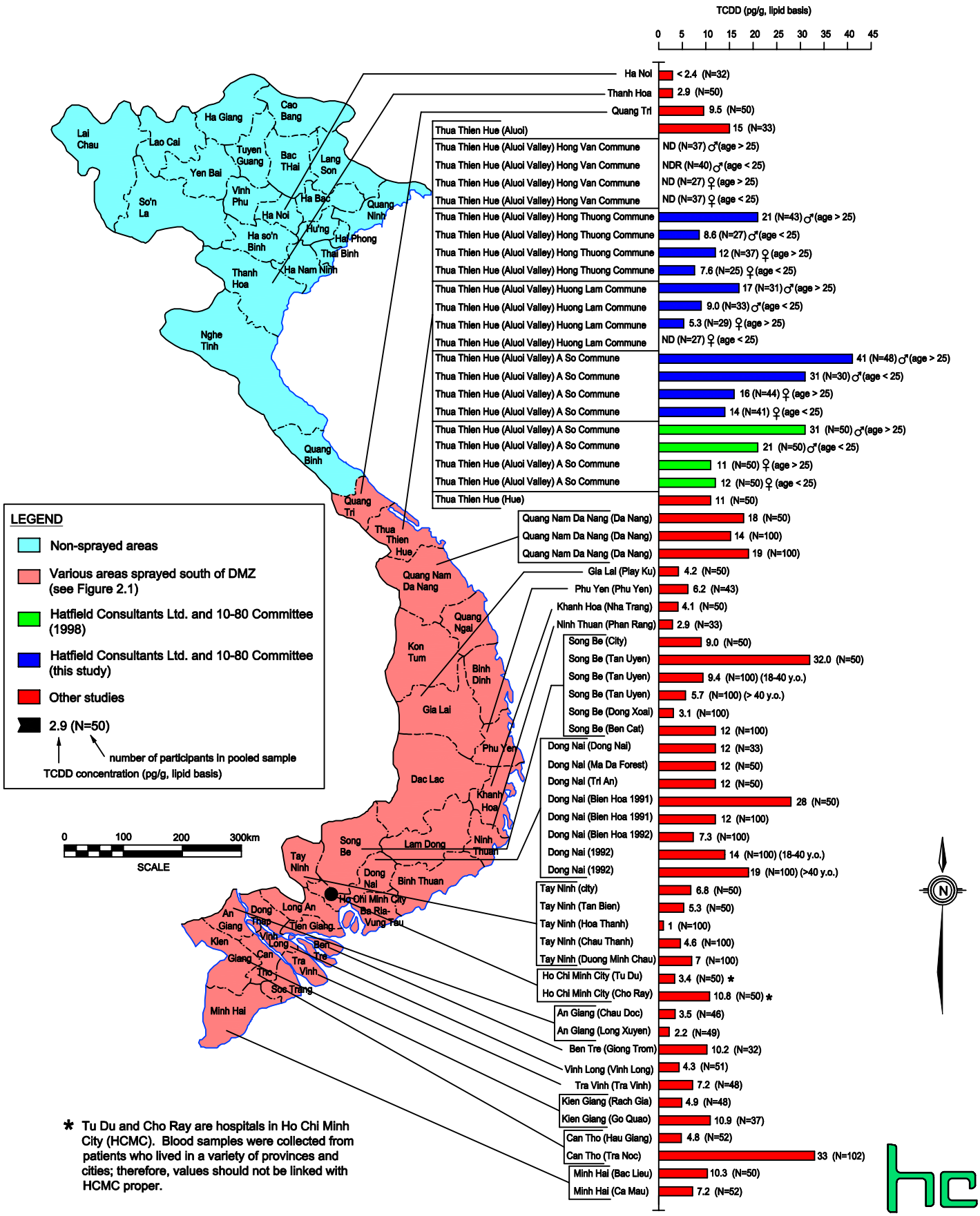
cida849;cida849 fig2.10.xls;fig 2.10

Figure 2.11 **Mean TCDD levels in whole human blood used in a 3-way ANOVA that determined the interaction of sex and commune location within the Aluoi Valley, Viet Nam, 1999.**



cida849;cida849 fig2.11.xls

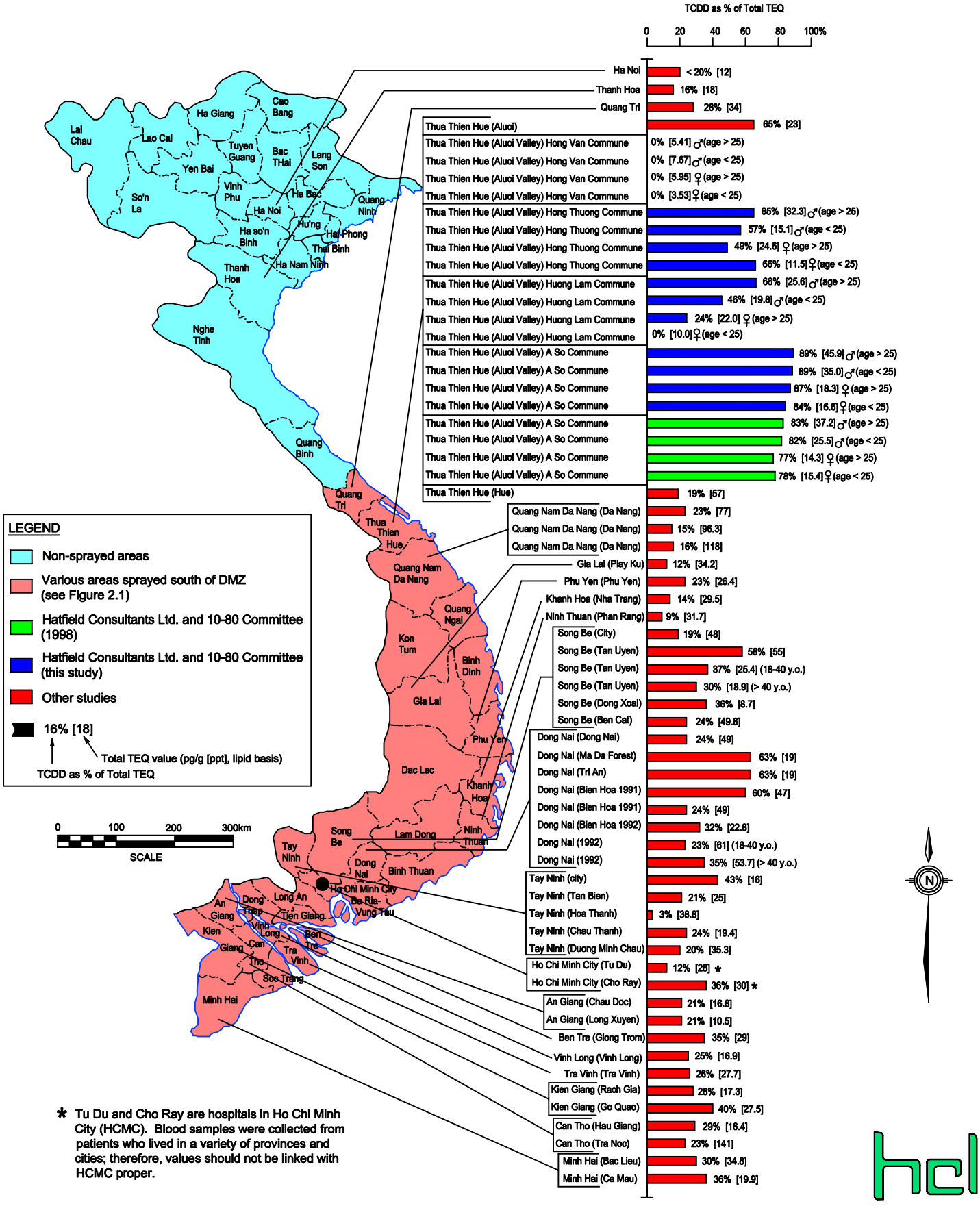
Figure 2.12 TCDD (pg/g [ppt], lipid basis) in pooled human blood collected from different localities in Viet Nam, 1987 to 1992 (Dai *et al.* 1994a, 1995, Schecter *et al.* 1992a, Schecter 1994b), 1997 (Hatfield and 10-80 Committee 1998) and 1999 (this study).



* Tu Du and Cho Ray are hospitals in Ho Chi Minh City (HCMC). Blood samples were collected from patients who lived in a variety of provinces and cities; therefore, values should not be linked with HCMC proper.

CIDA849: BL99TCDD7.DWG

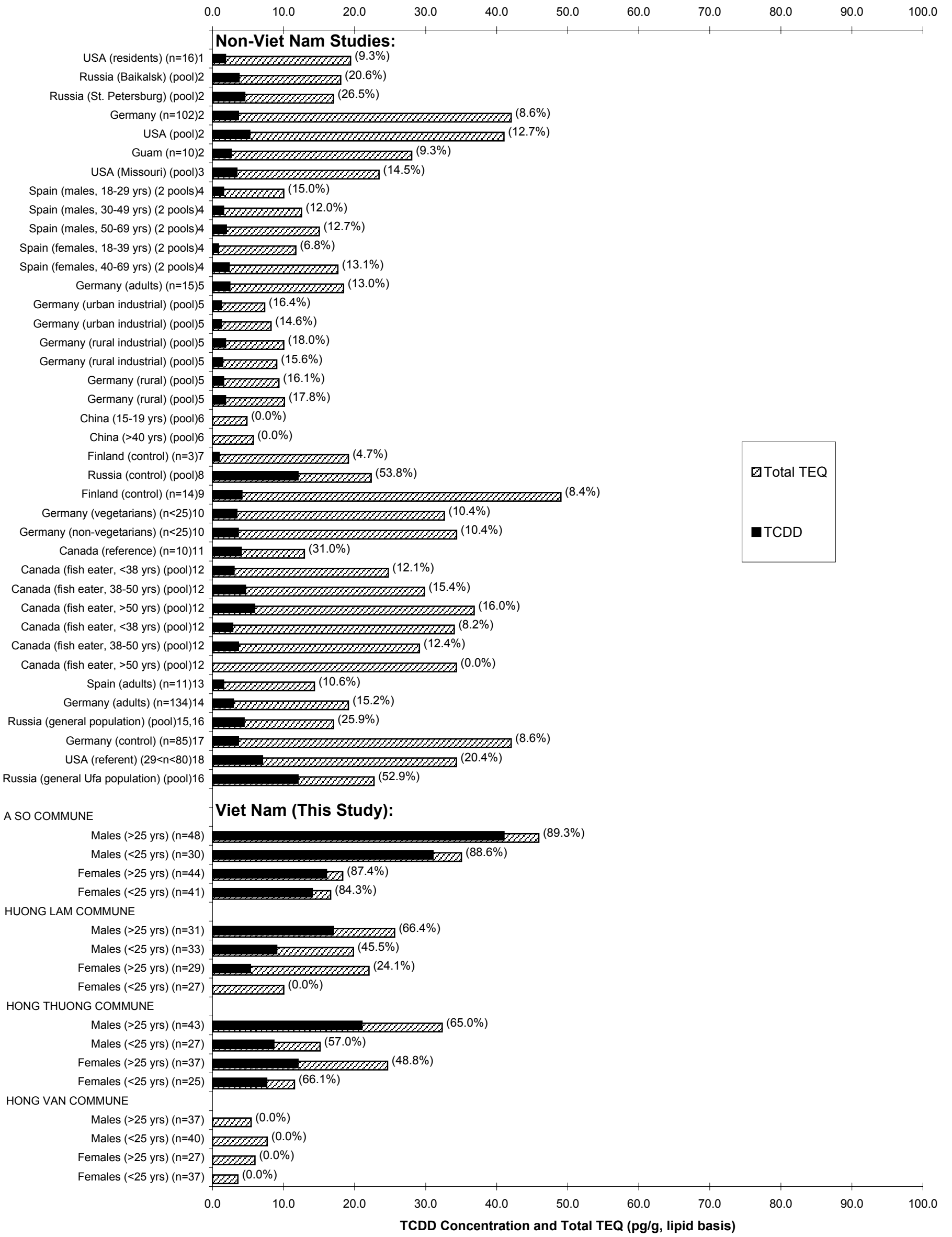
Figure 2.13 TCDD as % of Total TEQ in pooled human blood collected from different localities in Viet Nam, 1987 to 1992 (Dai *et al.* 1994a, 1995, Schecter *et al.* 1992a, Schecter 1994b), 1997 (Hatfield and 10-80 Committee 1998) and 1999 (this study).



