

Review of BLL Impacts of Lead Exposure Sources

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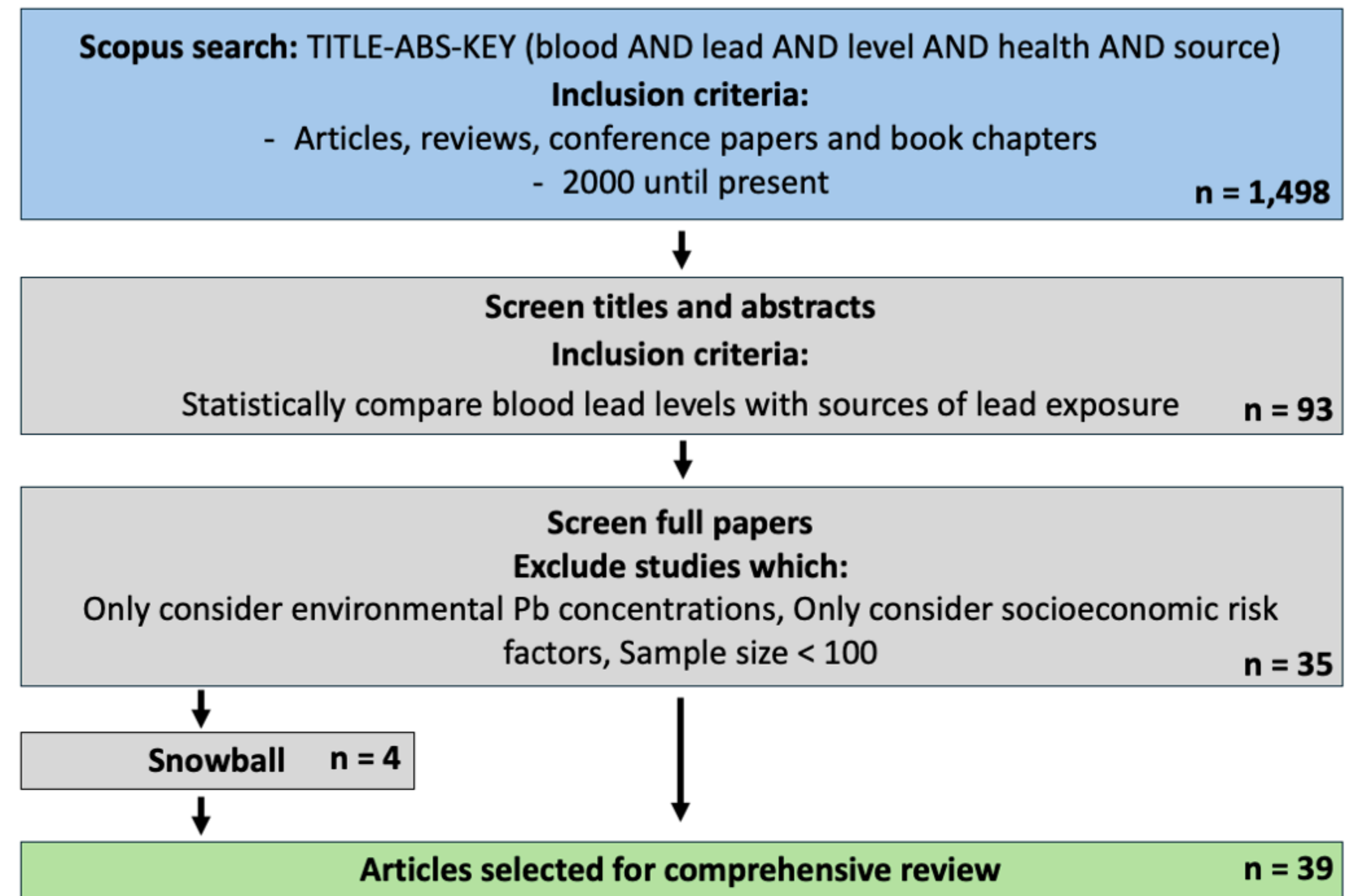
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Global blood lead levels (BLLs) are high, but the contributions from individual lead sources are unclear, hindering interventions.

