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Supplemental Material

Clinical biochemical parameters associated with the exposure to multiple environmental metals in residents from Kabwe, Zambia

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Supplementary Figure S1. Map of Kabwe showing the selected 20 SEAs (yellow) and mine site (red circle).

Supplementary Table S1. Operating conditions for ICP-MS analysis.

Parameter	Value
Radiation frequency power	1500 W
Argon gas pressure	600 kPa
Cell gas (Helium)	100 kPa
Peak pattern	3
Replicates	10
Sweeps/replicate	1000
Integration time/mass	9.00 sec
Stabilization time	30 sec

Supplementary Table S2. Age, height, body weight and BMI of 504 representative residents in Kabwe from 8 areas by age (mean and median at upper row and range at lower row).

Area	Kasanda	Makululu	Chowa	Natuseko	Bwacha	Mpima prison	Kang'omba	Hamududu	All area
Sample size (female, male)									
all age	94 (57, 37)	199 (116, 83)	15 (6, 9)	42 (22, 20)	19 (11, 8)	43 (22, 21)	38 (20, 18)	54 (26, 28)	504 (280, 224)
0 - 4	4 (0, 4)	5 (0, 5)	2 (0, 2)	12 (2, 10)	2 (1, 1)	8 (2, 6)	4 (3, 1)	9 (3, 6)	46 (11, 35)
5 - 17	33 (23, 10)	51 (23, 28)	4 (1, 3)	9 (3, 6)	4 (0, 4)	15 (5, 10)	10 (4, 6)	9 (4, 5)	135 (63, 72)
18 -	57 (34, 23)	143 (93, 50)	9 (5, 4)	21 (17, 4)	13 (10, 3)	20 (15, 5)	24 (13, 11)	36 (19, 17)	323 (206, 117)
Age (year)	30.7, 30 ab	31.9, 30 a	24.9, 26 abc	18.1, 13 c	30.8, 36 abc	19.9, 9 bc	25.9, 26 abc	25.3, 27 abc	28.1, 27
	(1 - 86)	(0 - 96)	(2 - 63)	(0 - 54)	(4 - 62)	(0 - 72)	(1 - 67)	(0 - 72)	(0 - 96)
Height (cm)									
all age	146.4, 156 ab	149.1, 158 a	148.1, 156 abc	130.6, 135 c	144.5, 154 abc	133.0, 170 bc	148.3, 155 ab	144.5, 158 abc	144.9, 156
	(79 - 186)	(61 - 180)	(90 - 187)	(65 - 172)	(88 - 173)	(70 - 170)	(89 - 189)	(71 - 183)	(61 - 189)
0 - 4	84.3, 82.0	96.8, 99.0	92.5, 92.5	87.2, 89.5	93.0, 93.0	93.8, 99.0	97.3, 98.0	91.8, 96.0	91.3, 95.0
	(79 - 92)	(61 - 128)	(90 - 95)	(65 - 100)	(88 - 98)	(70 - 104)	(89 - 105)	(71 -106)	(61 - 128)
5 - 17	124.5, 123.0	121.0, 122.0	130.3, 130.5	120.3, 123.0	132.3, 133.5	118.1, 115.0	126.1, 127.0	119.0, 120.0	122.4, 123.0
	(104 - 144)	(94 - 158)	(124 - 136)	(101 - 135)	(120 - 142)	(103 - 144)	(104 - 143)	(83 - 134)	(83 - 158)
18 -	162.3, 161.0	160.7, 161.0	168.3, 167.0	159.3, 160.0	156.2, 160.0	159.8, 164.0	163.7, 164.0	165.3, 164.0	161.6, 162.0
	(130 - 186)	(94 - 180)	(154 - 187)	(132 - 172)	(95 - 173)	(115 - 170)	(145 - 189)	(147 - 183)	(94 - 189)
Body weight (kg)									
all age	49.4, 51.5 a	50.8, 55.0 a	51.8, 59.0 abc	37.3, 27.0 c	57.1, 59.5 abc	35.9, 28.0 bc	50.2, 56.0 ab	47.1, 52.5 abc	47.9, 53.0
	(10 - 154)	(7 - 110)	(12 - 105)	(8 - 83)	(11 - 102)	(10 - 78)	(12 - 92)	(8 - 89)	(7 - 154)

0 - 4	11.8, 12.0	15.0, 14.5	12.5, 12.5	12.4, 13.0	13.5, 13.5	13.5, 13.0	17.0, 15.0	13.6, 14.0	13.4, 13.0
	(10 - 13)	(7 - 24)	(12 - 13)	(8 - 16)	(11 - 16)	(10 - 19)	(12 - 24)	(8 - 17)	(7 - 24)
5 - 17	25.1, 23.0	23.0, 22.0	25.3, 25.0	21.4, 22.5	26.3, 27.5	21.4, 20.0	25.5, 25.0	24.2, 22.0	23.7, 23.0
	(17 - 39)	(14 - 51)	(21 - 30)	(15 - 27)	(18 - 32)	(15 - 33)	(20 - 32)	(11 - 47)	(11 - 51)
18 -	66.1, 63.0	62.0, 59.0	72.3, 68.0	57.7, 55.0	74.6, 71.5	55.7, 52.0	64.7, 61.0	62.1, 61.5	63.0, 60.0
	(27 - 154)	(38 - 110)	(58, 105)	(27 - 83)	(53 - 102)	(40 - 78)	(49 - 92)	(43 - 89)	(27 - 154)

BMI

all age	21.5, 20.4 ab	21.5, 21.2 a	21.2, 21.9 ab	19.1, 18.2 ab	24.0, 24.1 a	18.4, 17.6 b	21.5, 21.8 ab	20.5, 19.7 ab	21.0, 20.4
	(12.9 - 53.9)	(12.8 - 40.9)	(13.3 - 30.8)	(13.3 - 29.8)	(12.5 - 37.9)	(10.6 - 30.2)	(14.3 - 34.2)	(13.2 - 30.1)	(10.6 - 53.9)
0 - 4	16.9, 16.0	15.8, 15.1	14.7, 14.7	16.3, 16.3	15.4, 15.4	15.6, 15.2	17.5, 15.6	16.2, 15.9	16.1, 15.6
	(15.4 - 19.3)	(14.0 - 18.8)	(13.3 - 16.0)	(13.9 - 19.3)	(14.2 - 16.7)	(10.6 - 20.4)	(15.1 - 21.8)	(13.2 - 21.3)	(10.6 - 21.8)
5 - 17	16.0, 15.5	15.5, 15.3	14.8, 14.4	14.6, 14.6	14.8, 15.1	15.2, 15.4	16.3, 15.4	16.6, 15.9	15.6, 15.4
	(12.9 - 20.5)	(12.8 - 20.4)	(13.7 - 16.7)	(13.3 - 15.9)	(12.5 - 16.6)	(12.9 - 16.6)	(14.3 - 25.9)	(13.4 - 26.2)	(12.5 - 26.2)
18 -	25.0, 22.9	23.9, 22.6	25.5, 25.3	22.4, 22.3	28.5, 28.8	21.9, 20.5	24.2, 23.4	22.7, 21.7	24.0, 22.6
	(16.0 - 53.9)	(15.4 - 40.9)	(20.8 - 30.8)	(15.5 - 29.8)	(20.7 - 37.9)	(17.4 - 30.2)	(16.2 - 34.2)	(17.4 - 30.1)	(15.4 - 53.9)

Note: Different small letters (a, b and c) between columns indicate a significant difference among areas.

Supplementary Table S3. BMI z-score for girls and boys with the age between 5 to 17 years old in 8 areas of Kabwe.