* Tu Du and Cho Ray are hospitals in Ho Chi Minh City (HCMC). Blood samples were collected from patients who lived in a variety of provinces and cities; therefore, values should not be linked with HCMC proper.

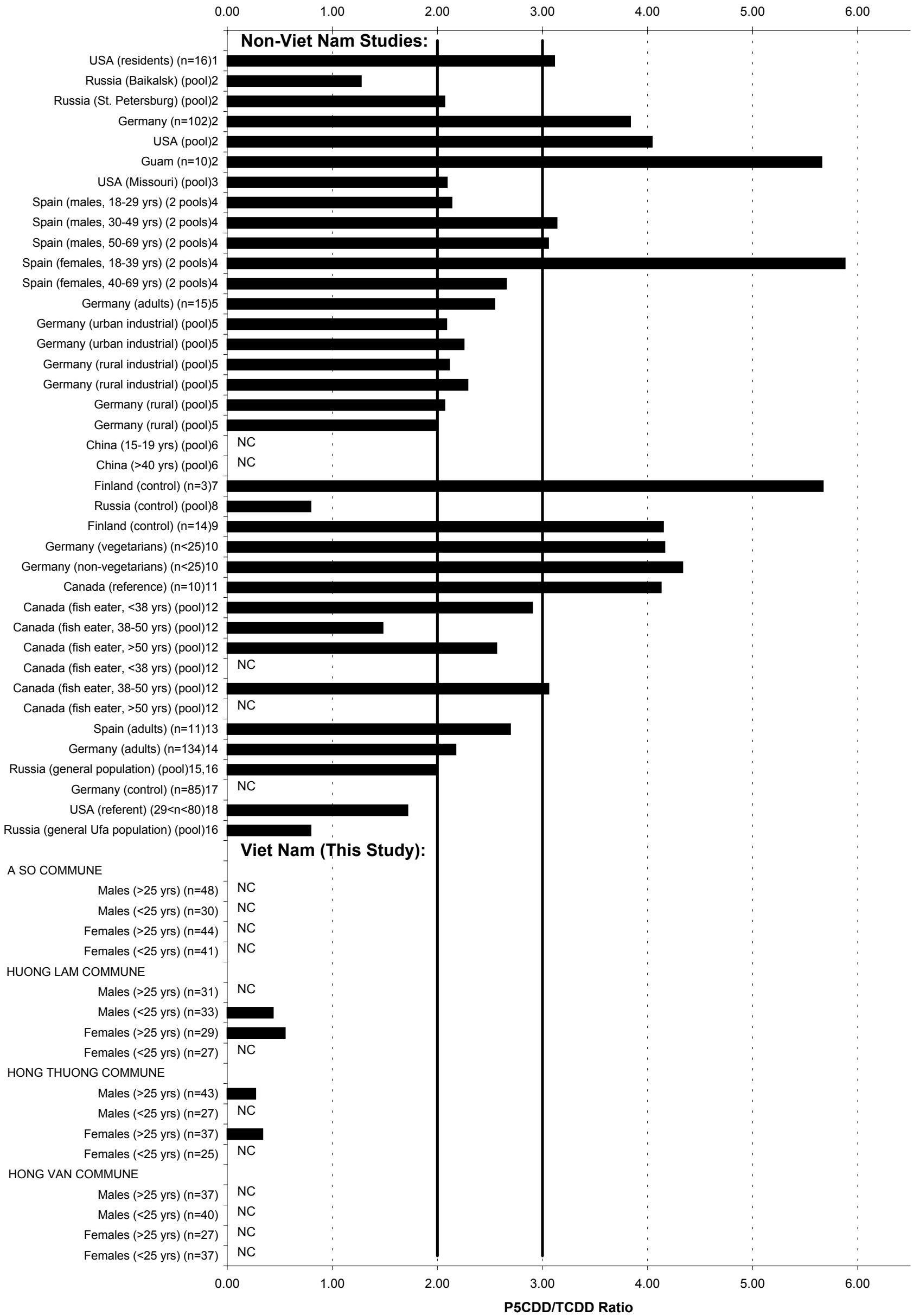
CIDA649: BL99TEQ7.DWG

Figure 2.14 TCDD concentrations (pg/g [ppt], lipid basis) and Total TEQs (% TCDD of Total TEQ in parentheses) determined in human blood from unexposed participants (non-Viet Nam studies) in industrialized countries, and in individuals in the Aluoi Valley, Viet Nam, 1999 (*cf.,* Tables 2.7 and 2.8).



[1] Tepper *et al.* 1997.
[2] Schecter *et al.* 1992c.
[3] Schecter 1994b (Table 15).
[4] Gonzalez *et al.* 1998.
[5] Wuthe *et al.* 1996.
[6] Schecter 1994b (Table 9).
[7] Hesso *et al.* 1992.
[8] Schecter 1994b (Table 8).
[9] Rosenberg *et al.* 1995.
[10] Welge *et al.* 1993.
[11] Papke *et al.* 1990.
[12] Cole *et al.* 1997.
[13] Jiminez *et al.* 1996.
[14] Papke *et al.* 1996.
[15] Schecter *et al.* 1993b.
[16] Schecter *et al.* 1994b.
[17] Schecter 1992.
[18] Piacitelli *et al.* 1992.

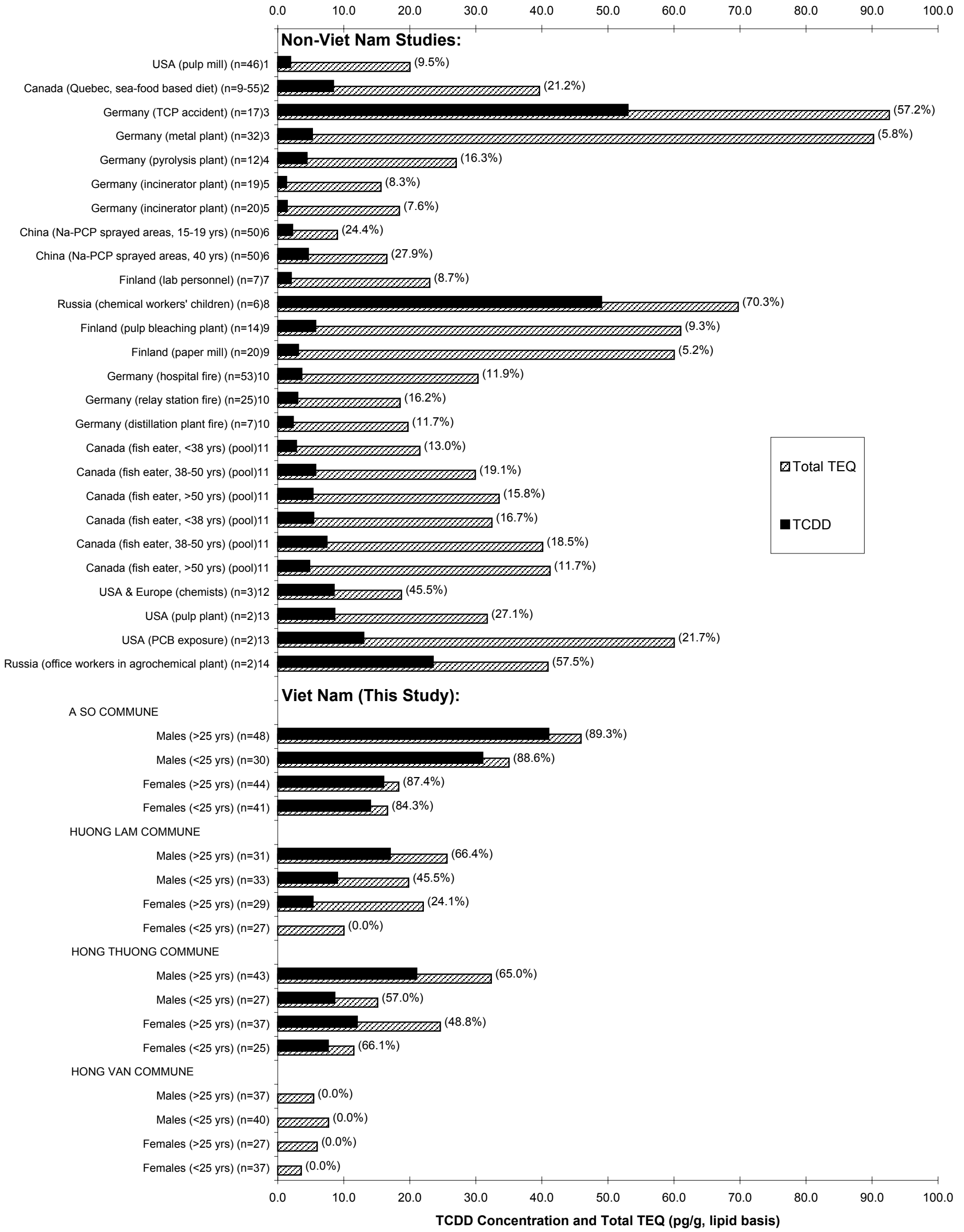
Figure 2.15 Ratios of P5CDD to TCDD levels (pg/g [ppt], lipid basis) calculated from human blood data reported in other investigations involving unexposed participants, and this study (1999) (*cf.,* Tables 2.7 and 2.8).



[1] Tepper *et al.* 1997.
[2] Schecter *et al.* 1992c.
[3] Schecter 1994b (Table 15).
[4] Gonzalez *et al.* 1998.
[5] Wuthe *et al.* 1996.
[6] Schecter 1994b (Table 9).
[7] Hesso *et al.* 1992.
[8] Schecter 1994b (Table 8).
[9] Rosenberg *et al.* 1995.
[10] Welge *et al.* 1993.
[11] Papke *et al.* 1990.
[12] Cole *et al.* 1997.
[13] Jiminez *et al.* 1996.
[14] Papke *et al.* 1996.
[15] Schecter *et al.* 1993b.
[16] Schecter *et al.* 1994b.
[17] Schecter 1992.
[18] Piacitelli *et al.* 1992.

