

LOW-LEVEL BLOOD LEAD AND ANAEMIA IN INFANTS

Izolda Kriviene¹, Rima Naginiene²

¹ Paediatric Clinic of Siauliai District Hospital, Siauliai, Lithuania

² Institute for Biomedical Research, Kaunas University of Medicine, Kaunas, Lithuania

Two Main Mechanisms of Lead Induced Anaemia

- Increased rate of red blood cell destruction
- Impairment in haeme biosynthesis

Objectives of the Study

- to determine blood lead level (BLL) in anaemic infants and toddlers
- to evaluate factors associated with BLL

Subjects and Methods

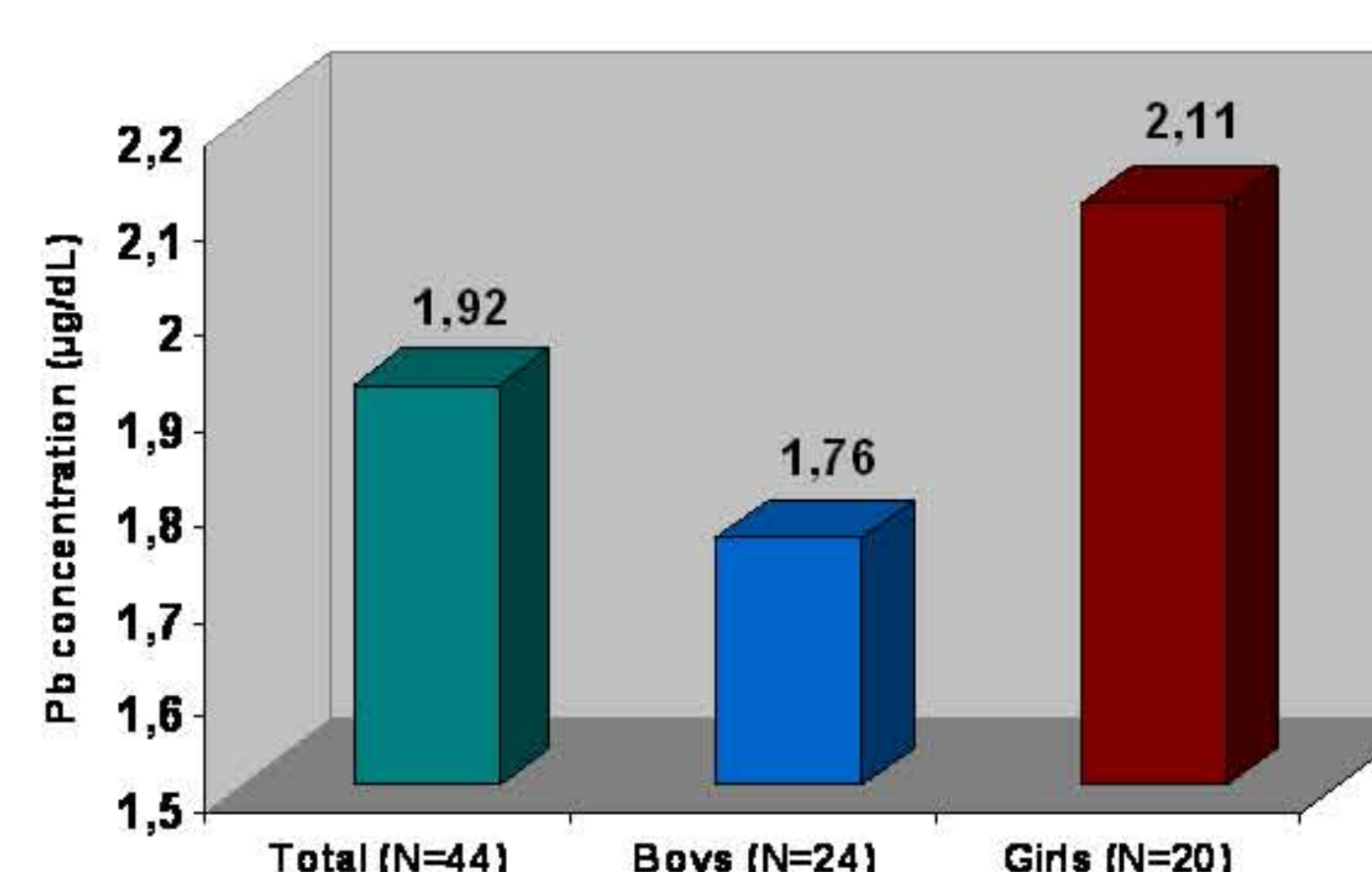
- Anaemic (haemoglobin concentration below 120 g/L) children and toddlers (N=44) aged 9-40 months
- Questionnaire (14 items): mothers pregnancy and delivery, child consumption of milk and tea per day, disturbances of sleep and appetite, living in houses or centrally heated homes, parents occupation involving exposure to lead, living near highway or busy street, living in Siauliai city or vicinities Siauliai district, using hot top water for cooking and drinking, using pottery for cooking, presence of *pica*
- Lead in vein blood (atomic absorption spectrophotometer)
- Red blood cell indices (MCV, MCH, MCHC, RDW) and S-ferritin

