RELATIONSHIP BETWEEN PREVALENCE OF 
BLLS $\geq 10 \mu g/dL$ AND PREVALENCE ABOVE OTHER 
CUT-OFF LEVELS

Prevalences of elevated BLLs represent 
distributions of BLLs in children and are a 
shorthand for these BLL distributions. BLLs in 
populations usually are log-normally distributed. 
That is, in any population, BLLs are distributed 
normally on a log-scale and are skewed toward 
lower BLLs on the arithmetic scale.

On the basis of these distributions, if the 
prevalence of BLLs that are 10 $\mu g/dL$ or greater 
is known, it is possible to estimate the 
prevalences of elevated BLLs at other cut-off 
points. For example, the prevalence of BLLs 15 $\mu g/dL$ or greater (the threshold for 
environmental intervention for individual children) 
or BLLs 20 $\mu g/dL$ or greater (the threshold for 
medical management) can be estimated.

To arrive at these estimates, some assumptions 
about the variability of BLLs in the population 
must be made. One measure of such variability 
is the geometric standard deviation (GSD). For 
this document, we estimated that a GSD of 1.9 
reflects typical variability in lead exposure in 
many communities in the United States. We 
selected it to be higher than the range of 1.67- 
1.79 reported in several recent studies of 
children living near lead smelters.¹

Children living near smelters are likely to have 
less variability in BLLs than is typical since all 
children in those communities share a single 
large source of lead exposure. In contrast, we 
selected a value that was less than the 2.12 
recently measured in a probability sample of 
U.S. children in NHANES III ¹ because the 
national estimate includes variability among 
communities that is not relevant in any single 
place.

References

lead levels in the U.S. population: phase 1 of the 
Third National Health and Nutrition Examination 

¹The underlying population distribution is assumed to be log-normal with a geometric standard deviation (GSD) of 1.9. If lead exposure is extremely heterogeneous, this GSD will be an underestimate and, at any given geometric mean, the proportion of children with very high BLLs may be greater. If lead exposure is unusually homogenous, this GSD may be an overestimate and, at any given geometric mean, the proportion of children with very high BLLs may be lower.
Table 1. Expected Proportions of Children with BLLs Higher Than Selected Thresholds, Given Different Prevalences of Elevated BLLs.

<table>
<thead>
<tr>
<th>Geometric Mean</th>
<th>Percentage</th>
<th>Percentage</th>
<th>Percentage</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\geq 10 \mu g/dL$</td>
<td>$\geq 15 \mu g/dL$</td>
<td>$\geq 20 \mu g/dL$</td>
<td>$\geq 25 \mu g/dL$</td>
</tr>
<tr>
<td>2.2</td>
<td>1 %</td>
<td>0.2%</td>
<td>0.03%</td>
<td>0.009%</td>
</tr>
<tr>
<td>2.7</td>
<td>2 %</td>
<td>0.4%</td>
<td>0.09%</td>
<td>0.025%</td>
</tr>
<tr>
<td>3.5</td>
<td>5 %</td>
<td>1.1%</td>
<td>0.32%</td>
<td>0.106%</td>
</tr>
<tr>
<td>3.9</td>
<td>7 %</td>
<td>1.8%</td>
<td>0.53%</td>
<td>0.185%</td>
</tr>
<tr>
<td>4.4</td>
<td>10%</td>
<td>2.8%</td>
<td>0.91%</td>
<td>0.337%</td>
</tr>
<tr>
<td>4.9</td>
<td>13%</td>
<td>3.9%</td>
<td>1.37%</td>
<td>0.533%</td>
</tr>
<tr>
<td>5.0</td>
<td>14%</td>
<td>4.3%</td>
<td>1.54%</td>
<td>0.607%</td>
</tr>
<tr>
<td>5.8</td>
<td>20%</td>
<td>7.0%</td>
<td>2.73%</td>
<td>1.163%</td>
</tr>
<tr>
<td>6.4</td>
<td>25%</td>
<td>9.6%</td>
<td>3.97%</td>
<td>1.777%</td>
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<td>7.1</td>
<td>30%</td>
<td>12.4%</td>
<td>5.43%</td>
<td>2.547%</td>
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<tr>
<td>8.5</td>
<td>40%</td>
<td>18.8%</td>
<td>9.12%</td>
<td>4.639%</td>
</tr>
</tbody>
</table>

* Rounded to the nearest tenth of a percent.
† Rounded to the nearest hundredth of a percent.
‡ Rounded to the nearest thousandth of a percent.