

## Biomonitoring Studies from Two Diverse Populations: Significance in Pregnancy

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### Abstract

**Background:** Owing to the prohibitive cost involved, many developing countries do not conduct formal biomonitoring programs that are conducted in many developed countries. Rather, they employ indirect or ‘surrogate biomonitoring’ programs (SBM). Studies from two diverse populations, the Alberta Biomonitoring Program (ABP), Canada, and from Nigeria, investigation of cadmium in pregnancy, are presented.

**Methods:** Paired pools of maternal serum (90 pools) and cord blood (90 pools) were analyzed in the ABP. Total metals were measured in pooled serum; including, Fe and Zn, using ICP-MS. They were further divided into non-micronutrients and micronutrients. SBM from Nigeria involved 160 participants comprising 125 pregnant and 35 non-pregnant participants as control. Pregnant participants were classified according to their trimester of pregnancy (1<sup>st</sup>, 35, 2<sup>nd</sup> 35, & 3<sup>rd</sup> 55). The third trimester participants were followed up (SBM) until delivery when in addition to measuring serum Cd and Zn levels using AAS, birth weight (BW), head circumference (HC) and body length (BL) were measured.

**Results:** Beryllium, cadmium, chromium, lead, platinum, thallium, tungsten, uranium, and vanadium were all detected at less than LOD in 25% of pools in ABP. Iron and zinc were detected in over 25% of the pools and were higher in cord than maternal serum. In the SBM 32 (58%) women delivered normal birth weight babies (NBW), 19 (35%) delivered babies with low birth weight (LBW), while 4 (7%) delivered babies with high birth weight (HBW). Women who delivered LBW babies had significantly higher serum cadmium levels and lower Zn levels. Zn was significantly reduced in the 3<sup>rd</sup> trimester compared with the 1<sup>st</sup> and 2<sup>nd</sup> trimesters and inversely correlated with Cd ( $r = -0.71$ ;  $p = 0.000$ ). Additionally, the 3<sup>rd</sup> trimester women with lowest Zn levels also exhibited the highest Cd levels and were associated with a large proportion of LBW (35 %).

**Conclusion:** Cadmium pollution is lower in Canada, with higher protective Zn levels, while Cadmium pollution is higher in Nigeria with attendant lower Zn levels. This has potential therapeutic monitoring significance, suggesting that populations from countries with elevated cadmium pollution may require monitoring of Zn levels and may benefit from dietary zinc intake.

**Key Words:** Biomonitoring, Cadmium pollution, Low birth weight (LBW), Pregnancy, Therapeutic monitoring, Zinc levels