Consequences of Iron Deficiency and Increased Blood Lead Level

- Iron deficiency anaemia is associated with:
 - Impaired motor development and coordination
 - Impaired language development and scholastic achievement
 - Psychological and behavioural effects (inattention, fatigue, insecurity...)
 - Decreased physical activity
 - Mild to moderate mental retardation

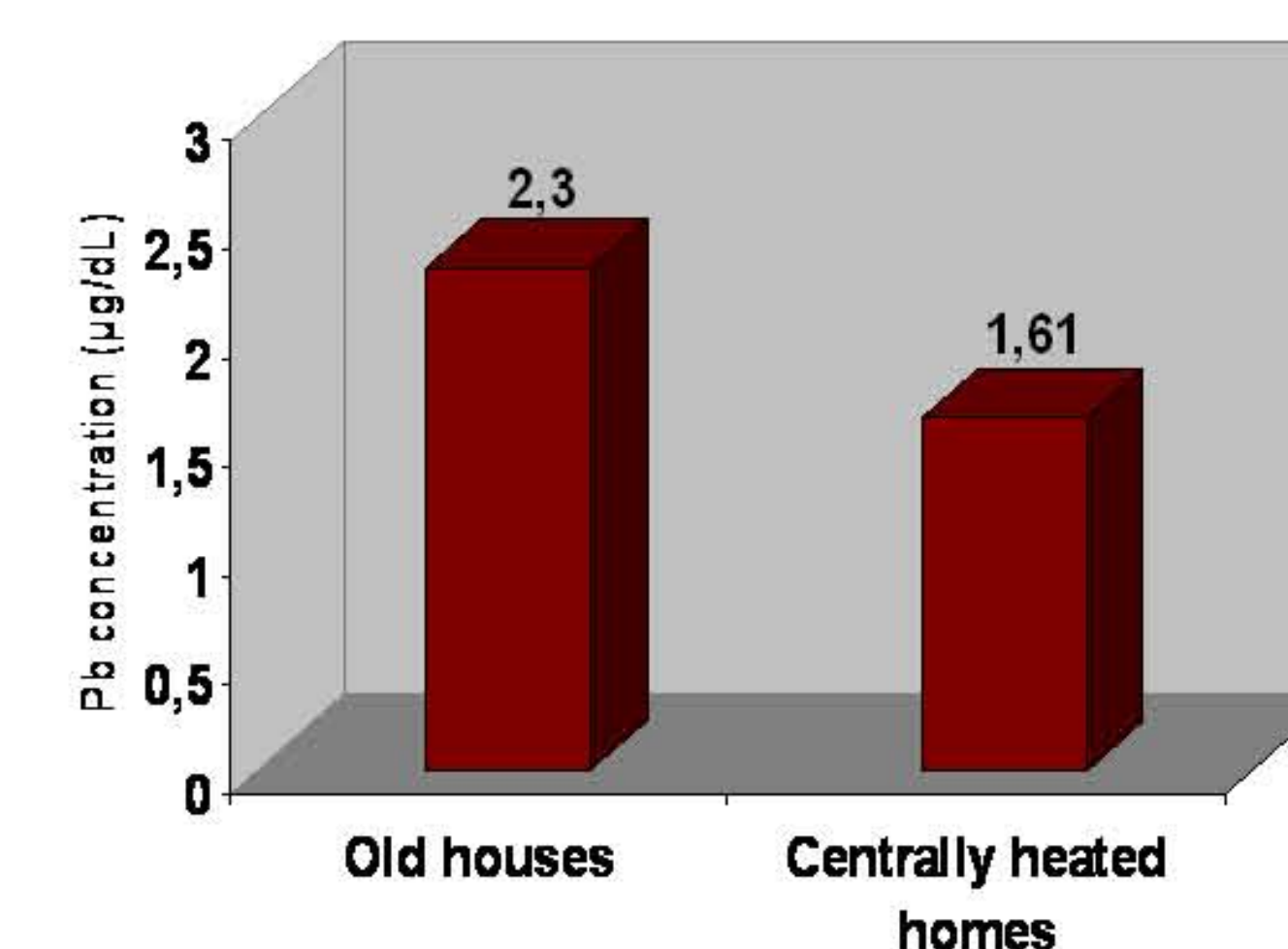
Recent studies indicate the neurodevelopmental disturbances in children with low-level blood lead