Area	Kasanda	Makululu	Chowa	Natuseko	Bwacha	Mpima prison	Kang'omba	Hamududu	All area
girl									
-3 ~ -2	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (25%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
-2 ~ -1	1 (10%)	3 (11%)	2 (67%)	2 (33%)	1 (25%)	1 (10%)	1 (17%)	1 (20%)	10 (16%)
-1 ~ 0	4 (40%)	15 (54%)	0 (0%)	3 (50%)	1 (25%)	5 (50%)	4 (67%)	1 (20%)	28 (45%)
0 ~ 1	4 (40%)	9 (32%)	1 (33%)	1 (17%)	1 (25%)	4 (40%)	0 (0%)	3 (60%)	18 (29%)
1 ~ 2	1 (10%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (6%)
2 ~ 3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (17%)	0 (0%)	2 (3%)
boy									
-3 ~ -2	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (-)	0 (0%)	0 (0%)	0 (0%)	1 (1%)
-2 ~ -1	2 (9%)	5 (22%)	1 (100%)	0 (0%)	0 (-)	1 (20%)	1 (25%)	0 (0%)	12 (17%)
-1 ~ 0	10 (43%)	7 (30%)	0 (0%)	2 (2%)	0 (-)	4 (80%)	3 (75%)	2 (50%)	33 (46%)
0 ~ 1	8 (35%)	9 (39%)	0 (0%)	0 (0%)	0 (-)	0 (0%)	0 (0%)	1 (25%)	23 (32%)
1 ~ 2	3 (13%)	1 (4%)	0 (0%)	0 (0%)	0 (-)	0 (0%)	0 (0%)	0 (0%)	2 (3%)
2 ~ 3	0 (0%)	1 (4%)	0 (0%)	0 (0%)	0 (-)	0 (0%)	0 (0%)	1 (25%)	1 (1%)

Supplementary Table S4. BMI z-score for girls and boys with the age between 5 to 17 years old by Pb-B range (0 – 4.9, 5 – 19.9, 20 – 44.9, 45≤ µg/dL).

Pb-B range	<5		5 - 19.9		20 - 44.9		45≤		All	
girl										
-3 ~ -2	0	(0%)	0	(0%)	0	(0%)	0	(0%)	0	(0%)
-2 ~ -1	2	(17%)	4	(22%)	4	(14%)	0	(0%)	10	(16%)
-1 ~ 0	8	(67%)	9	(50%)	10	(34%)	1	(33%)	28	(45%)
0 ~ 1	1	(8%)	3	(17%)	12	(41%)	2	(67%)	18	(29%)
1 ~ 2	0	(0%)	1	(6%)	3	(10%)	0	(0%)	4	(6%)
2 ~ 3	1	(8%)	1	(6%)	0	(0%)	0	(0%)	2	(3%)
boy										
-3 ~ -2	0	(0%)	1	(4%)	0	(0%)	0	(0%)	1	(1%)
-2 ~ -1	4	(29%)	4	(15%)	4	(14%)	0	(0%)	12	(17%)
-1 ~ 0	4	(29%)	14	(54%)	15	(54%)	0	(0%)	33	(46%)
0 ~ 1	5	(36%)	6	(23%)	9	(32%)	3	(75%)	23	(32%)
1 ~ 2	0	(0%)	1	(4%)	0	(0%)	1	(25%)	2	(3%)
2 ~ 3	1	(7%)	0	(0%)	0	(0%)	0	(0%)	1	(1%)

Supplementary Table S5. Blood biochemical parameters in plasma among the 504 representative Kabwe residents from 8 areas (mean±SD, minimum – maximum).

Area	Kasanda		Makululu		Chowa		Natuseko		Bwacha		Mpima prison		Kang'omba		Hamududu	
T-bil (mg/dL)	0.43 ± 0.24	ab	0.34 ± 0.16	c	0.44 ± 0.18	abc	0.51 ± 0.32	a	0.49 ± 0.27	abc	0.44 ± 0.20	ab	0.35 ± 0.19	bc	0.43 ± 0.31	abc
	(0.1 - 1.6)		(0.1 - 0.8)		(0.2 - 0.8)		(0.1 - 1.9)		(0.2 - 1.4)		(0.2 - 1.1)		(0.1 - 1.3)		(0.1 - 1.8)	
AST (IU/L)	21.28 ± 8.62	abc	20.37 ± 12.33	bc	19.60 ± 4.12	abc	23.64 ± 11.90	ab	18.05 ± 4.17	abc	20.93 ± 4.80	abc	18.4 ± 6.96	c	23.76 ± 11.46	a
	(12 - 88)		(7 - 149)		(14 - 29)		(13 - 85)		(12 - 30)		(13 - 35)		(7 - 36)		(12 - 81)	
ALT (IU/L)	8.77 ± 3.20	a	8.453 ± 3.82	a	9.84 ± 3.60	a	7.82 ± 2.05	a	8.53 ± 2.77	a	7.96 ± 1.85	a	9.23 ± 3.85	a	9.27 ± 4.33	a
	(7 - 24)		(7 - 45)		(7 - 19)		(7 - 17)		(7 - 15)		(7 - 14)		(7 - 22)		(7 - 26)	
LDH (IU/L)	214.34 ± 69.19	abc	207.64 ± 98.94	bc	303.53 ± 235.72	ab	242.86 ± 80.22	ab	269.21 ± 98.78	a	200.60 ± 57.01	bc	196.13 ± 65.72	c	199.61 ± 66.48	bc
	(89 - 605)		(112 - 1176)		(95 - 1038)		(124 - 506)		(148 - 581)		(109 - 345)		(124 - 414)		(89 - 374)	
GGT (IU/L)	45.28 ± 37.74	ab	50.71 ± 55.25	ab	42.40 ± 37.54	ab	48.29 ± 58.76	ab	58.32 ± 43.57	a	34.00 ± 20.74	ab	34.35 ± 26.92	b	48.26 ± 42.00	ab
	(13 - 308)		(7 - 390)		(17 - 168)		(13 - 391)		(21 - 224)		(11 - 120)		(7 - 143)		(13 - 203)	
ALP (IU/L)	580.83 ± 344.92	ab	481.95 ± 285.41	b	540.93 ± 299.01	ab	635.55 ± 336.71	a	525.47 ± 323.80	ab	656.95 ± 373.32	a	507.26 ± 282.88	ab	554.46 ± 336.92	ab
	(186 - 1545)		(195 - 1660)		(202 - 1118)		(258 - 1499)		(219 - 1114)		(176 - 1597)		(183 - 1134)		(234 - 1600)	
T-pro (g/dL)	7.13 ± 1.09	ab	6.98 ± 1.01	ab	7.35 ± 0.92	ab	7.10 ± 0.93	ab	6.71 ± 0.89	ab	7.05 ± 0.91	ab	6.75 ± 1.20	b	7.16 ± 1.47	a
	(4.3 - 9.4)		(4.2 - 10.4)		(5.9 - 9.6)		(5.1 - 9.1)		(4.8 - 8.5)		(5.3 - 9.0)		(4.4 - 9.7)		(4.7 - 10.4)	
Alb (g/dL)	4.13 ± 0.67	ab	3.78 ± 0.60	c	4.76 ± 0.55	a	4.03 ± 0.65	abc	3.79 ± 0.65	bc	3.94 ± 0.54	abc	3.93 ± 0.79	abc	4.07 ± 0.96	abc
	(2.3 - 5.8)		(2.3 - 5.6)		(3.8 - 6.0)		(3.0 - 5.5)		(2.3 - 5.3)		(3.1 - 5.3)		(2.3 - 6.0)		(2.2 - 5.9)	
BUN (mg/dL)	9.87 ± 3.25	a	9.91 ± 2.99	a	10.20 ± 2.60	a	9.32 ± 2.69	a	9.98 ± 2.51	a	8.85 ± 2.49	a	10.29 ± 3.38	a	10.40 ± 4.21	a
	(4 ± 22)		(4 - 23)		(6 - 17)		(4 - 15)		(4 - 14)		(4 - 14)		(6 - 17)		(4 - 24)	
UA (mg/dL)	5.10 ± 1.47	a	4.80 ± 1.45	ab	5.17 ± 1.67	ab	4.47 ± 1.40	ab	4.99 ± 2.00	ab	4.30 ± 1.01	ab	4.51 ± 1.17	ab	4.46 ± 1.34	b
	(2.5 - 9.3)		(1.4 - 10.5)		(3 - 8.4)		(2.4 - 7.9)		(2.9 - 10.4)		(2.6 - 6.5)		(2.4 - 6.5)		(2.3 - 8.7)	
Cre (mg/dL)	1.03 ± 0.27	ab	0.90 ± 0.24	b	1.17 ± 0.28	a	0.93 ± 0.28	ab	0.96 ± 0.21	ab	0.90 ± 0.22	b	0.97 ± 0.23	ab	0.91 ± 0.34	b
	(0.5 ± 1.9)		(0.3 - 1.7)		(0.7 - 1.8)		(0.5 - 1.6)		(0.4 - 1.3)		(0.6 - 1.4)		(0.6 - 1.5)		(0.2 - 1.7)	

