An assessment of the combined risk to human health from flooding and poor sanitary conditions in the community of Gbegbeyise in Accra.

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Coconut Grove Regency Hotel
Flooding a perennial phenomenon in low-lying areas in Accra

Pollution of streams identified as part of the major environmental problems facing the city.

The situation is bad in poor and highly populated communities e.g. Gbegbeyise and may be aggravated due to climate change.
One main cost rarely quantified is the health risk to population living in these areas.

This is the first step to find ways and means of containing the related health implications.
Sample collection and analysis:

Polluted stream water, soil and drinking water

- Before flooding
- After flooding

Reference pathogens:

- *Faecal coliforms*
- *E. coli*,
- *Cholera spp.*
- Helminth eggs

[V. vulnificus / V. cholerae]

[V. parahaemolyticus]

[V. alginolyticus]
Some results
Gbegbe
Faecal Coliforms
E. coli
Faecal Streptococci
V. vulnificus / V. cholerae
V. alginolyticus
V. parahaemolyticus

Bacteria contamination levels of Gbegbe
Bacteria contamination levels of Gbegbe

Before flooding

After flooding

- Faecal Coliforms
- E. coli
- Faecal Streptococci
- V. vulnificus / V. cholerae
- V. alginolyticus
- V. parahaemolyticus
Bacteria contamination levels in stream

![Graph showing bacterial contamination levels before and after flooding.](image)

- Faecal Coliforms
- E. coli
- Faecal Streptococci
- V. vulnificus / V. cholerae
- V. alginolyticus
- V. parahaemolyticus

Log of mean bacterial population:

- Before flooding
- After flooding
Bacteria contamination levels in drinking water

- Faecal Coliforms
- E. coli
- Faecal Streptococci
- V. vulnificus / V. cholerae
- V. alginolyticus
- V. parahaemolyticus

The graph shows the log of mean bacteria population across different samples (A, B, C) for various bacterial species.
Drinking water quality before and after flooding (site A)

- **Faecal Coliforms**
- **E. coli**
- **Faecal Streptococci**
- **V. vulnificus / V. cholerae**
- **V. alginolyticus**
- **V. parahaemolyticus**

**Before flooding**

**After flooding**

- [Blue bar for Before flooding]
- [Red bar for After flooding]
Bacteria contamination levels in soil

![Graph showing bacteria contamination levels in soil with Log of mean bacteria population on the y-axis and A, B, C on the x-axis. The graph compares Faecal Coliforms, E. coli, Faecal Streptococci, V. vulnificus / V. cholerae, V. alginolyticus, and V. parahaemolyticus.]
Bacteria contamination levels in soil from A
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Distribution Type</th>
<th>Value</th>
<th>Description/source/reference</th>
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</thead>
<tbody>
<tr>
<td>Faecal coliform concentrations in:</td>
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<tr>
<td>Floodwaters</td>
<td>#/mL</td>
<td>lognormal</td>
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<tr>
<td>Drinking water</td>
<td>#/mL</td>
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<tr>
<td>Soil</td>
<td>#/g</td>
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<tr>
<td>E coli concentrations in:</td>
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<td>Floodwaters</td>
<td>#/mL</td>
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<tr>
<td>Soil</td>
<td>#/g</td>
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<tr>
<td>Faecal streptococci concentrations in:</td>
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<tr>
<td>Floodwaters</td>
<td>#/mL</td>
<td>lognormal</td>
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<tr>
<td>Drinking water</td>
<td>#/mL</td>
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<tr>
<td>Soil</td>
<td>#/g</td>
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<tr>
<td>Cholera spp concentrations in:</td>
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<tr>
<td>Floodwaters</td>
<td>#/mL</td>
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<tr>
<td>Drinking water</td>
<td>#/mL</td>
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<tr>
<td>Soil</td>
<td>#/g</td>
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<tr>
<td>Conversion factors from indicators to pathogens of concern:</td>
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<tr>
<td>Parameter</td>
<td>Units</td>
<td>Distribution Type</td>
<td>Value</td>
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<tr>
<td><strong>EXPOSURE:</strong></td>
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<tr>
<td>FLOODWATER</td>
<td>mL per person per day</td>
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<tr>
<td>Soil ingested</td>
<td>g per person per day</td>
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<tr>
<td>CONTAMINATED DRINKING WATER</td>
<td>mL per person per day</td>
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<tr>
<td><strong>DOSE-RESPONSE MODELS:</strong></td>
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<td></td>
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<tr>
<td>?which pathogens to model??</td>
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</tbody>
</table>
### DISEASE BURDEN:

<table>
<thead>
<tr>
<th>Disease burden (for each pathogen) – Ghana specific if possible</th>
<th>DALYs/case</th>
<th>Point estimate</th>
<th>campylobacter – 0.06 RV – 0.39 crypto – 0.09 ascaris – 0.05</th>
<th>Lulani, 2008 Lulani, 2008 Lulani, 2008 Lulani, 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptibility fraction (for each pathogen and each exposure pathway)</td>
<td>%</td>
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</tbody>
</table>
THANK YOU