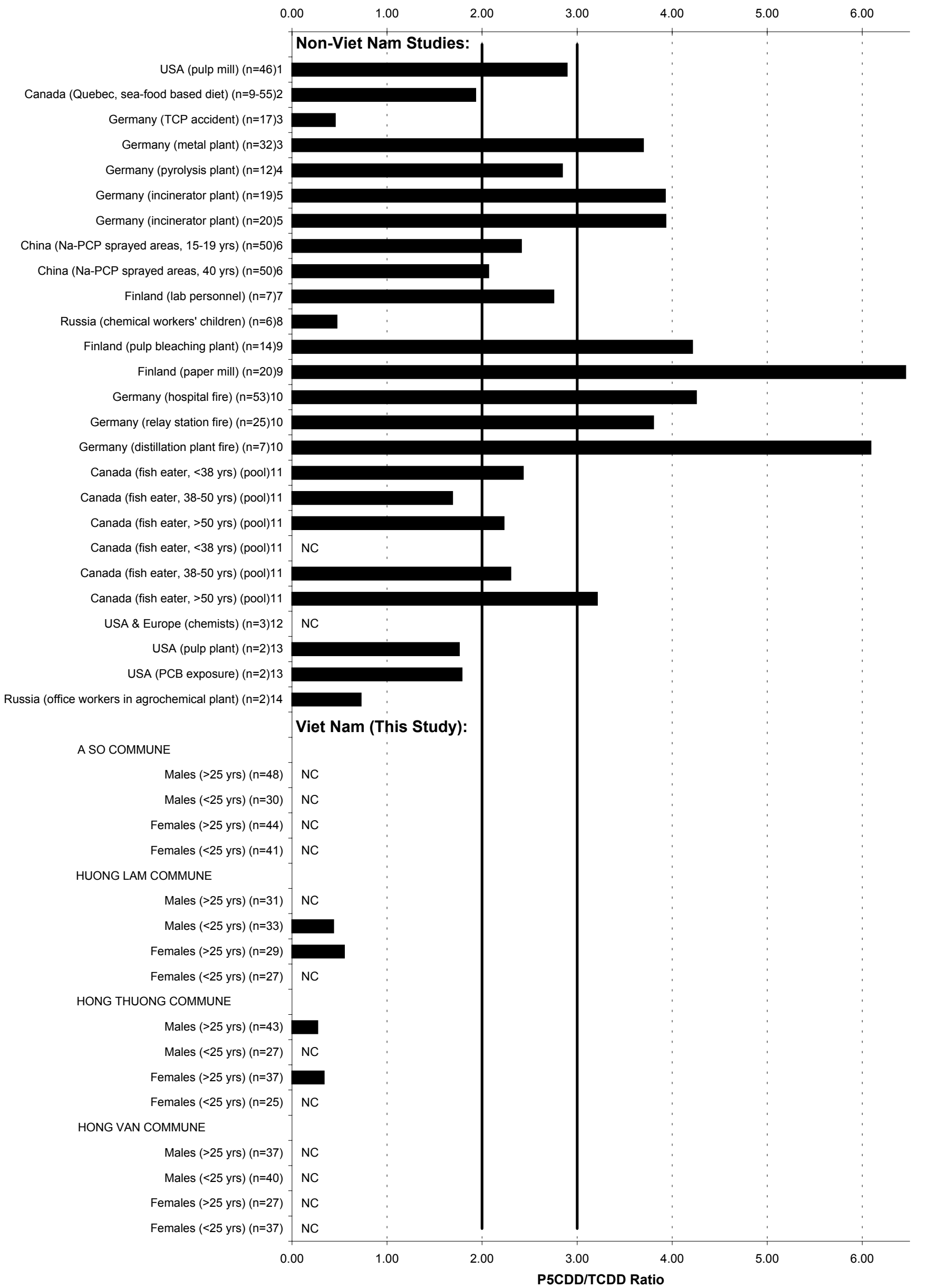
Note: NC denotes a ratio could not be calculated given that either P5CDD or TCDD was below detection, or the P5CDD level was not reported.

Figure 2.16 TCDD concentrations (pg/g [ppt], lipid basis) and Total TEQs (% TCDD of Total TEQ in parentheses) determined in human blood from exposed participants (i.e., some form of exposure in industrialized countries), and individuals in the Aluoi Valley, Viet Nam, 1999 (*cf.,* Tables 2.7 and 2.9).



[1] Tepper *et al.* 1997.
[2] Ayotte *et al.* 1997.
[3] Papke *et al.* 1992.
[4] Wuthe *et al.* 1992.
[5] Demi *et al.* 1996.
[6] Schecter 1994b (Table 9).
[7] Hesso *et al.* 1992.
[8] Schecter 1994b (Table 8).
[9] Rosenberg *et al.* 1995.
[10] Papke *et al.* 1990.
[11] Cole *et al.* 1997.
[12] Schecter 1992.
[13] Schecter *et al.* 1993a.
[14] Schecter *et al.* 1994b.

Figure 2.17 Ratios of P5CDD to TCDD levels (pg/g [ppt], lipid basis) calculated from human blood data reported in other invesigations involving exposed participants, and this study (1999) (*cf.,* Tables 2.7 and 2.9).



[1] Tepper *et al.* 1997.
[2] Ayotte *et al.* 1997.
[3] Papke *et al.* 1992.
[4] Wuthe *et al.* 1992.
[5] Demi *et al.* 1996.
[6] Schecter 1994b (Table 9).
[7] Hesso *et al.* 1992.
[8] Schecter 1994b (Table 8).
[9] Rosenberg *et al.* 1995.
[10] Papke *et al.* 1990.
[11] Cole *et al.* 1997.
[12] Schecter 1992.
[13] Schecter *et al.* 1993a.
[14] Schecter *et al.* 1994b.

Note: NC denotes a ratio could not be calculated given that either P5CDD or TCDD was below detection, or the P5CDD level was not reported.

Figure 2.18 **TCDD concentrations (pg/g [ppt], lipid basis) in human breast milk collected from the Aluoi Valley, Viet Nam, June 1999.**

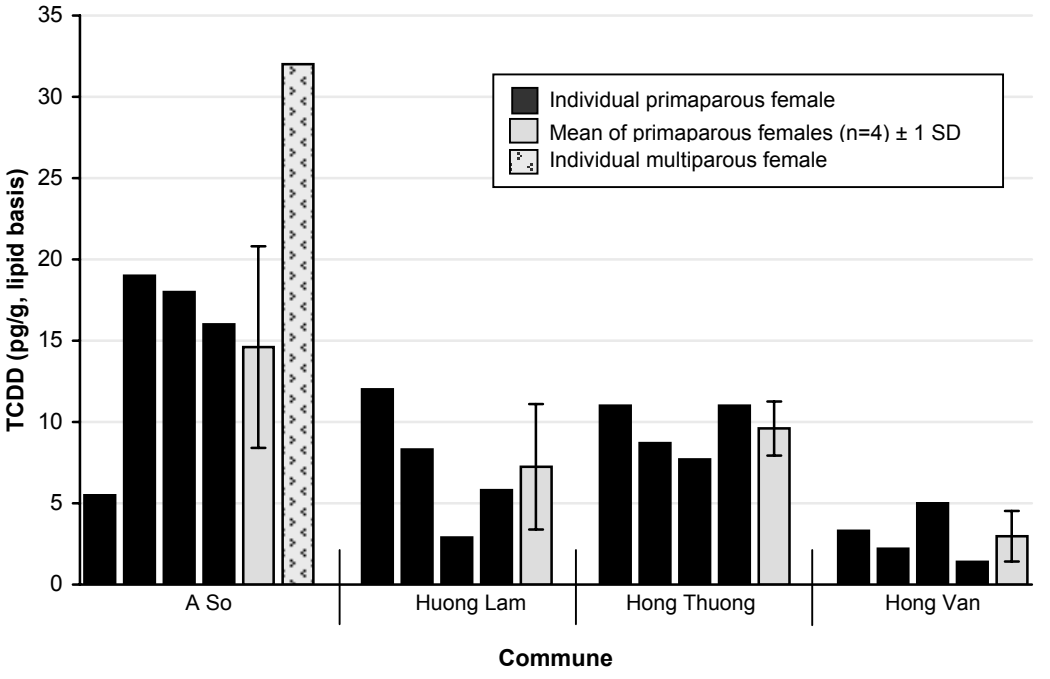
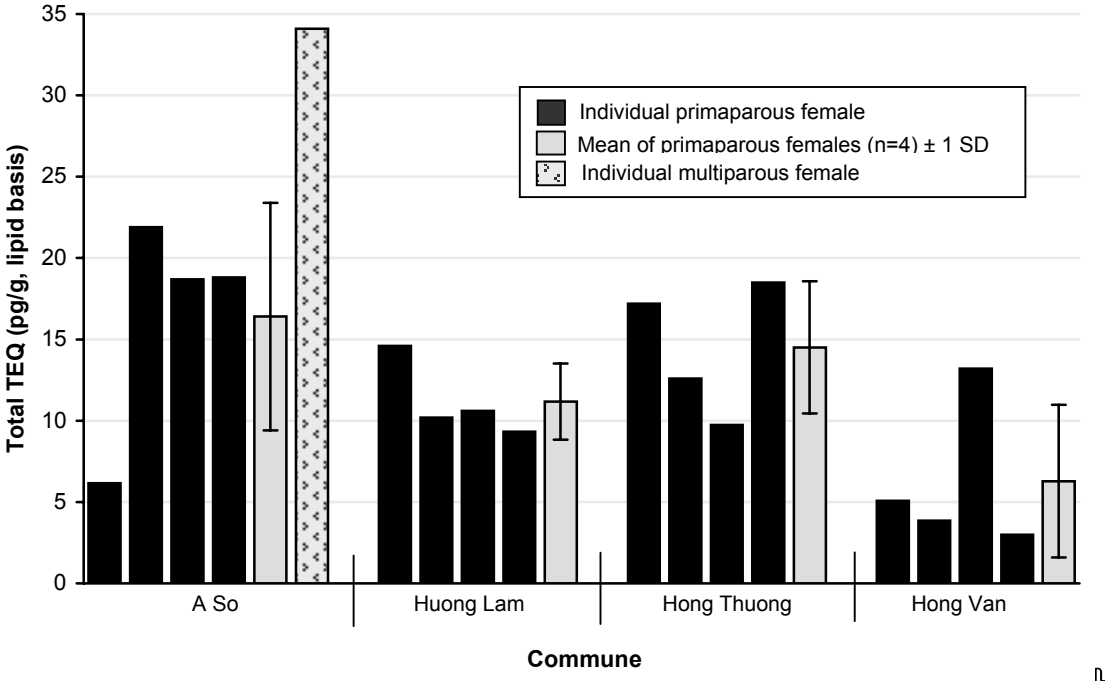
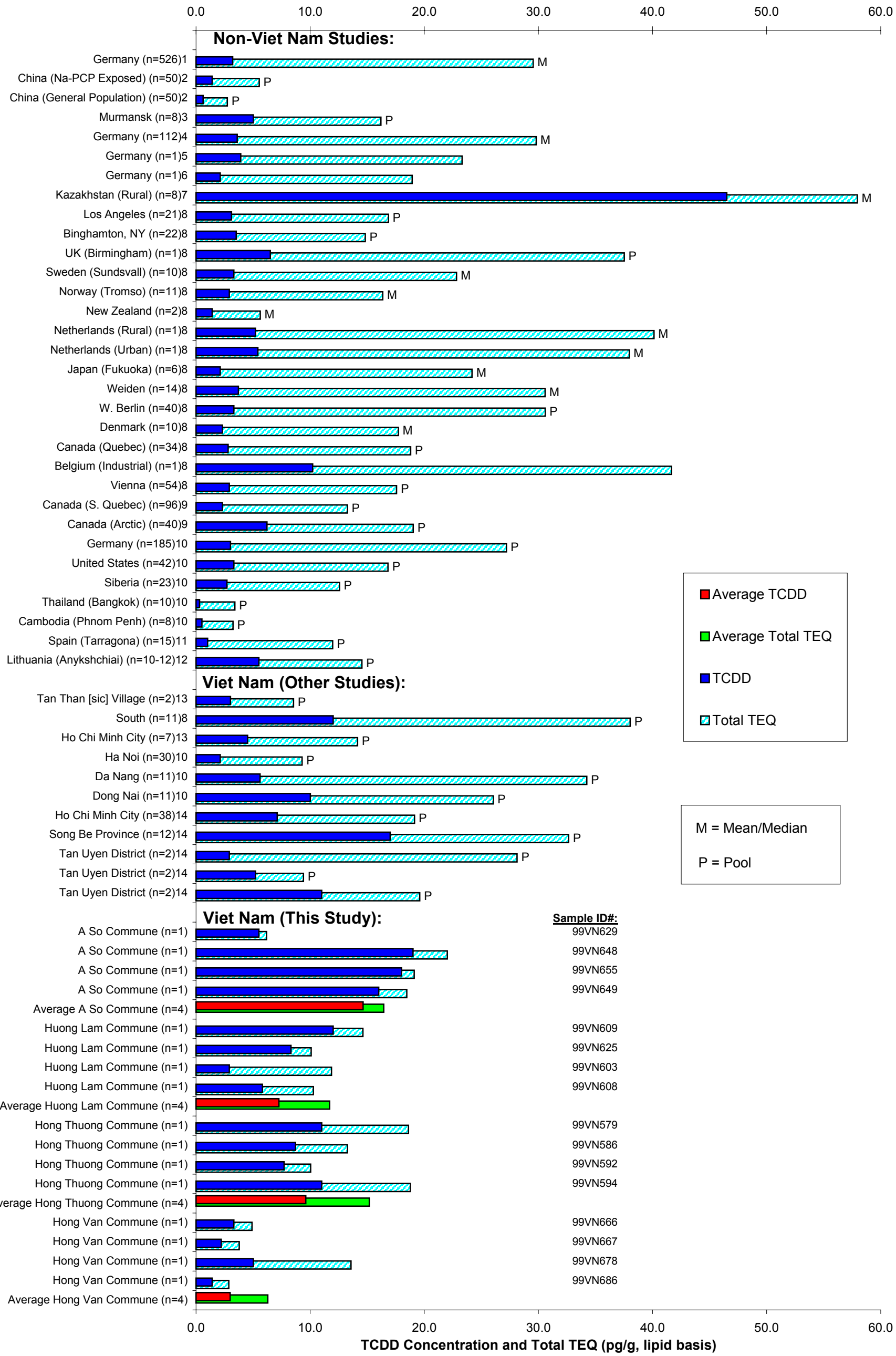