Mean BLL in Boys and Girls

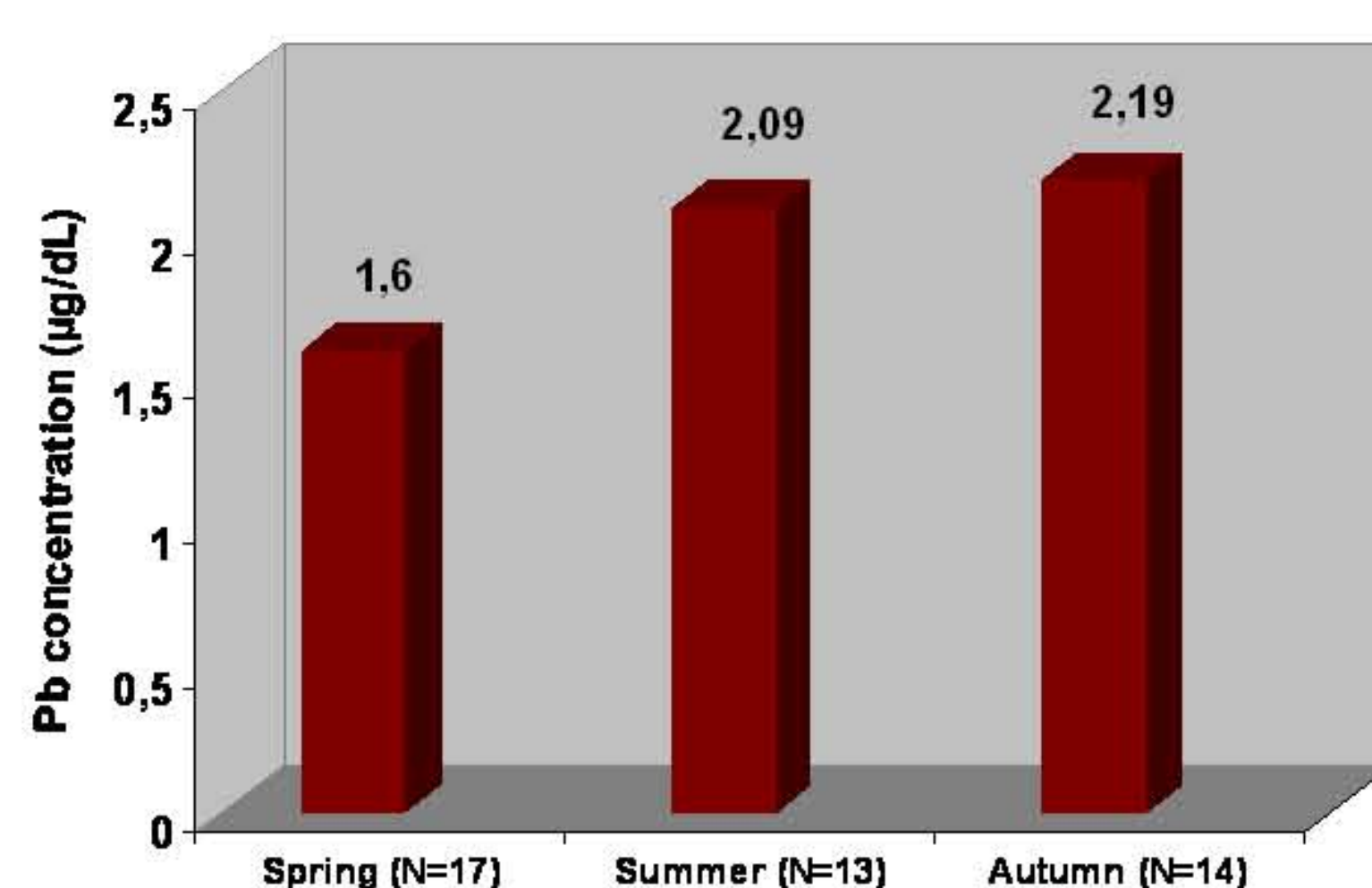


Girls (55.6%) had BLL > 3 µg/dL vs. boys (44.4%) (p > 0.05)