BUN/Cre	9.87 ± 3.06	a	11.28 ± 4.11	a	9.21 ± 3.61	a	10.69 ± 4.16	a	11.22 ± 4.86	a	10.39 ± 3.69	a	10.90 ± 3.96	a	12.77 ± 6.63	a
	(4.29 - 24.29)		(3.93 - 30.00)		(5.33 - 18.89)		(5.33 - 25.00)		(3.21 - 25.00)		(3.22 - 20.00)		(6.36 - 25.00)		(2.21 - 45.00)	
eGFR$_{MDRD}$	66.62 ± 11.02	c	83.89 ± 21.76	a	69.65 ± 18.25	c	75.53 ± 18.90	c	74.21 ± 14.56	abc	71.89 ± 8.32	bc	84.90 ± 23.78	abc	83.89 ± 29.31	ab
	(36.25 - 92.46)		(48.01 - 186.99)		(41.22 - 86.36)		(51.73 - 130.65)		(55.86 - 106.50)		(52.13 - 87.40)		(50.87 - 116.09)		(43.96 - 151.51)	

Note: Different small letters (a, b and c) between columns indicate a significant difference among areas.

Supplementary Table S6. Distribution of blood biochemical parameters in plasma by age and Pb-B range (0 – 4.9, 5 – 19.9, 20 – 44.9, 45≤ µg/dL).

	reportable range	age group	normal range	number of samples below reportable range	BLL range	min	25% quartile	median	75% quartile	max	mean	SD	SE			Comparison with normal value range (%)		
																below	within	above
T-bil (mg/dL)	0.2 - 25.0	all age	-	32	all BLL	0.1	0.3	0.3	0.5	1.9	0.4	0.2	0.0			-	-	-
		0 - 4	-	8	all BLL	0.1	0.2	0.3	0.4	1.9	0.3	0.3	0.0	A		-	-	-
					<5	0.1	0.2	0.2	0.4	1.2	0.3	0.3	0.1		a	-	-	-
					5 - 19.9	0.1	0.3	0.3	0.4	1.9	0.4	0.4	0.1		a	-	-	-
					20.0 - 44.9	0.1	0.2	0.2	0.3	0.4	0.2	0.1	0.0		a	-	-	-
					45≤	0.3	0.4	0.4	0.4	0.4	0.4	0.1	0.0		a	-	-	-
		5 - 17		13	all BLL	0.1	0.2	0.3	0.4	1.6	0.3	0.2	0.0	A		-	-	-
					<5	0.2	0.3	0.4	0.6	1.3	0.4	0.2	0.0		a	-	-	-
					5 - 19.9	0.1	0.3	0.3	0.4	0.8	0.3	0.1	0.0		ab	-	-	-
					20.0 - 44.9	0.1	0.2	0.3	0.4	1.6	0.3	0.2	0.0		b	-	-	-
					45≤	0.1	0.2	0.3	0.4	0.6	0.3	0.2	0.1		ab	-	-	-
		18 -, female	0.2 - 1.2	10	all BLL	0.1	0.3	0.3	0.5	1.4	0.4	0.2	0.0	B		4.9	93.7	1.5
					<5	0.1	0.3	0.4	0.5	1.4	0.5	0.3	0.0		a	3.0	92.4	4.5
					5 - 19.9	0.1	0.2	0.3	0.4	0.8	0.4	0.1	0.0		b	6.4	93.6	0.0
					20.0 - 44.9	0.1	0.3	0.4	0.5	0.6	0.4	0.1	0.0		ab	4.0	96.0	0.0
					45≤	0.3	0.3	0.7	0.9	1.2	0.7	0.4	0.2		a	0.0	100.0	0.0
		18 -, male	0.2 - 1.2	1	all BLL	0.1	0.3	0.4	0.6	1.8	0.5	0.2	0.0	C		0.9	98.3	0.9
					<5	0.3	0.3	0.4	0.6	1.8	0.5	0.3	0.0		a	0.0	97.3	2.7
					5 - 19.9	0.1	0.4	0.5	0.6	0.8	0.5	0.2	0.0		a	1.9	98.1	0.0
					20.0 - 44.9	0.2	0.4	0.5	0.6	1.0	0.5	0.2	0.0		a	0.0	100.0	0.0
					45≤	0.3	0.3	0.4	0.6	0.9	0.5	0.3	0.1		a	0.0	100.0	0.0

Analyte	Detection range	Age	Reference interval	N	BLL					n	Mean	SD	SE	Group		%1	%2	%3
AST (IU/L)	10 - 1000	all age	-	6	all BLL	7	16	19	23	149	21.0	10.4	0.5			-	-	-
		0 - 4	-	0	all BLL	12	19	22	26	53	23.4	7.4	1.1	AB		-	-	-
					<5	12	18	23	25	39	22.2	6.1	1.5		a	-	-	-
					5 - 19.9	15	19	21	27	53	24.0	8.5	1.9		a	-	-	-
					20.0 - 44.9	17	18	20	22	29	20.7	4.2	1.6		a	-	-	-
					45≤	25	29	32	37	42	33.0	8.5	4.9		a	-	-	-
		5 - 17		0	all BLL	11	17	19	24	149	21.7	12.8	1.1	B		-	-	-
					<5	15	18	20	25	36	21.8	5.8	1.1		a	-	-	-
					5 - 19.9	12	17	18	21	35	19.7	5.0	0.7		a	-	-	-
					20.0 - 44.9	11	17	20	24	149	23.2	18.8	2.5		a	-	-	-
					45≤	17	20	20	25	27	22.0	3.7	1.4		a	-	-	10 -
		18 -, female	7 - 38	6	all BLL	7	15	17	21	36	17.9	5.0	0.4	C		0.0	100.0	0.0
					<5	7	15	18	22	31	17.9	5.3	0.6		a	0.0	100.0	0.0
					5 - 19.9	7	14	17	20	36	17.4	4.7	0.4		a	0.0	100.0	0.0
					20.0 - 44.9	11	14	20	22	32	19.4	5.8	1.2		a	0.0	100.0	0.0
					45≤	15	16	21	22	28	20.4	5.2	2.3		a	0.0	100.0	0.0
		18 -, male	7 - 38	0	all BLL	11	18	21	26	88	24.6	13.4	1.2	A		0.0	91.5	8.5
					<5	14	18	21	26	81	24.9	12.7	2.1		a	0.0	91.9	8.1
					5 - 19.9	11	18	21	27	85	25.4	14.0	1.9		a	0.0	88.5	11.5
					20.0 - 44.9	14	18	20	22	88	22.8	14.3	2.9		a	0.0	95.8	4.2
					45≤	18	18	22	27	31	23.3	6.4	3.2		a	0.0	100.0	0.0
ALT (IU/L)	10 - 1000	all age	-	378	all BLL	7	7	7	8	45	8.6	3.5	0.2			-	-	-
		0 - 4	-	40	all BLL	7	7	7	7	16	7.7	1.8	0.3	A		-	-	-
					<5	7	7	7	7	7	7.1	0.0	0.0		a	-	-	-
					5 - 19.9	7	7	7	7	16	8.2	2.5	0.6		a	-	-	-
					20.0 - 44.9	7	7	7	7	12	7.8	1.9	0.7		a	-	-	-