Figure 2.19 **Total TEQ (pg/g [ppt], lipid basis) in human breast milk collected from the Aluoi Valley, Viet Nam, June 1999.**



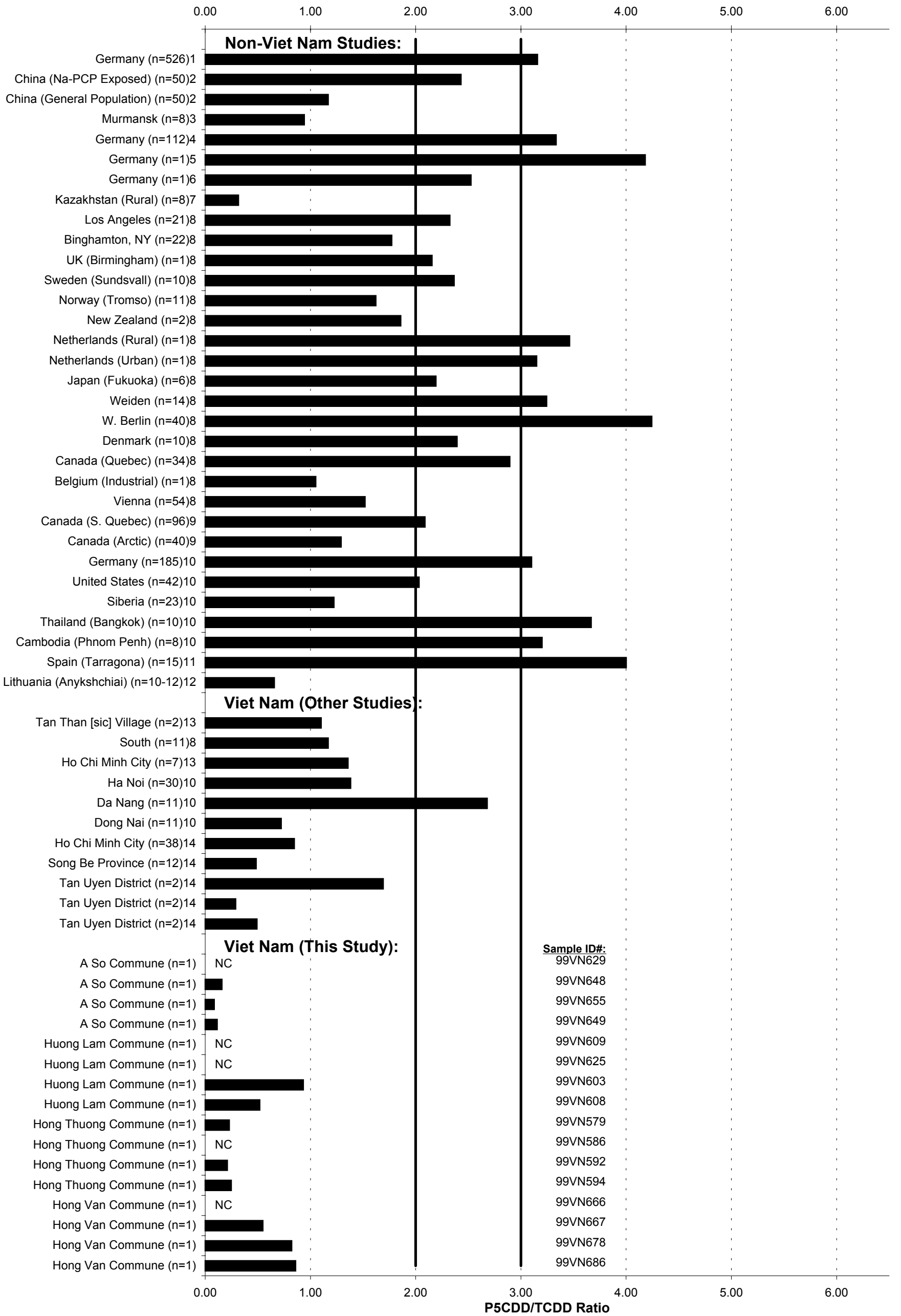
cida849:cida849 fig2.18 & 2.19.xls:chart 1 data

Figure 2.20 TCDD concentrations (pg/g [ppt], lipid basis) and Total TEQs determined in human breast milk reported in other investigations, and this study (1999) (*cf.,* Tables 2.11 and 2.13).



[1] Furst *et al.* 1994.
[2] Schecter *et al.* 1994a.
[3] Polder *et al.* 1998.
[4] Beck *et al.* 1994.
[5] Korner *et al.* 1993.
[6] Jodicke *et al.* 1992.
[7] Hooper *et al.* 1998.
[8] Jensen and Slorach 1991.
[9] Dewailly *et al.* 1992, Dewailly *et al.* 1991.
[10] Schecter *et al.* 1991a, Schecter 1994b.
[11] Schuhmacher *et al.* 1999.
[12] Becher 1995.
[13] Schecter *et al.* 1989b.
[14] Schecter *et al.* 1989c.

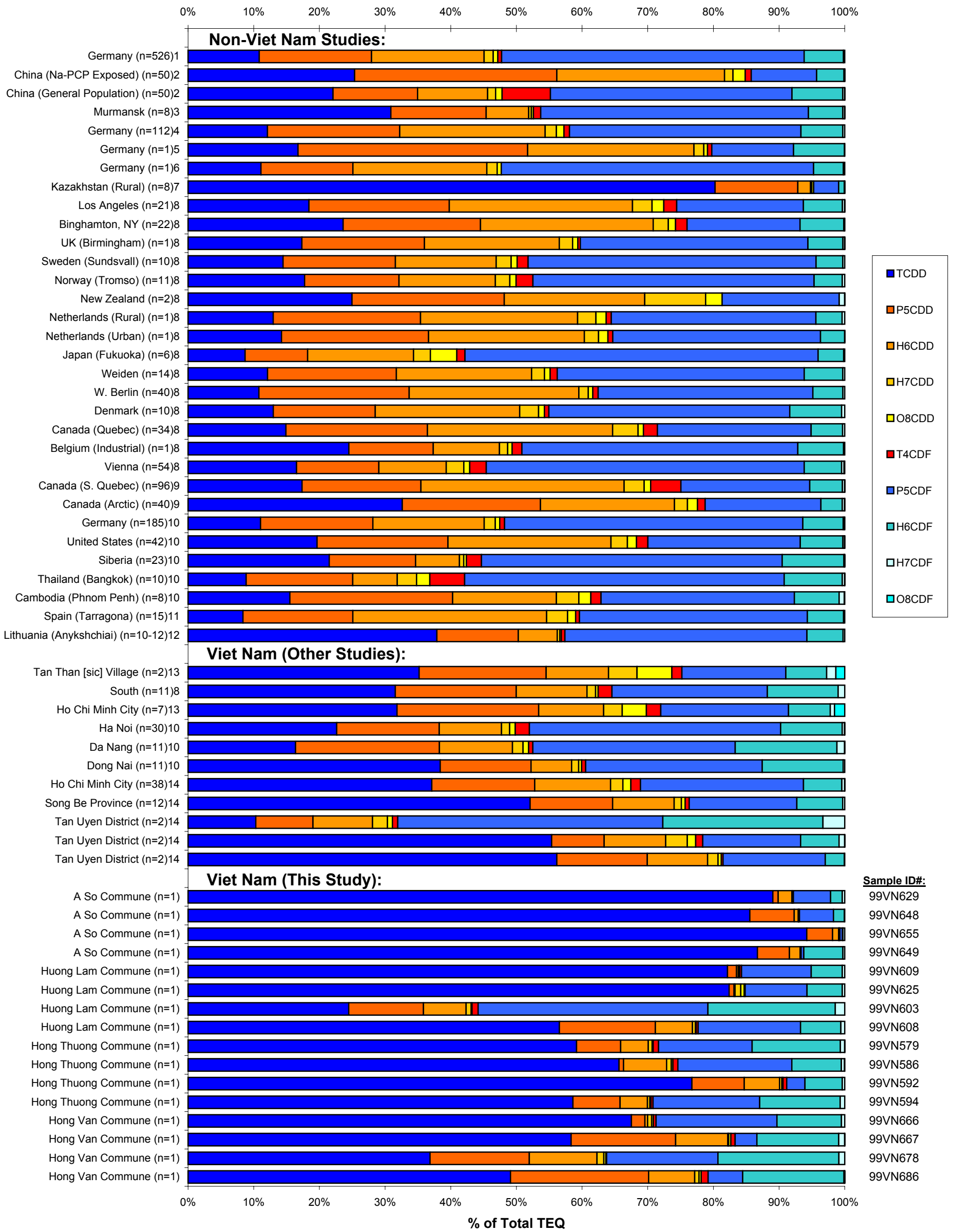
Figure 2.21 **Ratios of P5CDD to TCDD levels (pg/g [ppt], lipid basis) calculated from human breast milk data reported in other investigations, and this study (1999) (*cf.,* Tables 2.11 and 2.13).**