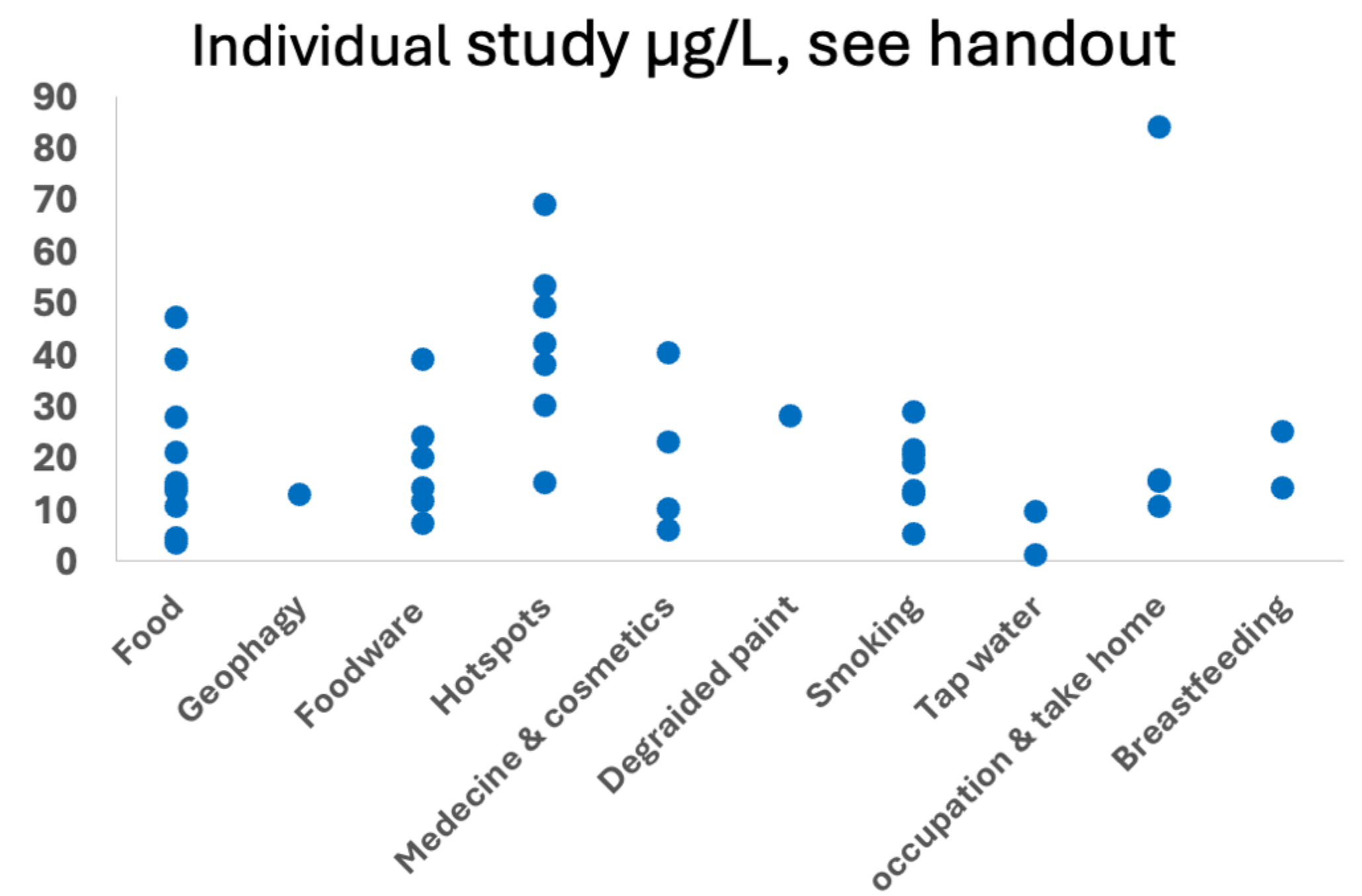
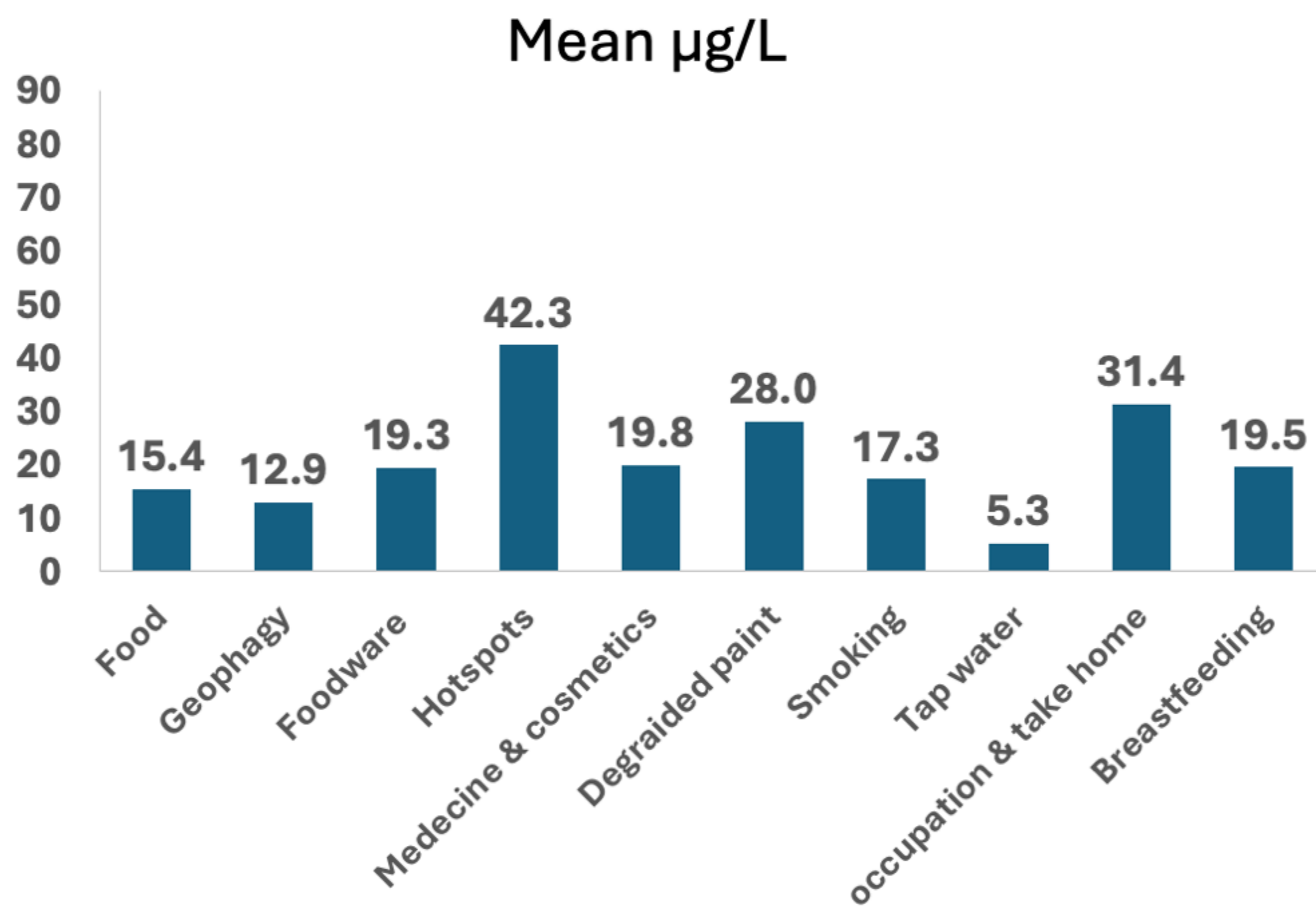
Objectives:

- Review studies which quantify the BLL impacts of individual sources of lead poisoning
- Identify key lead exposure sources driving global BLLs
- Identify knowledge gaps concealing the health burdens of lead exposure sources
- Highlight shortcomings and improvements for achieving statistical power to detect sources of lead poisoning

Method



BLL impacts by source



Key gaps	Recommendations
<ul style="list-style-type: none"> • Few national blood lead studies in LMICs investigating sources of lead poisoning: the transparency of global health burden per lead source is low 	<ul style="list-style-type: none"> • More national lead source assessment studies in LMICs needed
<ul style="list-style-type: none"> • BLL impacts of aluminium cookware are likely very high but have not yet been recorded in BLL studies 	<ul style="list-style-type: none"> • Include aluminium cookware in BLL source assessments • Pursue leaching studies reflecting typical cooking practices
<ul style="list-style-type: none"> • Soil-to-plant crop contamination is a key driver of global BLLs, but the sources of soil lead contamination are unclear: <ul style="list-style-type: none"> • Smoking (14-28 µg/L) and child passive smoking (5-19 µg/L) are likely key drivers of global BLLs • Several studies found significant BLL impacts from food (5-47 µg/L) 	<ul style="list-style-type: none"> • Isotopic analysis to investigate sources of soil lead contamination in agricultural plots: agrochemicals, industrial pollution, and irrigation water
<ul style="list-style-type: none"> • Exposure pathways of industrial lead pollution are poorly understood – the health burden is likely significantly underestimated: <ul style="list-style-type: none"> • 25-85% of lead emissions from lead smelters are fine particles (PM2.5) and can travel thousands of km and be absorbed by crops • Current global ULAB health burden analysis only considers soil exposures within 300m 	<ul style="list-style-type: none"> • Model the distribution and BLL impacts of long-range industrial lead pollution: soil, food, air, and water contamination
<ul style="list-style-type: none"> • Studies aiming to identify sources of lead poisoning often have insufficient statistical power –potentially failing to identify significant lead sources 	<ul style="list-style-type: none"> • Power calculations should consider the expected BLL impact of sources, % of study population exposed to the lead source, ppm of lead source, and deviation of BLLs across the study population