Analyte	Ref range	Age	BLL range	N	BLL	P1	P2	P3	P4	P5	Mean	SD	SE	Grp	subgrp	%	%	%
					45≤	7	7	7	9	10	8.0	1.7	1.0		a	-	-	-
					all BLL	7	7	7	7	17	7.5	1.5	0.1	A		-	-	-
					<5	7	7	7	7	13	7.6	1.5	0.3		a	-	-	-
		5 - 17	-	124	5 - 19.9	7	7	7	7	14	7.4	1.2	0.2		a	-	-	-
					20.0 - 44.9	7	7	7	7	14	7.4	1.3	0.2		a	-	-	-
					45≤	7	7	7	7	17	8.5	3.8	1.4		a	-	-	-
					all BLL	7	7	7	7	24	8.3	2.8	0.2	A		0.0	100.0	0.0
					<5	7	7	7	9	21	8.5	2.8	0.3		a	0.0	100.0	0.0
		18 -, female	4 - 44	164	5 - 19.9	7	7	7	7	22	7.9	2.5	0.2		a	0.0	100.0	0.0
					20.0 - 44.9	7	7	7	10	24	9.2	4.0	0.8		a	0.0	100.0	0.0
					45≤	7	7	7	7	11	7.9	1.8	0.8		a	0.0	100.0	0.0
					all BLL	7	7	11	13	45	11.0	5.2	0.5	B		0.0	99.1	0.9
					<5	7	7	11	13	26	11.2	5.2	0.8		a	0.0	100.0	0.0
		18 -, male	4 - 44	50	5 - 19.9	7	7	11	13	45	11.6	6.0	0.8		a	0.0	98.1	1.9
					20.0 - 44.9	7	7	7	11	21	9.5	3.6	0.7		a	0.0	100.0	0.0
					45≤	7	10	12	12	13	10.8	2.6	1.3		a	0.0	100.0	0.0
		all age	-	0	all BLL	89	164	196	248	1176	214.7	93.3	4.2			-	-	-
					all BLL	150	191	255	321	605	259.8	86.2	12.7	A		-	-	-
					<5	150	180	193	258	364	230.9	71.4	17.3		a	-	-	-
		0 - 4	-	0	5 - 19.9	150	238	259	309	424	262.5	66.6	15.3		ab	-	-	-
LDH	50 - 2000				20.0 - 44.9	164	198	265	294	345	250.9	66.0	24.9		ab	-	-	-
(IU/L)					45≤	328	338	348	477	605	427.0	154.5	89.2		b	-	-	-
					all BLL	142	198	233	277	1176	248.2	98.5	8.5	A		-	-	-
					<5	142	207	233	274	414	245.8	64.1	12.3		a	-	-	-
		5 - 17	-	0	5 - 19.9	161	185	232	279	377	239.6	58.1	8.8		a	-	-	-
					20.0 - 44.9	148	203	238	271	1176	257.9	135.1	17.9		a	-	-	-

					45≤	178	203	214	253	320	231.9	52.4	19.8		a	-	-	-
					all BLL	89	148	181	222	1038	197.6	97.0	6.8	B		1.5	71.8	26.7
		18 -, female	106 - 220	0	<5	103	142	182	229	1038	211.5	134.2	16.5		a	1.5	69.7	28.8
					5 - 19.9	89	150	177	212	846	189.8	78.0	7.4		a	0.9	75.5	23.6
					20.0 - 44.9	89	172	196	222	305	194.8	53.2	10.6		a	4.0	64.0	32.0
					45≤	146	186	188	231	248	199.8	40.4	18.1		a	0.0	60.0	40.0
					all BLL	95	152	175	211	581	188.3	61.1	5.7	B		1.7	79.5	18.8
		18 -, male	106 - 220	0	<5	104	149	166	221	581	198.1	87.6	14.4		a	2.7	70.3	27.0
					5 - 19.9	95	154	180	211	378	187.9	49.8	6.9		a	1.9	80.8	17.3
					20.0 - 44.9	134	150	174	186	247	173.4	29.6	6.1		a	0.0	91.7	8.3
					45≤	171	174	187	204	223	191.8	24.0	12.0		a	0.0	75.0	25.0
		all age	-	3	all BLL	7	23	34	52	391	46.6	46.5	2.1			-	-	-
					all BLL	13	20	23	33	77	28.5	14.5	2.1	A		-	-	-
		0 - 4	-	0	<5	13	16	22	27	68	24.9	12.9	3.1		a	-	-	-
					5 - 19.9	14	21	25	34	77	30.3	16.5	3.8		a	-	-	-
					20.0 - 44.9	19	21	22	31	53	28.1	12.3	4.6		a	-	-	-
					45≤	27	31	34	44	54	38.3	14.0	8.1		a	-	-	-
GGT (IU/L)	10 - 1500				all BLL	7	19	25	33	64	26.9	10.9	0.9	A		-	-	-
					<5	7	23	27	33	55	27.7	9.8	1.9		a	-	-	-
		5 - 17	-	2	5 - 19.9	11	19	23	32	57	26.6	10.7	1.6		a	-	-	-
					20.0 - 44.9	7	19	22	33	64	25.5	10.8	1.4		a	-	-	-
					45≤	17	29	38	46	54	36.9	13.0	4.9		a	-	-	-
					all BLL	7	24	36	54	280	45.9	35.0	2.4	B		0.5	49.0	50.5
		18 -, female	9 - 35	1	<5	7	24	38	54	143	43.2	24.4	3.0		a	1.5	42.4	56.1
					5 - 19.9	11	26	35	52	280	48.7	41.4	3.9		a	0.0	50.0	50.0
					20.0 - 44.9	13	19	26	59	108	39.7	28.0	5.6		a	0.0	64.0	36.0

ALP (IU/L)	130 - 4000	Group	Sex/Age	BLL	min	p25	p50	p75	max	mean	SD	CV				%	%	%
				45≤	23	31	42	110	23	51.0	34.5	15.4		a	0.0	40.0	60.0
				all BLL	14	36	53	85	391	77.7	73.8	6.8	C		0.0	33.3	66.7
				<5	22	36	55	74	224	70.6	53.8	8.8		a	0.0	35.1	64.9
		18 -, male	9 - 40	0	5 - 19.9	14	38	52	104	391	90.3	91.4	12.7		a	0.0	26.9	73.1
				20.0 - 44.9	19	33	41	65	308	58.4	57.4	11.7		a	0.0	50.0	50.0
				45≤	67	75	80	101	157	96.0	41.2	20.6		a	0.0	0.0	100.0
		all age	-	0	all BLL	176	299	389	764	1660	541.2	323.6	14.4			-	-	-
				all BLL	315	711	807	1023	1593	846.2	274.5	40.5	A		-	-	-
				<5	448	710	796	970	1593	846.6	285.0	69.1		a	-	-	-
		0 - 4	-	0	5 - 19.9	315	736	833	1045	1540	902.4	281.3	64.5		a	-	-	-
				20.0 - 44.9	322	550	621	758	927	640.6	196.5	74.3		a	-	-	-
				45≤	817	927	1036	1043	1050	967.7	130.7	75.4		a	-	-	-
				all BLL	238	709	872	1071	1660	907.8	280.7	24.2	A		-	-	-
				<5	238	754	960	1272	1600	998.3	366.3	70.5		a	-	-	-
ALP (IU/L)	130 - 4000	5 - 17	-	0	5 - 19.9	307	742	882	1011	1370	877.0	219.1	33.0		a	-	-	-
				20.0 - 44.9	359	709	845	1029	1660	878.3	256.5	34.0		a	-	-	-
				45≤	471	657	1106	1258	1545	993.0	399.1	150.8		a	-	-	-
				all BLL	183	271	325	381	855	344.1	109.2	7.6	B		0.0	71.4	28.6
				<5	183	283	324	390	631	346.0	102.1	12.6		ab	0.0	69.7	30.3
		18 -, female	120 - 370	0	5 - 19.9	195	270	317	361	855	334.6	107.0	10.2		b	0.0	76.4	23.6
				20.0 - 44.9	226	331	358	406	772	389.1	127.6	25.5		a	0.0	56.0	44.0
				45≤	186	212	255	424	439	303.2	119.8	53.6		ab	0.0	60.0	40.0
				all BLL	176	280	327	382	899	345.3	112.9	10.4	B		0.0	70.9	29.1
		18 -, male	120 - 370	0	<5	176	280	347	403	655	348.0	100.8	16.6		a	0.0	59.5	40.5
				5 - 19.9	216	283	320	363	634	334.5	85.8	11.9		a	0.0	78.8	21.2
				20.0 - 44.9	191	269	320	381	899	367.7	176.3	36.0		a	0.0	66.7	33.3

