INTRODUCTION: Phthalates are mainly used as plasticizers or a large variety of products. Phthalates, as endocrine disruptors with estrogenic activity, have the potential to affect bone metabolism. Experimental studies have demonstrated that some phthalates interferes with skeletal formation and balance of bone homeostasis; there is no evidence on the relationship of phthalates with bone health in human. The purpose of this study was to examine the association of bone mineral density (BMD) or osteoporosis with concentrations of phthalate metabolites in older women.

METHODS: We conducted a cross-sectional study of 556 women adults (≥50 years) who participated in the 2005–06 and 2007–08 National Health and Nutrition Examination Survey. Eleven phthalates (LOD > 60%) were included in the present analysis. The total hip BMD was measured using dual-energy X-ray absorptiometry, and the status of osteoporosis was based on the World Health Organization WHO definitions.

RESULTS: Women with higher levels of mono-n-butyl phthalate (MnBP), mono-(3-carboxypropyl) phthalate (MCPP), monoethyl phthalate (MEP), and monobenzyl phthalate (MBzP) were associated with significant decreases in the total hip BMD, after adjusting for potential confounders. Compared with women in the lowest quartile, women in the highest quartile for the sum of three di(2-ethylhexyl) phthalate (DEHP), MCPP, mono(2-ethyl-5-carboxypentyl) phthalate (MECPP) had a four- to seven- fold greater risk for osteoporosis [OR = 6.7 (95% CI 2.3, 19.2) for DEHP, OR = 4.6 (95% CI 1.6, 13.6) for MCPP, and OR = 3.5 (95% CI 1.0, 12.0) for MECPP, respectively].

CONCLUSIONS: Our findings suggest that specific phthalate metabolites may continue a risk factor for low bone mass and osteoporosis in older women. Future studies are needed to confirm the effect of phthalates on bone health in human.