[1] Furst *et al.* 1994.
[2] Schecter *et al.* 1994a.
[3] Polder *et al.* 1998.
[4] Beck *et al.* 1994.
[5] Korner *et al.* 1993.
[6] Jodicke *et al.* 1992.
[7] Hooper *et al.* 1998.
[8] Jensen and Slorach 1991.
[9] Dewailly *et al.* 1992, Dewailly *et al.* 1991.
[10] Schecter *et al.* 1991a, Schecter 1994b.
[11] Schuhmacher *et al.* 1999.
[12] Becher 1995.
[13] Schecter *et al.* 1989b.
[14] Schecter *et al.* 1989c.

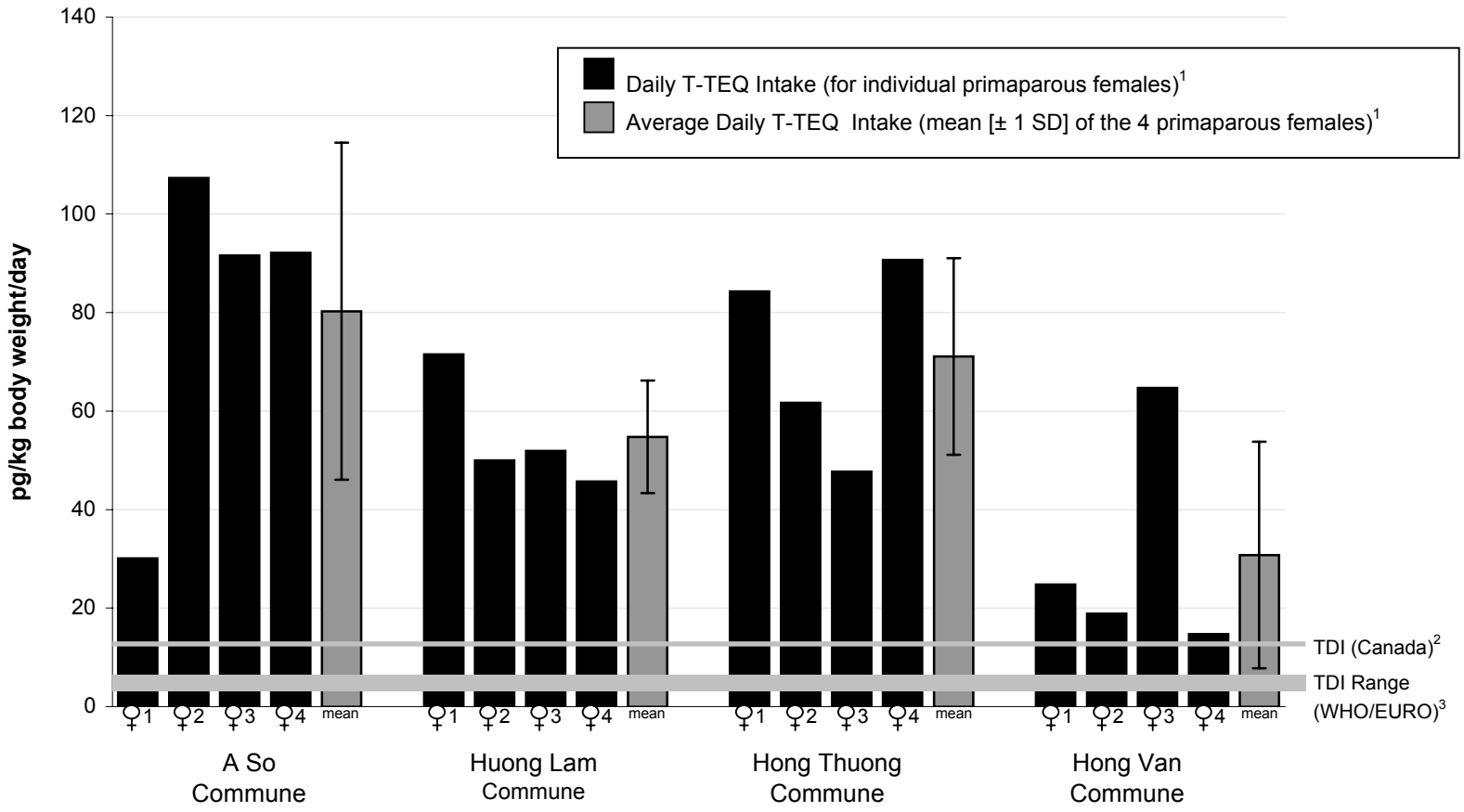
Note: NC denotes a ratio could not be calculated given that P5CDD was below detection.

Figure 2.22 **Polychlorinated dibenzo-*p*-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) congener profiles expressed as a percent of Total TEQ, determined in human breast milk during other investigations, and during the present study in the Aluoi Valley, Viet Nam, 1999; Toxicity Equivalent Factors were applied to the congener concentration (pg/g [ppt], lipid basis) to facilitate calculation of a percent contribution to total toxicity (2,3,7,8-T4CDD = TCDD; if data points were ND or NDR, 1/2 the detection level was used in the T-TEQ calculation; *cf.,* Tables 2.11 and 2.13).**



[1] Furst *et al.* 1994.
[2] Schecter *et al.* 1994a.
[3] Polder *et al.* 1998.
[4] Beck *et al.* 1994.
[5] Korner *et al.* 1993.
[6] Jodicke *et al.* 1992.
[7] Hooper *et al.* 1998.
[8] Jensen and Slorach 1991.
[9] Dewailly *et al.* 1992, Dewailly *et al.* 1991.
[10] Schecter *et al.* 1991a, Schecter 1994b.
[11] Schuhmacher *et al.* 1999.
[12] Becher 1995.
[13] Schecter *et al.* 1989b.
[14] Schecter *et al.* 1989c.

Figure 2.23 **Intake of polychlorinated dibenzo-*p*-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) by infants through breast milk from primaparous females, Aluoi Valley, Viet Nam, 1999; Aluoi Valley data are compared to the tolerable daily intake (TDI; based on Total TEQ [T-TEQ]) values used in Canada (10 pg/kg body weight/day), and as recommended by WHO/EURO (1-4 pg/kg body weight/day).**



[1]Based on a 5 kg infant consuming 700 ml breast milk/day with 3.5% lipid content in milk (WHO/EURO 1989).
[2]Government of Canada (1993).
[3]WHO/EURO (1998 a,b).

Figure 2.24 Comparative overview of the highest Agent Orange dioxin (2,3,7,8-T4CDD [TCDD]) levels in environmental samples (soil in pg/g dry weight; foods in pg/g wet weight; human blood and breast milk in pg/g lipid) in four Aluoi Valley communes, Viet Nam, 1996-1999 (numbers in parentheses represent the Total I-TEQ of the sample).

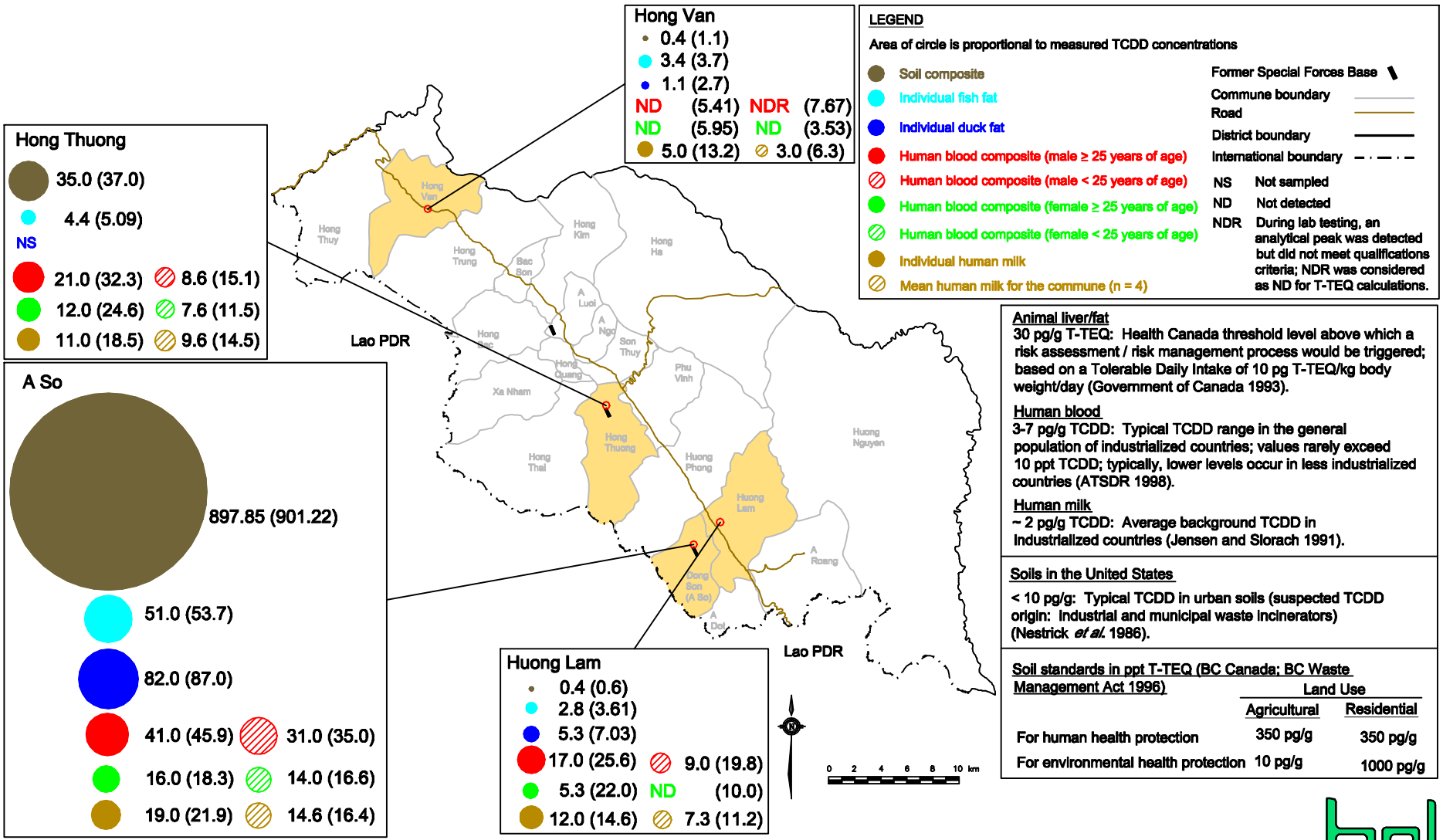


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Figure 3.1 **Pregnancy outcomes (1959-1999) in four communes (A So, Huong Lam, Hong Thuong and Hong Van), in the Aluoi Valley, Viet Nam.**