Analyte	Ref	Group	Norm	0	BLL									L	a	%1	%2	%3
					45≤	297	299	325	351	355	325.5	31.3	15.6		a	0.0	100.0	0.0
		all age	-	0	all BLL	4.2	6.3	7.0	7.7	10.4	7.1	1.1	0.0			-	-	-
					all BLL	4.2	5.6	6.5	7.0	9.7	6.3	1.1	0.2	A		-	-	-
					<5	4.7	5.6	6.9	7.3	9.7	6.7	1.4	0.3		a	-	-	-
		0 - 4	-	0	5 - 19.9	4.8	5.8	6.2	6.9	7.6	6.3	0.8	0.2		a	-	-	-
					20.0 - 44.9	4.2	5.1	5.6	6.2	7.0	5.6	1.0	0.4		a	-	-	-
					45≤	6.0	6.4	6.7	6.8	6.9	6.5	0.5	0.3		a	-	-	-
					all BLL	4.3	6.1	6.6	7.4	9.9	6.8	1.1	0.1	A		-	-	-
					<5	5.4	6.4	6.9	7.9	9.2	7.1	1.1	0.2		a	-	-	-
		5 - 17	-	0	5 - 19.9	5.1	6.3	6.9	7.1	9.1	6.8	0.9	0.1		a	-	-	-
					20.0 - 44.9	4.3	6.0	6.5	7.1	9.9	6.6	1.2	0.2		a	-	-	-
T-pro	2.0 - 11.0				45≤	5.1	6.0	7.4	8.2	8.5	7.1	1.4	0.5		a	-	-	- -
(g/dL)					all BLL	4.4	6.6	7.2	8.0	10.4	7.3	1.0	0.1	B		29.1	56.8	14.1
					<5	4.4	6.6	7.4	8.3	10.4	7.4	1.2	0.1		a	25.8	53.0	21.2
		18 -, female	6.7 - 8.3	0	5 - 19.9	4.8	6.6	7.1	7.7	9.5	7.1	0.9	0.1		a	32.7	58.2	9.1
					20.0 - 44.9	5.9	6.8	7.4	8.0	9.4	7.5	1.0	0.2		a	20.0	60.0	20.0
					45≤	6.4	6.5	7.2	7.6	7.9	7.1	0.7	0.3		a	40.0	60.0	0.0
					all BLL	5.4	6.5	7.2	7.7	10.4	7.3	1.1	0.1	B		27.4	54.7	17.9
					<5	5.6	6.4	7.2	7.7	10.3	7.4	1.2	0.2		a	37.8	40.5	21.6
		18 -, male	6.7 - 8.3	0	5 - 19.9	5.4	6.9	7.3	7.8	10.4	7.3	1.0	0.1		a	23.1	59.6	17.3
					20.0 - 44.9	5.7	6.6	7.1	7.7	9.1	7.2	0.9	0.2		a	25.0	62.5	12.5
					45≤	7.5	7.6	7.7	7.9	8.6	7.9	0.5	0.3		a	0.0	75.0	25.0
		all age	-	0	all BLL	2.2	3.5	3.9	4.3	6.0	3.9	0.7	0.0			-	-	-
Alb	1.0 - 6.0				all BLL	2.2	3.2	3.5	4.0	6.0	3.6	0.8	0.1	A		-	-	-
(g/dL)		0 - 4	-	0	<5	2.2	3.1	3.6	4.3	6.0	3.7	1.0	0.2		a	-	-	-
					5 - 19.9	2.7	3.2	3.5	3.9	4.2	3.5	0.4	0.1		a	-	-	-

					20.0 - 44.9	2.3	2.6	3.2	3.4	4.2	3.1	0.7	0.3		a	-	-	-
					45≤	3.2	3.7	4.2	4.2	4.2	3.9	0.6	0.3		a	-	-	-
					all BLL	2.3	3.4	3.8	4.3	5.6	3.9	0.7	0.1	B		-	-	-
					<5	3.1	3.6	4.1	4.3	5.5	4.1	0.7	0.1		a	-	-	-
		5 - 17	-	0	5 - 19.9	2.9	3.5	3.9	4.4	5.4	3.9	0.6	0.1		a	-	-	-
					20.0 - 44.9	2.3	3.3	3.5	4.2	5.6	3.8	0.7	0.1		a	-	-	-
					45≤	2.8	3.4	3.9	4.6	4.8	3.9	0.8	0.3		a	-	-	-
					all BLL	2.3	3.5	3.9	4.3	6.0	4.0	0.7	0.0	BC		39.3	57.3	3.4
					<5	2.3	3.6	4.1	4.6	6.0	4.1	0.8	0.1		a	31.8	62.1	6.1
		18 -, female	3.8 - 5.3	0	5 - 19.9	2.3	3.5	3.8	4.1	5.6	3.8	0.6	0.1		a	48.2	50.0	1.8
					20.0 - 44.9	3.2	3.8	4.0	4.6	5.4	4.2	0.6	0.1		a	24.0	72.0	4.0
					45≤	3.6	4.0	4.2	4.5	4.6	4.2	0.4	0.2		a	20.0	80.0	0.0
					all BLL	2.8	3.7	4.0	4.5	5.9	4.1	0.7	0.1	C		30.8	65.0	4.3
					<5	2.8	3.7	3.9	4.5	5.9	4.1	0.8	0.1		a	37.8	51.4	10.8
		18 -, male	3.8 - 5.3	0	5 - 19.9	3.0	3.8	4.0	4.5	5.8	4.1	0.6	0.1		a	25.0	73.1	1.9
					20.0 - 44.9	3.2	3.5	4.0	4.3	5.3	4.1	0.7	0.1		a	37.5	62.5	0.0
					45≤	4.0	4.2	4.4	4.7	5.0	4.5	0.4	0.2		a	0.0	100.0	0.0
		all age	-	13	all BLL	4	8	9	12	24	9.9	3.1	0.1			-	-	-
					all BLL	4	6	8	9	17	8.5	3.0	0.4	A		-	-	-
					<5	4	7	9	9	15	8.8	3.1	0.8		a	-	-	-
		0 - 4	-	2	5 - 19.9	4	7	8	10	15	8.4	2.8	0.6		a	-	-	-
BUN	5 - 200				20.0 - 44.9	6	8	8	8	10	7.9	1.2	0.5		a	-	-	-
(mg/dL)					45≤	5	6	6	12	17	9.3	6.7	3.8		a	-	-	-
					all BLL	4	7	9	11	17	9.1	2.5	0.2	A		-	-	-
		5 - 17	-	3	<5	5	7	8	11	14	8.6	2.4	0.5		a	-	-	-
					5 - 19.9	6	8	9	11	14	9.3	2.2	0.3		a	-	-	-