Mean BLL and Living in Old Houses or Centrally Heated Homes

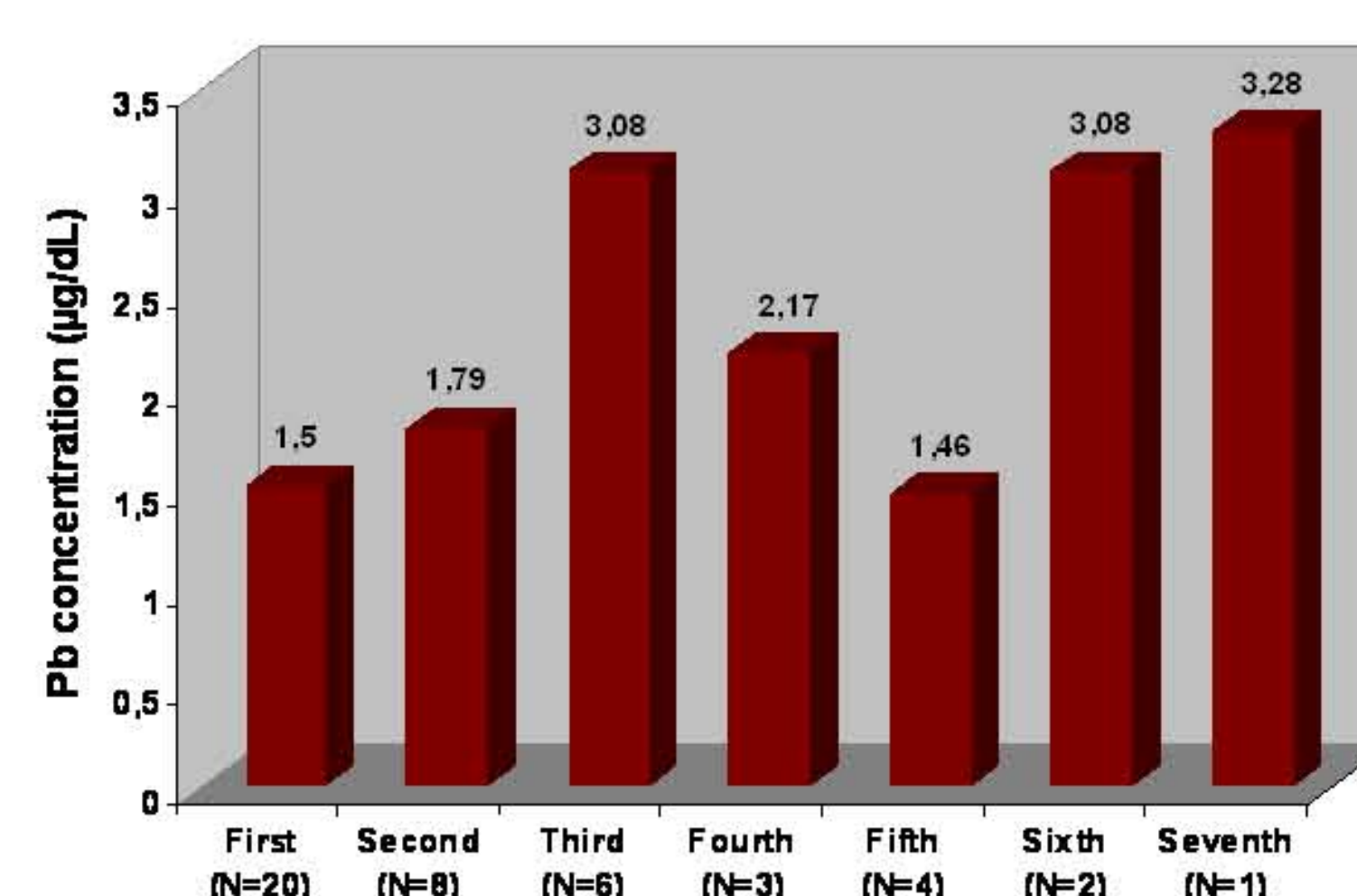


Seasonal Variations of BLL



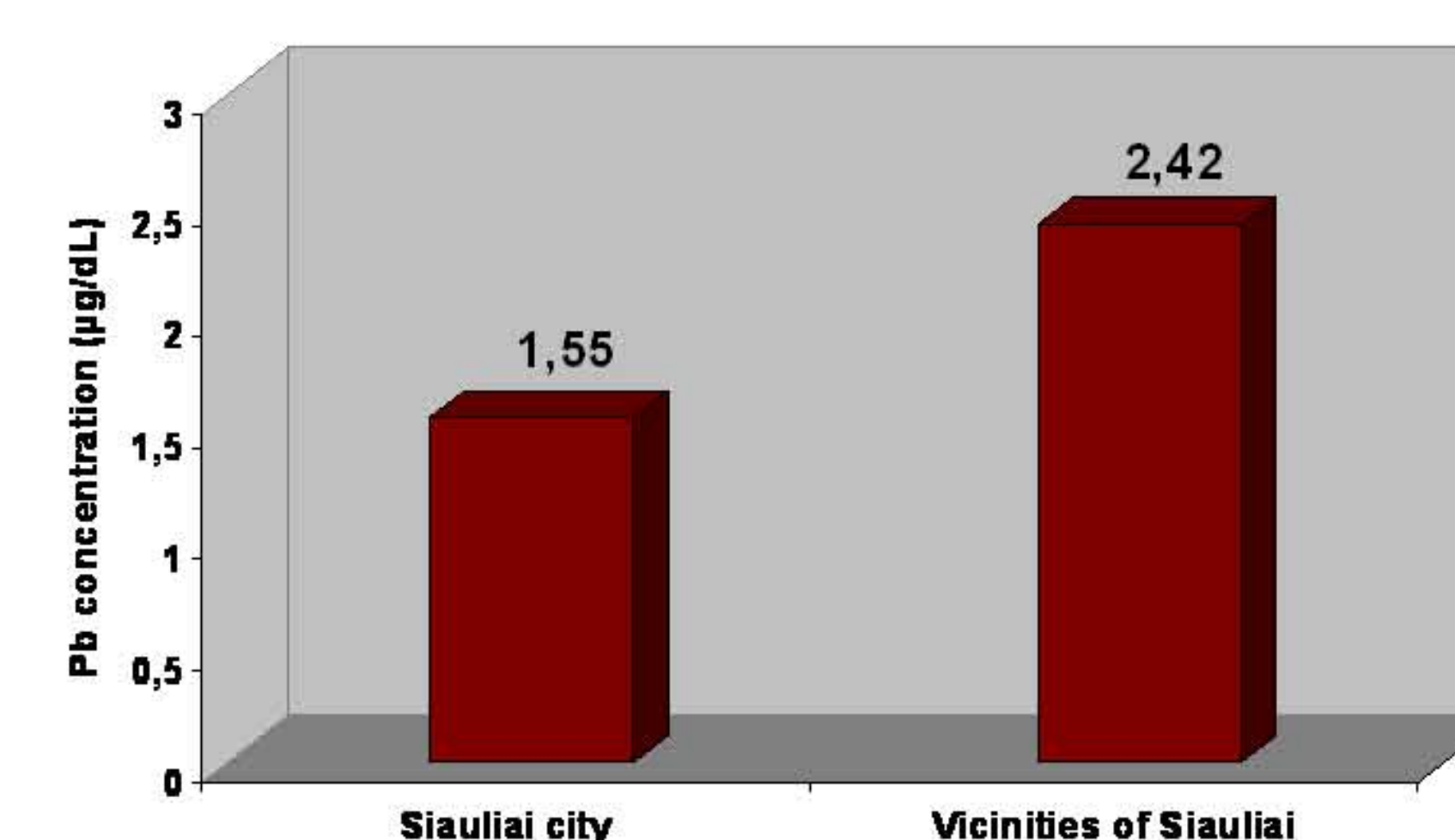
BLL < 1 µg/dL in spring (61.5%) vs. BLL > 1 µg/dL in autumn (41.9%), p > 0.05

Mean BLL and Succession of Pregnancy



17.4% first-born infants had BLL > 2 µg/dL vs. 61.9% non-first born infants (p < 0.05)

Mean BLL and Living Place (City or Vicinities)



77.8% infants from vicinities had BLL > 3 µg/dL vs. children from city (p < 0.05)

Pearson's Correlation Coefficients r Between BLL and Haematological Parameters

Hb and BLL	-0.218 (p > 0.05)
Ht and BLL	-0.077 (p < 0.05)
MCV and BLL	-0.407 (p < 0.05)
MCHC and BLL	-0.402 (p < 0.05)
RDW and BLL	0.494 (p > 0.05)
S-ferritin and BLL	-0.155 (p > 0.05)

Factors associated with higher (> 3 µg/dL) BLL

- Consumption of tea > 1000 mL/day, good appetite and living outside industrial Siauliai city (p < 0.05)
 - Autumn season, female gender, children born from 2nd or later delivery, consumption of milk > 500 mL/day, living near busy street, using pottery for cooking and *pica* (p > 0.05)
- Anaemic children up to 1 years age (88.9%) had > 3 µg/dL (p > 0.05)

Conclusions

- Increasing BLL may cause anaemia in children and toddlers. Differently, iron deficient infants might be at greatest risk for the increased lead absorption
- Microcytosis, hypochromia and other indices of iron deficiency anaemia in anaemic children are associated with higher (> 2-3 µg/dL) blood lead levels, which still much below acceptable (10 µg/dL) blood lead levels