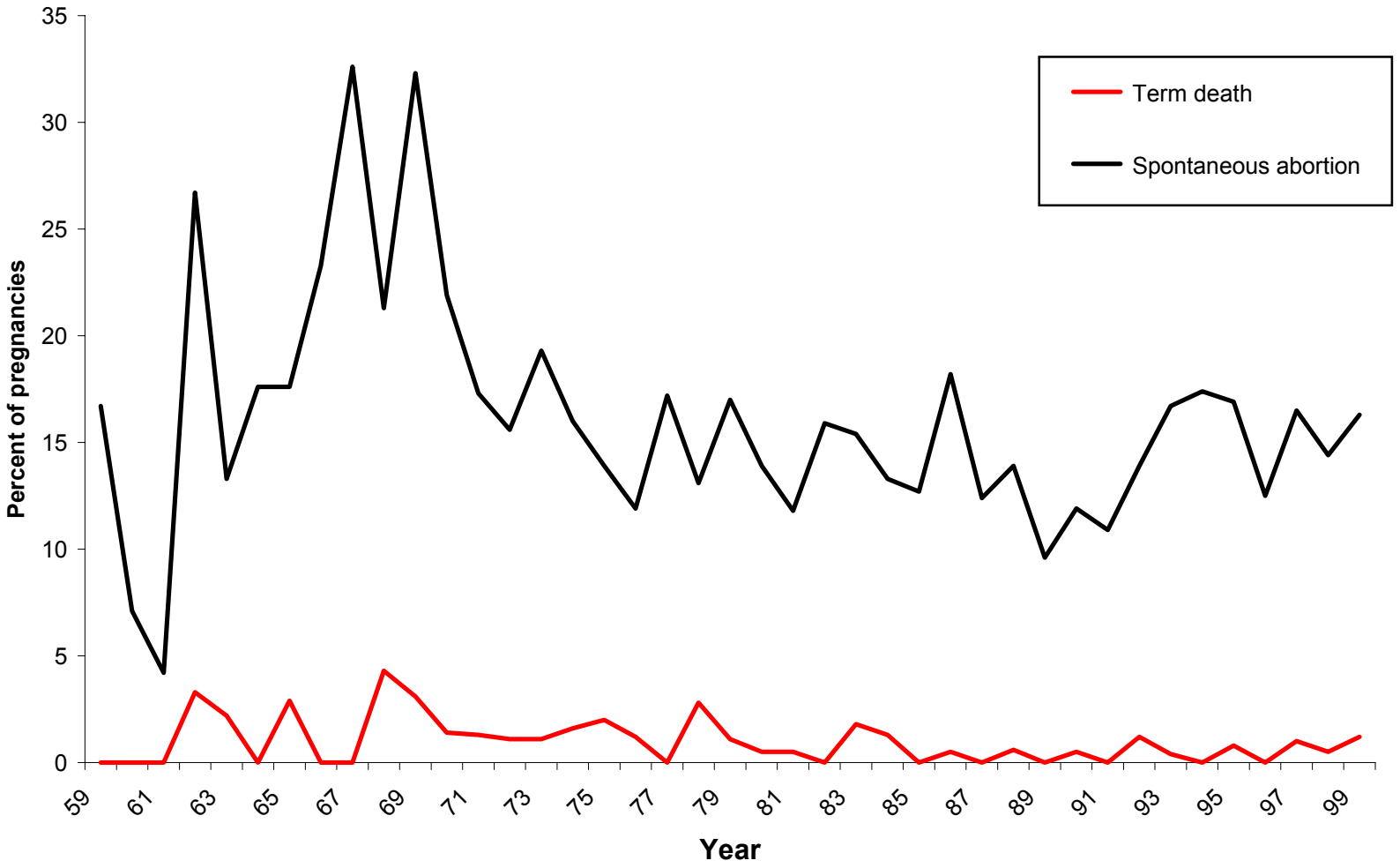


Figure 3.2 **Birth outcomes (1959-1999) in four communes (A So, Huong Lam, Hong Thuong and Hong Van) in the Aluoi Valley, Viet Nam.**

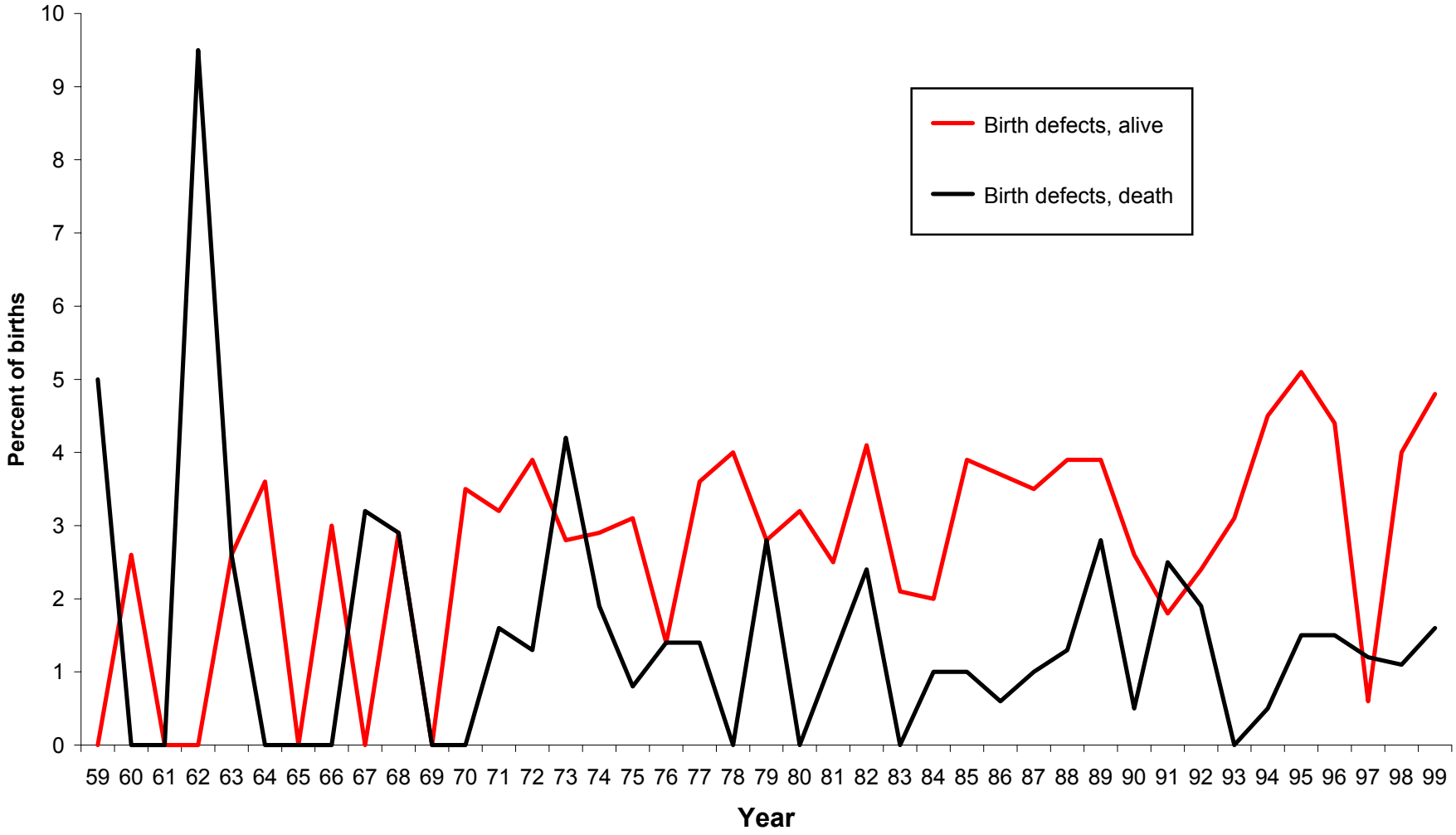


Figure 3.3 Total birth defects (1959-1999) in four communes in the Aluoi Valley, Viet Nam.