Analyte	Conc. range	Group	Sub-range	N	BLL	P5	P25	P50	P75	P95	Mean	SD	SE			%1	%2	%3
					20.0 - 44.9	4	8	9	11	17	9.1	2.7	0.4		a	-	-	-
					45≤	6	7	7	11	14	8.9	2.9	1.1		a	-	-	-
					all BLL	4	8	9	11	23	9.8	3.1	0.2	A		19.9	78.6	1.5
					<5	4	8	9	11	18	9.5	3.0	0.4		a	22.7	77.3	0.0
		18 -, female	8 - 20	7	5 - 19.9	4	8	10	11	23	9.9	3.1	0.3		a	17.3	80.9	1.8
					20.0 - 44.9	4	8	9	11	22	9.5	3.7	0.7		a	24.0	72.0	4.0
					45≤	7	9	12	12	13	10.6	2.5	1.1		a	20.0	80.0	0.0
					all BLL	4	9	11	13	24	11.5	3.3	0.3	B		8.5	89.7	1.7
					<5	4	9	12	14	22	11.8	3.7	0.6		a	10.8	86.5	2.7
		18 -, male	8 - 20	1	5 - 19.9	5	9	11	12	24	11.2	3.3	0.5		a	5.8	92.3	1.9
					20.0 - 44.9	7	10	11	13	17	11.1	2.8	0.6		a	12.5	87.5	0.0
					45≤	11	13	15	16	17	14.3	2.8	1.4		a	0.0	100.0	0.0
		all age	-	0	all BLL	1.4	3.7	4.5	5.6	10.5	4.7	1.4	0.1			-	-	-
					all BLL	2.3	3.4	3.8	4.4	7.8	3.9	1.0	0.2	A		-	-	-
					<5	2.3	2.8	3.7	4.1	5.2	3.6	0.9	0.2		a	-	-	-
		0 - 4	-	0	5 - 19.9	2.4	3.5	3.8	4.6	7.8	4.1	1.1	0.3		a	-	-	-
					20.0 - 44.9	2.6	3.4	3.5	4.1	4.6	3.7	0.7	0.3		a	-	-	-
					45≤	3.9	4.2	4.4	5.7	6.9	5.1	1.6	0.9		a	-	-	-
UA (mg/dL)	1.0 - 20.0				all BLL	2.4	3.4	4.0	4.5	6.6	4.0	0.8	0.1	A		-	-	-
					<5	2.4	3.2	3.4	4.2	5.9	3.7	0.9	0.2		a	-	-	-
		5 - 17	-	0	5 - 19.9	2.6	3.5	4.0	4.5	6.6	4.1	0.8	0.1		ab	-	-	-
					20.0 - 44.9	2.7	3.6	4.0	4.7	6.5	4.2	0.8	0.1		b	-	-	-
					45≤	3.0	3.8	4.2	4.5	5.2	4.1	0.7	0.3		ab	-	-	-
					all BLL	1.4	3.7	4.5	5.5	8.6	4.7	1.2	0.1	B		6.3	69.4	24.3
		18 -, female	3 - 5.5	0	<5	2.7	3.5	4.3	5.1	7.5	4.4	1.2	0.1		a	4.5	77.3	18.2
					5 - 19.9	1.4	3.8	4.7	5.6	8.5	4.7	1.2	0.1		a	5.5	66.4	28.2

				20.0 - 44.9	2.5	4.3	4.8	5.5	8.6	4.8	1.4	0.3		a	16.0	64.0	20.0
				45≤	4.0	4.3	4.7	6.0	6.4	5.1	1.1	0.5		a	0.0	60.0	40.0
				all BLL	2.9	5.2	6.0	6.7	10.5	6.0	1.6	0.1	C		6.8	72.6	20.5
				<5	2.9	4.6	5.4	6.4	9.3	5.6	1.3	0.2		a	5.4	86.5	8.1
	18 -, male	4 - 7	0	5 - 19.9	3.1	5.3	6.0	6.8	10.5	6.2	1.7	0.2		a	7.7	71.2	21.2
				20.0 - 44.9	3.0	5.1	6.1	7.2	9.3	6.2	1.7	0.3		a	8.3	58.3	33.3
				45≤	6.3	6.7	7.3	7.7	7.8	7.2	0.7	0.4		a	0.0	50.0	50.0
	all age	-	0	all BLL	0.2	0.8	0.9	1.1	1.9	1.0	0.3	0.0			-	-	-
				all BLL	0.2	0.5	0.6	0.7	1.3	0.6	0.2	0.0	A		-	-	-
				<5	0.2	0.4	0.6	0.7	1.2	0.6	0.3	0.1		a	-	-	-
	0 - 4	-	0	5 - 19.9	0.4	0.6	0.7	0.8	1.3	0.7	0.2	0.0		a	-	-	-
				20.0 - 44.9	0.4	0.5	0.5	0.6	0.8	0.5	0.2	0.1		a	-	-	-
				45≤	0.6	0.7	0.7	0.8	0.8	0.7	0.1	0.1		a	-	-	-
				all BLL	0.3	0.7	0.8	0.9	1.4	0.8	0.2	0.0	B		-	-	-
Cre (mg/dL)				<5	0.6	0.7	0.8	0.9	1.2	0.8	0.2	0.0		a	-	-	-
0.3 - 40.0	5 - 17	-	0	5 - 19.9	0.5	0.7	0.8	0.9	1.2	0.8	0.1	0.0		a	-	-	-
				20.0 - 44.9	0.3	0.7	0.8	0.8	1.4	0.8	0.2	0.0		a	-	-	0.3 -
				45≤	0.4	0.6	0.8	0.9	1.0	0.7	0.2	0.1		a	-	-	-
				all BLL	0.5	0.9	1.0	1.1	1.9	1.0	0.2	0.0	C		0.5	38.8	60.7
				<5	0.6	0.9	1.0	1.1	1.8	1.0	0.2	0.0		a	0.0	34.8	65.2
	18 -, female	0.6 - 0.9	0	5 - 19.9	0.5	0.9	1.0	1.1	1.7	1.0	0.2	0.0		a	0.9	46.4	52.7
				20.0 - 44.9	0.6	1.0	1.1	1.2	1.9	1.1	0.3	0.1		a	0.0	24.0	76.0
				45≤	1.0	1.0	1.1	1.1	1.1	1.1	0.1	0.0		a	0.0	0.0	100.0
				all BLL	0.7	1.0	1.1	1.3	1.7	1.2	0.2	0.0	D		2.6	65.8	31.6
	18 -, male	0.8 - 1.2	0	<5	0.8	0.9	1.1	1.3	1.7	1.1	0.3	0.0		a	0.0	70.3	29.7
				5 - 19.9	0.7	1.0	1.1	1.3	1.6	1.1	0.2	0.0		a	1.9	69.2	28.8

					20.0 - 44.9	0.7	1.0	1.2	1.4	1.7	1.2	0.3	0.1		a	8.3	62.5	29.2
					45≤	1.3	1.3	1.3	1.3	1.4	1.3	0.0	0.0		a	0.0	0.0	100.0
		all age	-	-	all BLL	2.2	8.2	10.0	12.9	45.0	11.0	4.3	0.2			-	-	-
					all BLL	6.4	10.0	12.7	16.5	45.0	14.5	6.9	1.0	A		-	-	-
					<5	6.4	11.7	12.9	20.0	45.0	16.5	9.0	2.2		a	-	-	-
		0 - 4	-	-	5 - 19.9	7.1	9.0	11.4	15.0	25.0	12.5	4.4	1.0		a	-	-	-
					20.0 - 44.9	8.8	11.7	16.0	18.0	25.0	15.6	5.6	2.1		a	-	-	-
					45≤	7.5	7.9	8.3	16.3	24.3	13.4	9.5	5.5		a	-	-	-
					all BLL	5.1	9.0	11.3	14.3	30.0	12.1	4.3	0.4	A		-	-	-
					<5	6.3	8.2	10.0	13.5	20.0	11.1	3.9	0.8		a	-	-	-
		5 - 17	-	-	5 - 19.9	7.3	9.0	11.1	13.6	20.0	11.7	3.3	0.5		a	-	-	-
					20.0 - 44.9	5.1	10.0	11.4	15.0	30.0	12.7	5.2	0.7		a	-	-	-
BUN/Cre	-				45≤	7.5	10.8	11.7	14.7	17.5	12.5	3.4	1.3		a	-	-	-
					all BLL	2.2	7.5	9.2	11.4	25.6	9.8	3.2	0.2	B		50.5	48.5	1.0
					<5	2.2	7.5	9.0	11.1	18.9	9.5	3.2	0.4		a	56.1	43.9	0.0
		18 -, female	10 - 20	-	5 - 19.9	3.2	7.8	10.0	12.0	25.6	10.2	3.3	0.3		a	44.5	53.6	1.8
					20.0 - 44.9	3.9	7.3	8.3	11.0	14.5	8.9	2.8	0.6		a	64.0	36.0	0.0
					45≤	7.0	8.2	10.9	10.9	13.0	10.0	2.4	1.1		a	40.0	60.0	0.0
					all BLL	3.2	8.0	10.0	12.2	30.0	10.3	3.6	0.3	B		46.2	53.0	0.9
					<5	3.2	8.0	10.0	13.3	18.8	10.8	3.8	0.6		a	37.8	62.2	0.0
		18 -, male	10 - 20	-	5 - 19.9	5.0	8.1	9.3	11.8	30.0	10.1	4.0	0.6		a	51.9	46.2	1.9
					20.0 - 44.9	6.3	7.7	9.7	10.2	17.5	9.8	2.7	0.5		a	50.0	50.0	0.0
					45≤	7.9	9.5	11.2	12.5	13.1	10.8	2.4	1.2		a	25.0	75.0	0.0
eGFR_MDRD		all age	>=60	-	all BLL	36.3	65.9	74.8	87.4	187.0	78.6	21.4	1.5			-	-	-
(mL/min/1.73	-				all BLL	30.2	48.9	59.0	68.3	212.7	66.3	31.7	4.8	A		76.7	23.3	-
		0 - 4	>=60	-														
m2)					<5	36.1	53.2	61.4	87.6	212.7	77.3	43.3	6.6		a	64.7	35.3	-

			5 - 19.9	30.2	45.0	54.6	61.0	100.2	54.7	16.0	2.4		a	94.4	5.6	-
			20.0 - 44.9	46.5	61.2	74.3	88.4	105.7	75.1	21.7	3.3		a	50.0	50.0	-
			45≤	47.5	49.2	50.9	52.7	54.4	50.9	4.9	0.7		a	100.0	0.0	-
5 - 17	>=60	-	all BLL	31.2	56.7	65.6	74.3	155.6	67.7	15.6	2.4	A	a	78.4	21.6	-
			<5	43.7	57.6	65.3	72.0	91.5	65.6	11.3	1.7		a	84.6	15.4	-
			5 - 19.9	31.2	56.3	63.5	70.9	103.3	64.4	12.7	1.9		a	86.4	13.6	-
			20.0 - 44.9	39.5	59.7	67.1	77.3	155.6	70.9	18.6	2.8		a	71.9	28.1	-
			45≤	51.9	57.5	72.3	78.8	97.1	70.5	16.1	2.4		a	57.1	42.9	-
18 -, female	>=60	-	all BLL	36.3	65.9	74.8	87.4	187.0	78.6	20.8	3.2	B	a	12.3	87.7	-
			<5	41.2	66.7	73.3	85.9	151.5	78.6	21.3	3.2		a	12.3	87.7	-
			5 - 19.9	48.0	66.9	76.6	89.7	187.0	80.4	21.3	3.2		a	11.0	89.0	-
			20.0 - 44.9	36.3	64.2	67.2	82.9	131.6	72.6	18.7	2.8		a	20.8	79.2	-
			45≤	64.3	67.0	67.4	73.7	75.2	69.5	4.7	0.7		a	0.0	100.0	-
18 -, male	>= 60	-	all BLL	45.5	72.9	86.7	103.4	151.4	89.5	23.4	3.6	C	a	9.5	90.5	-
			<5	55.2	72.8	90.8	110.6	150.9	92.9	25.0	3.9		a	8.3	91.7	-
			5 - 19.9	56.4	76.0	87.0	101.4	134.1	89.4	18.8	2.9		a	5.8	94.2	-
			20.0 - 44.9	45.5	63.8	82.8	110.0	151.4	88.0	30.2	4.7		a	20.8	79.2	-
			45≤	60.0	66.0	70.5	73.4	74.5	68.9	6.5	1.0		a	0.0	100.0	-

Note: Different capital letters (A, B, C and D) indicate a significant difference among age groups. Different small letters (a and b) indicate a significant difference among

Pb-B for each age groups.

Supplementary Table S7. δ-ALAD activity in whole blood among the 504 representative Kabwe residents from 8 areas by Pb-B range (0 – 4.9, 5 – 19.9, 20 – 44.9, 45≤ µg/dL) (mean±SD, minimum – maximum).

Area		Kasanda		Makululu		Chowa		Natuseko		Bwacha		Mpima prison		Kang'omba		Hamududu	
ALAD activity ratio																		
	all age	0.50 ± 0.10	a	0.52 ± 0.10	a	0.62 ± 0.09	b	0.68 ± 0.10	b	0.67 ± 0.08	b	0.66 ± 0.08	b	0.69 ± 0.09	b	0.66 ± 0.10	b
		(0.30 - 0.71)		(0.29 - 0.76)		(0.53 - 0.80)		(0.45 - 0.83)		(0.53 - 0.82)		(0.50 - 0.80)		(0.51 - 0.85)		(0.36 - 0.85)	
	0 - 4	0.36 ± 0.01		0.43 ± 0.08		0.56		0.67 ± 0.11		0.56		0.66 ± 0.08		0.68 ± 0.06		0.66 ± 0.02	
		(0.35 - 0.36)		(0.33 - 0.50)		(0.55, 0.57)		(0.46 - 0.77)		(0.56, 0.57)		(0.54 -0.74)		(0.62 - 0.76)		(0.63 - 0.68)	
	5 - 17	0.48 ± 0.10		0.51 ± 0.10		0.56 ± 0.05		0.67 ± 0.09		0.65 ± 0.09		0.67 ± 0.09		0.68 ± 0.09		0.66 ± 0.09	
		(0.30 - 0.69)		(0.31 - 0.71)		(0.53 - 0.62)		(0.55 -0.79)		(0.53 - 0.74)		(0.55 - 0.80)		(0.58 - 0.85)		(0.58 - 0.82)	
	18 -	0.52 ± 0.09		0.53 ± 0.10		0.66 ± 0.09		0.69 ± 0.11		0.69 ± 0.07		0.65 ± 0.08		0.69 ± 0.10		0.66 ± 0.11	
		(0.31 - 0.71)		(0.29 - 0.76)		(0.53 - 0.80)		(0.45 - 0.83)		(0.59 - 0.82)		(0.50 - 0.78)		(0.51 - 0.84)		(0.36 - 0.85)	
ALAD activity (matrix blank)																		
	all age	21.35 ± 4.37	a	22.79 ± 8.16	a	22.77 ± 3.79	a	24.48 ± 4.67	a	23.31 ± 4.99	a	24.03 ± 4.61	a	21.74 ± 7.62	a	24.15 ± 6.54	a
		(11.59 - 32.46)		(9.27 - 69.56)		(18.55 - 30.14)		(13.91 - 33.62)		(13.91 - 32.46)		(15.07 - 32.46)		(10.43 - 35.94)		(13.91 - 34.78)	
	0 - 4	19.71 ± 3.28		23.65 ± 9.08		20.29		24.51 ± 3.10		31.30		27.59 ± 5.34		16.81 ± 3.07		19.25 ± 3.63	
		(17.39 - 22.03)		(12.75 - 32.46)		(18.55, 22.03)		(20.87 - 28.98)		(30.14, 32.46)		(18.55 - 32.46)		(13.91 - 20.87)		(13.91 - 23.19)	
	5 - 17	21.76 ± 4.36		22.78 ± 6.88		23.19 ± 4.02		23.02 ± 4.98		24.35 ± 7.21		22.80 ± 4.50		24.22 ± 6.87		24.35 ± 6.73	
		(11.59 - 32.46)		(11.59 - 38.26)		(20.87 - 27.82)		(15.07 - 30.14)		(13.91 - 30.14)		(15.07 - 32.46)		(13.91 - 32.46)		(15.07 - 32.46)	
	18 -	21.17 ± 4.45		22.76 ± 8.59		23.19 ± 4.10		24.95 ± 5.07		21.76 ± 3.25		24.06 ± 4.25		21.62 ± 8.19		24.81 ± 6.65	
		(11.59 - 30.14)		(9.27 - 69.56)		(18.55 - 30.14)		(13.91 - 33.62)		(17.39 - 28.98)		(15.07 - 32.46)		(10.43 - 35.94)		(13.91 - 34.78)	
ALAD activity (non-activated)																		
	all age	40.77 ± 9.66	d	45.55 ± 15.28	cd	49.47 ± 11.09	cd	50.08 ± 11.23	c	48.81 ± 11.19	cd	47.16 ± 7.79	cd	64.44 ± 15.76	b	85.87 ± 19.59	a
		(19.71 - 66.08)		(16.23 - 126.37)		(37.10 - 67.24)		(32.46 - 99.70)		(37.10 - 81.15)		(31.30 - 61.45)		(45.21 - 99.70)		(41.74 - 125.21)	
	0 - 4	32.46 ± 6.56		39.19 ± 6.63		34.78		45.38 ± 5.29		53.33		47.53 ± 8.68		64.63 ± 24.21		86.72 ± 5.34	