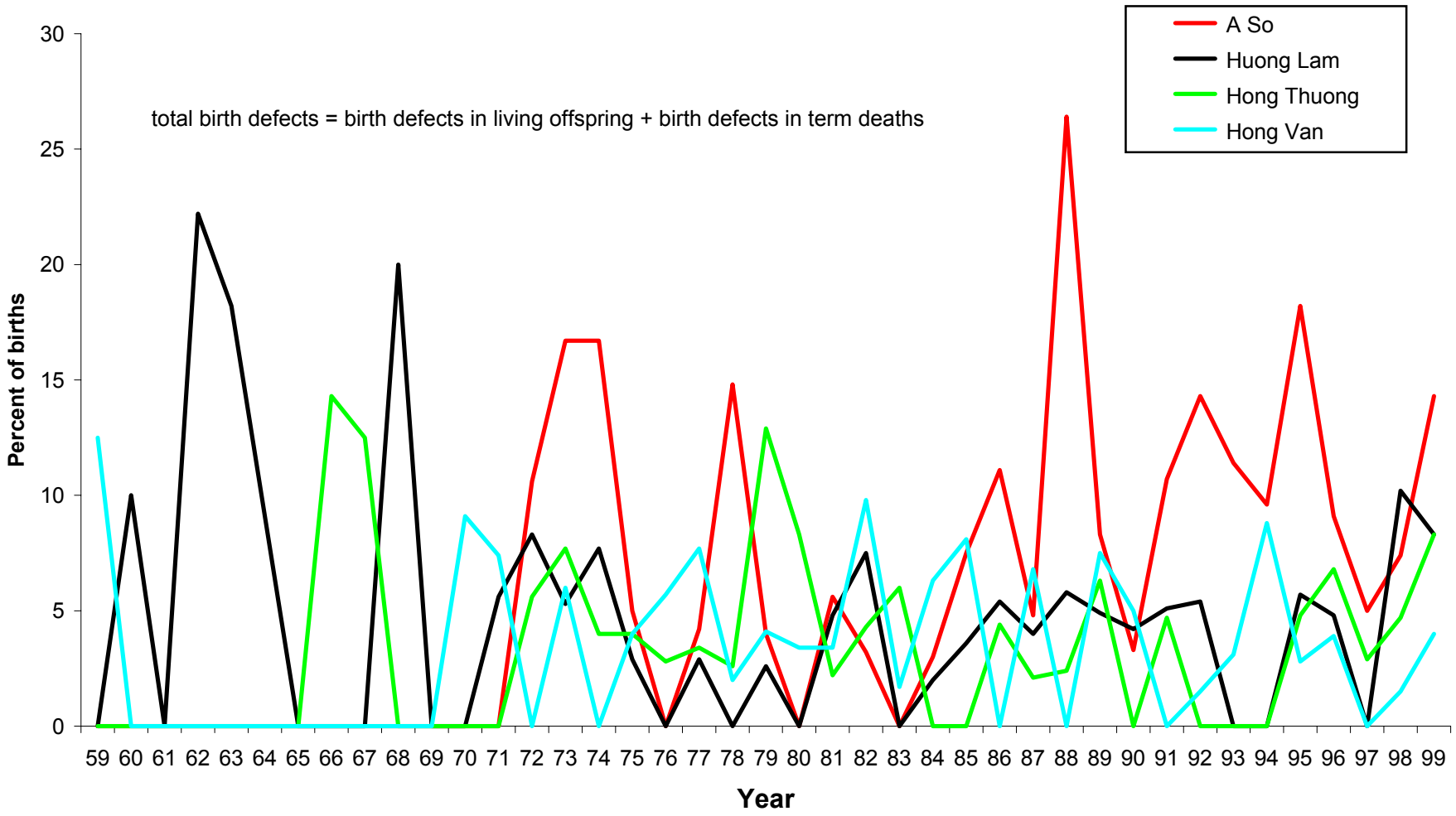


Figure 3.4 Birth defects in live offspring (1959-1999) in four communes in the Aluoi Valley, Viet Nam.

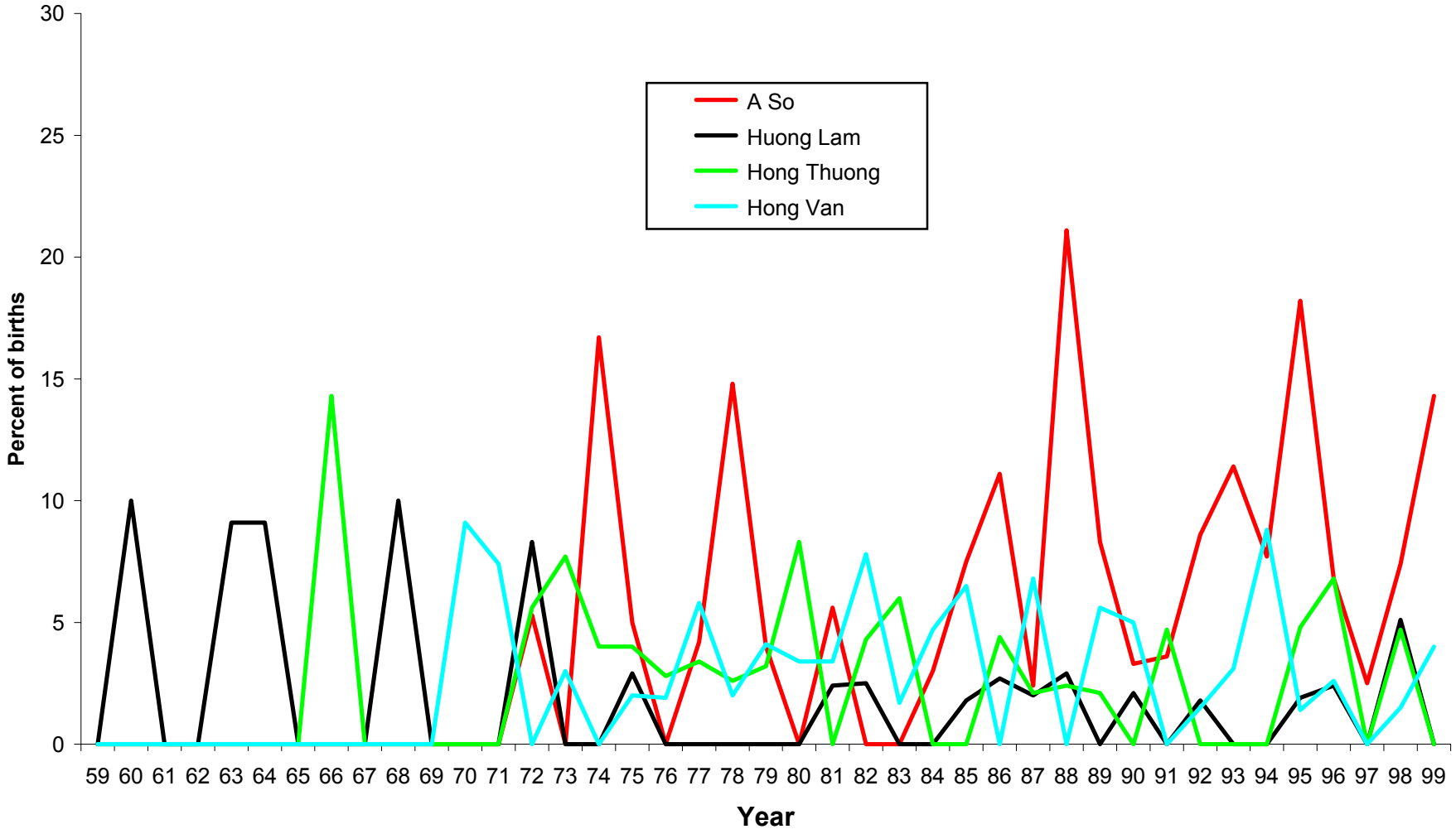


Figure 3.5 **Total birth defects (1959-1999) in A So and three other communes in the Aluoi Valley, Viet Nam.**

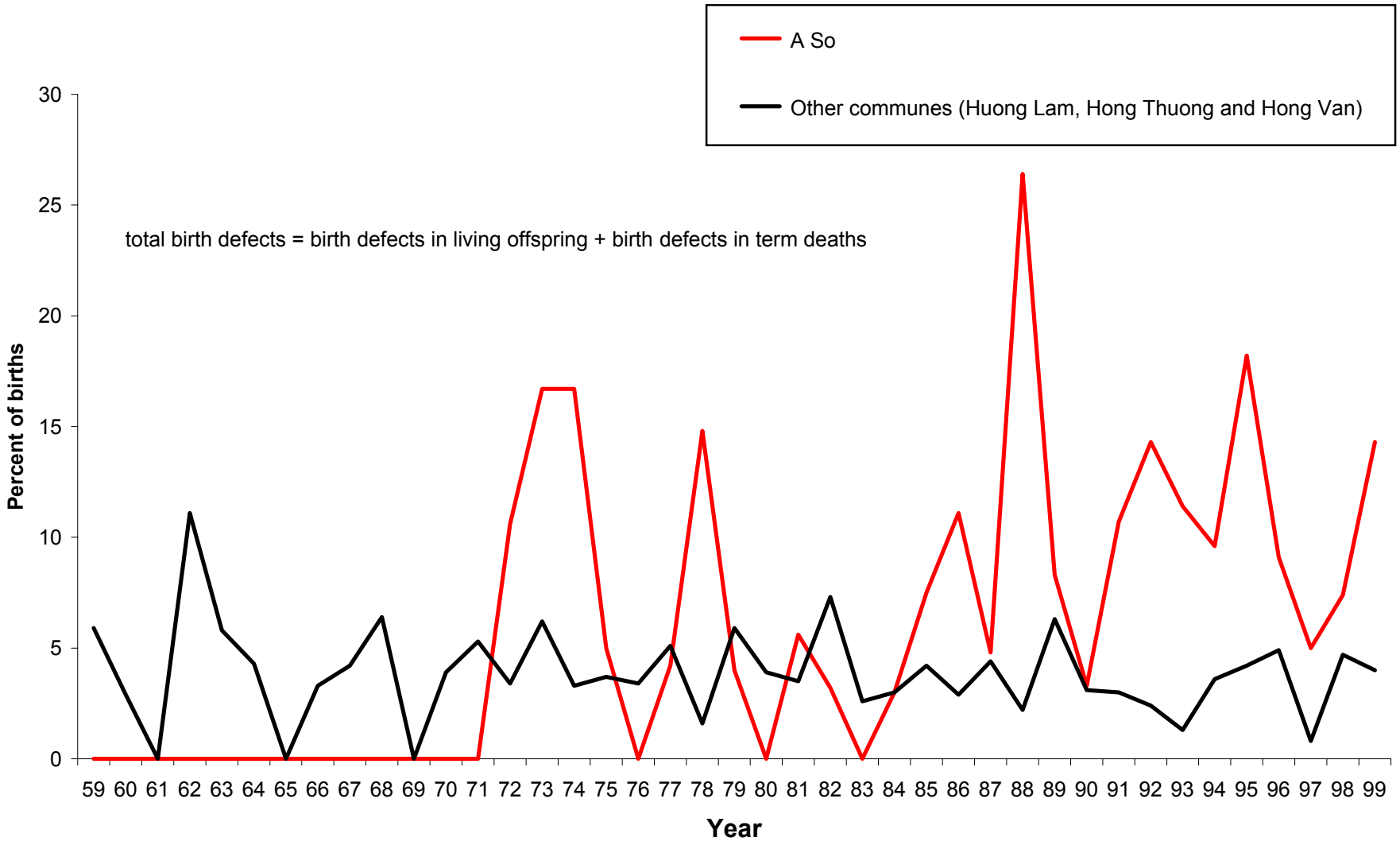


Figure 3.6 **Birth defects in live offspring (1959-1999) in A So and three other communes in the Aluoi Valley, Viet Nam.**