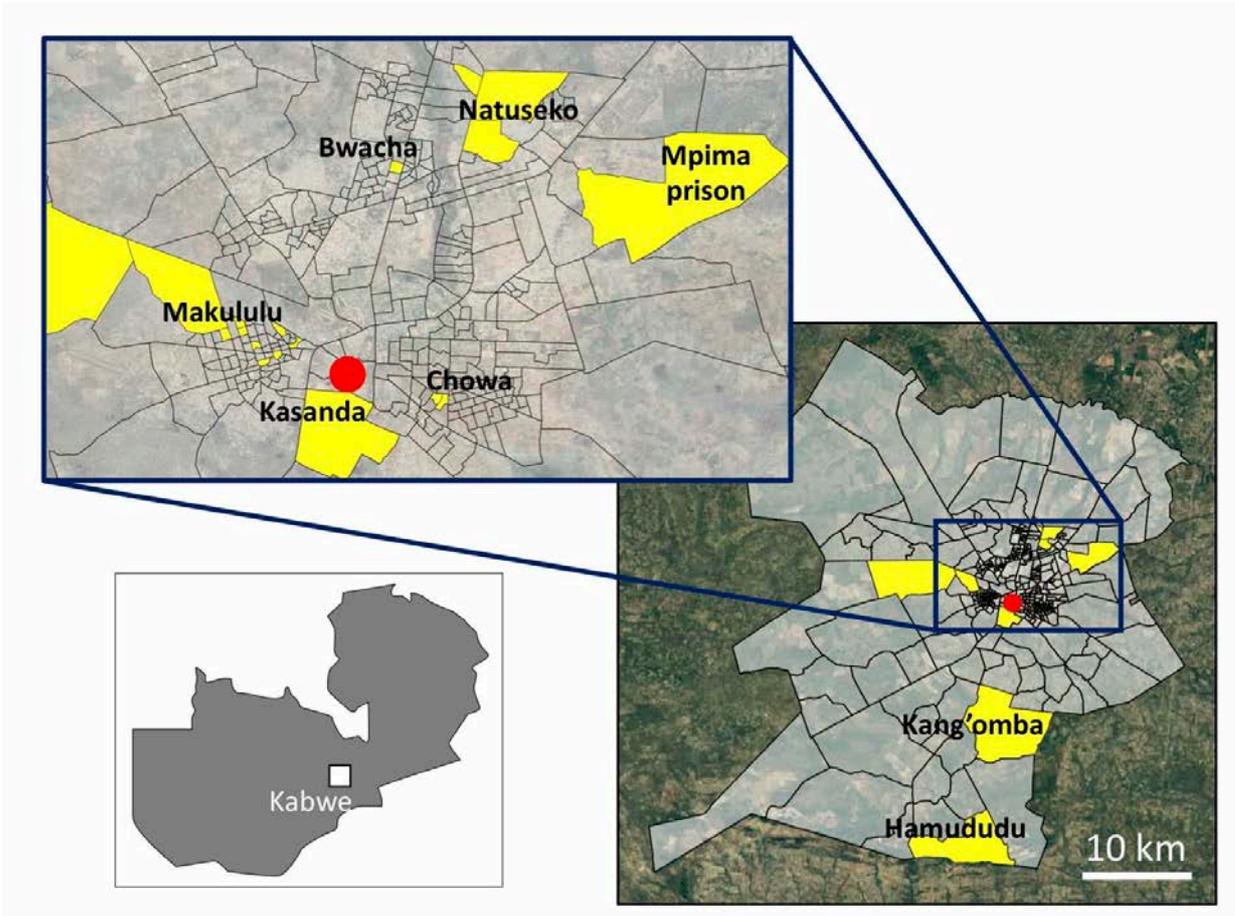|	Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8
	(27.82 - 37.10)	(28.98 - 47.53)	(33.62, 35.94)	(35.94 - 51.01)	(47.53, 59.13)	(39.42 - 57.97)	(46.37 - 99.70)	(79.99 - 93.91)
5 - 17	42.12 ± 9.82	44.85 ± 13.85	49.08 ± 13.54	48.03 ± 6.31	49.85 ± 11.86	46.84 ± 8.78	62.48 ± 14.14	85.94 ± 27.86
	(24.35 - 66.08)	(23.19 - 88.11)	(37.10 - 63.76)	(37.10 - 56.81)	(40.58 - 67.24)	(31.30 - 61.45)	(47.53 - 89.27)	(48.69 - 125.21)
18 -	40.31 ± 9.61	46.03 ± 15.97	49.59 ± 11.10	52.34 ± 13.40	47.80 ± 11.92	47.30 ± 7.20	65.18 ± 15.50	85.63 ± 17.99
	(19.71 - 60.29)	(16.23 - 126.37)	(38.26 - 67.24)	(32.46 - 99.70)	(37.10 - 81.15)	(32.46 - 60.29)	(45.21 - 97.38)	(41.74 - 115.93)
ALAD activity (reactivated)								
all age	60.31 ± 17.22 c	65.98 ± 22.39 c	62.44 ± 18.33 bc	63.27 ± 20.33 c	61.69 ± 15.33 c	59.13 ± 10.16 c	83.63 ± 20.54 b	116.70 ± 29.79 a
	(28.98 - 114.78)	(27.82 - 168.10)	(45.21 - 102.02)	(42.90 - 161.05)	(41.74 - 105.50)	(41.74 - 79.99)	(57.97 - 131.01)	(57.97 - 168.10)
0 - 4	55.65 ± 13.12	61.91 ± 17.57	46.4	56.48 ± 10.17	70.7	58.20 ± 10.15	85.50 ± 28.32	122.43 ± 10.61
	(46.37 - 64.92)	(46.37 - 88.11)	(45.21, 47.53)	(42.90 - 71.88)	(59.13, 82.31)	(46.37 - 70.72)	(63.76 - 126.37)	(112.46 - 140.28)
5 - 17	65.35 ± 19.66	65.90 ± 21.42	70.33 ± 27.66	61.28 ± 10.49	63.18 ± 11.84	58,82 ± 11.66	79.61 ± 16.80	114.20 ± 39.28
	(35.94 - 114.78)	(32.46 - 139.12)	(51.01 - 102.02)	(45.21 - 77.68)	(53.33 - 79.99)	(42.90 - 79.99)	(62.60 - 112.46)	(60.29 - 162.31)
18 -	57.64 ± 15.41	66.16 ± 22.98	63.38 ± 16.29	66.19 ± 24.74	59.84 ± 16.64	59.59 ± 9.45	84.88 ± 21.23	116.60 ± 28.05
	(28.98 - 90.43)	(27.82 - 168.10)	(48.69 - 99.70)	(44.06 - 161.15)	(41.74 - 105.50)	(41.74 - 78.84)	(57.97 - 131.01)	(57.97 - 168.10)

Note: Different small letters (a, b, c and d) between columns indicate a significant difference among areas.

Supplementary Figure S1. Map of Kabwe showing the selected 20 SEAs (yellow) and mine site (red circle).