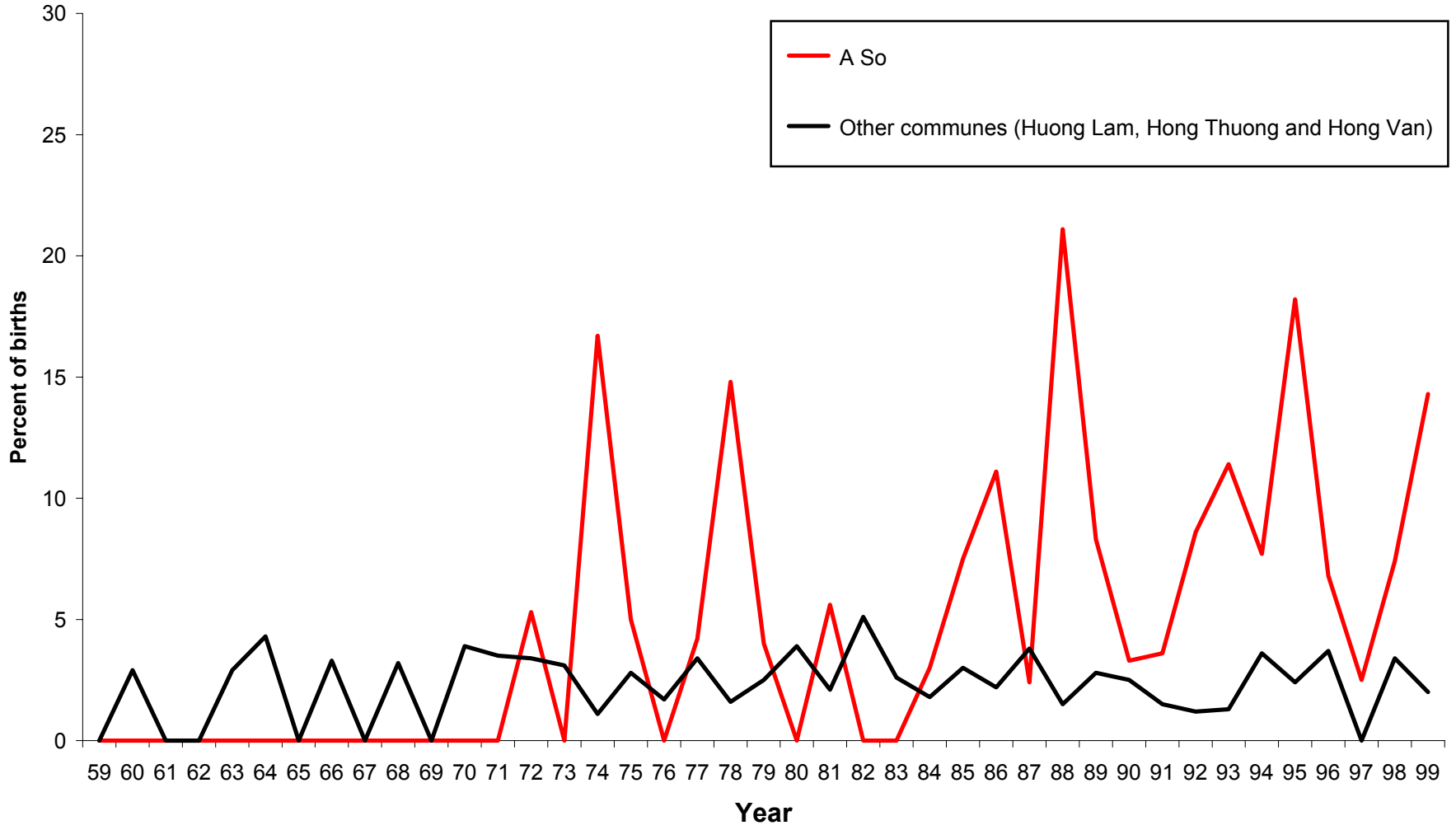
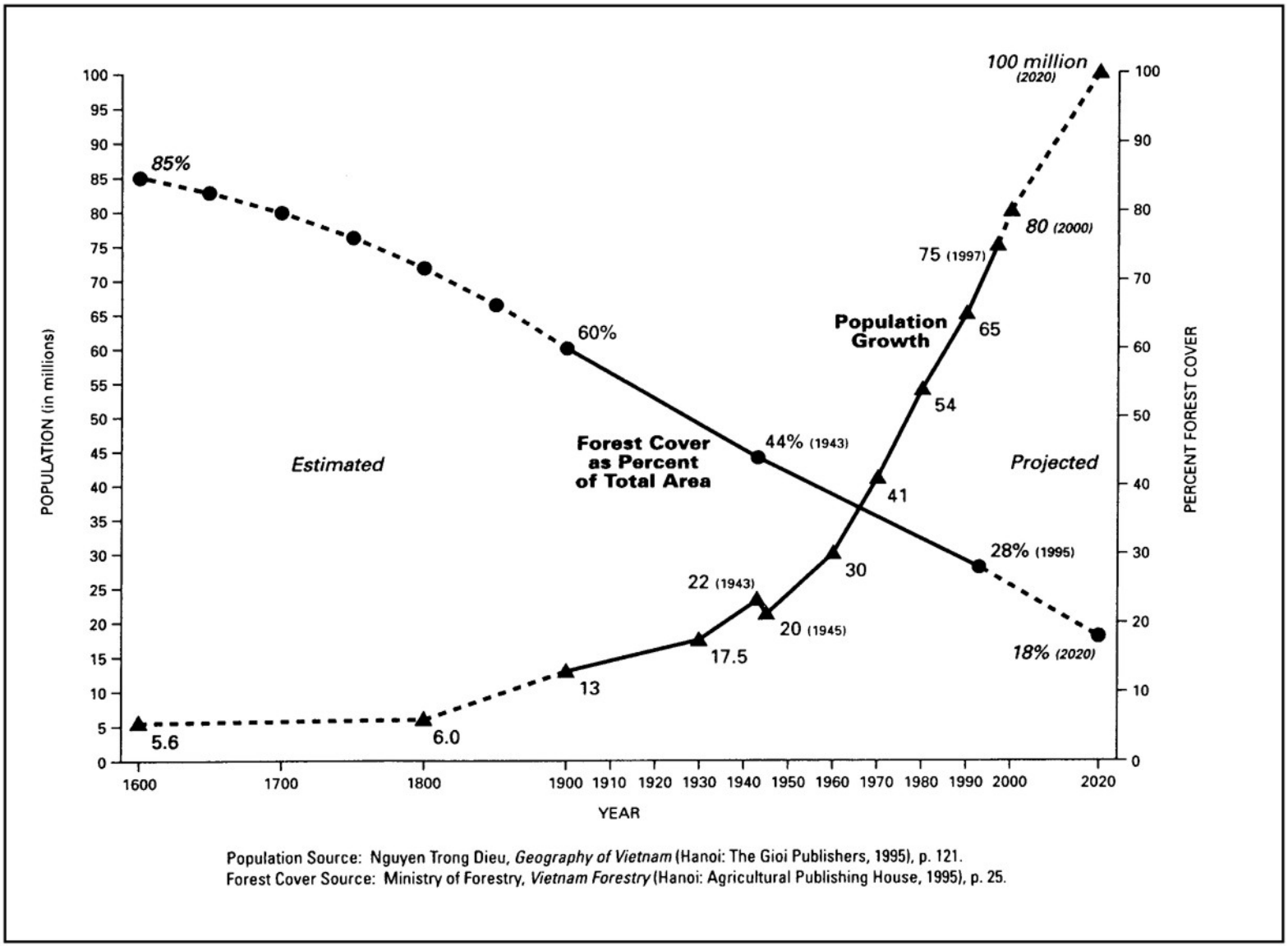


Figure 5.1 Historical population and forest cover trends in Viet Nam.



Population Source: Nguyen Trong Dieu, *Geography of Vietnam* (Hanoi: The Gioi Publishers, 1995), p. 121.
Forest Cover Source: Ministry of Forestry, *Vietnam Forestry* (Hanoi: Agricultural Publishing House, 1995), p. 25.

Figure 5.2 Changing forest cover in Viet Nam - 1943 to 1992.

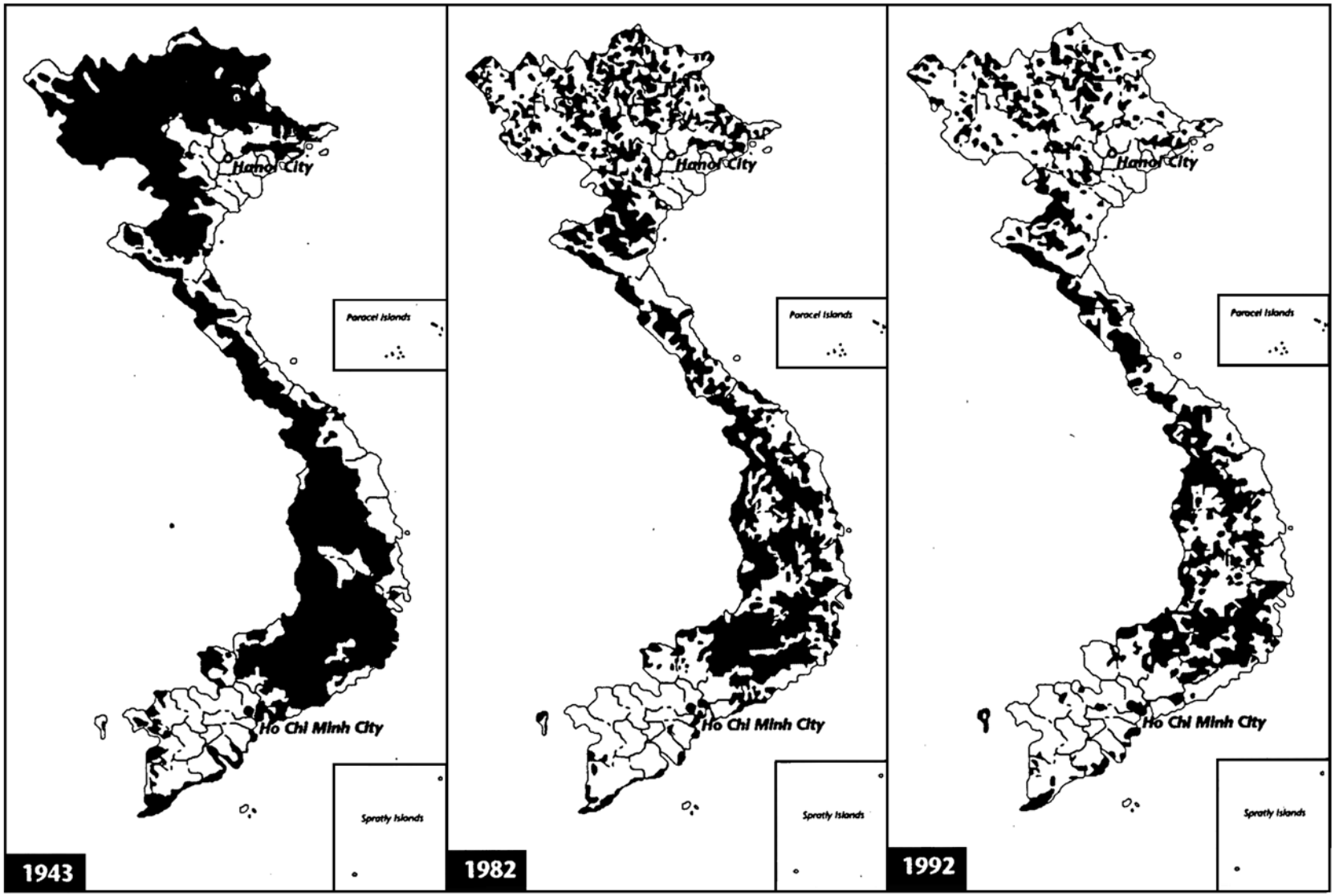


Figure 5.3 Current (1991) land use map of Aluoi District (data from FIPI 1995).