A risk assessment (F2F) for the use of wastewater in agriculture in Accra, Ghana

PRINCE ANTWI-AGYEI

4th November, 2014 (SanCoP UK – Leeds)
Why do this risk assessment?

• Method to make decisions under uncertainty.
• To determine data needs
• Determine critical pathways along the production to consumption continuum
• Determine risk factors and human behaviours associated with risk to farmers and consumers of wastewater irrigated produce
• To predict potential health risk and whether risks are within acceptable limits
• To propose possible risk management measures at every entry point of the food chain
Why reuse wastewater for urban agriculture? - (strengths)

• Limited access to potable water and freshwater resources
• High cost of wastewater treatment
• Valuable nutrients for plant growth (economic benefits)
• Urban food demand (urbanisation) and proximity to urban markets
• Environmental sustainability
Contamination of produce, and contamination extending beyond farm level (weakness)

Dry season

Rainy season

Combined season

Log E. coli/g

farm lettuce
market lettuce
market cabbage
street salad

farm lettuce
market lettuce
market cabbage
street salad

farm lettuce
market lettuce
market cabbage
restaurant salad
street salad
Farmers’ exposure to faecal contamination – (weakness)

<table>
<thead>
<tr>
<th>Exposure type/risk practice</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feet-to-soil (working barefooted)</td>
<td>93</td>
</tr>
<tr>
<td>Hand-to-soil</td>
<td>86</td>
</tr>
<tr>
<td>Feet/hand-to-irrigation water</td>
<td>≥ 91</td>
</tr>
<tr>
<td>Hand-to-mouth/face</td>
<td>53</td>
</tr>
<tr>
<td>Poultry manure use (both seasons)</td>
<td>80</td>
</tr>
<tr>
<td>Open defaecation</td>
<td>73</td>
</tr>
<tr>
<td>Farmers who irrigated after 2 days before harvest (rainy season)</td>
<td>44</td>
</tr>
</tbody>
</table>
Perceptions of stakeholder risk on wastewater reuse for urban agriculture (Strengths/threats?)

- Market vendors, $n=40$: 78% aware of health risk, 23% will buy wastewater irrigated produce, 66% aware of sources of irrigation water.
- Produce buyers, $n=160$: 80% aware of health risk, 21% will buy wastewater irrigated produce, 21% aware of sources of irrigation water.
- St. Food vendors, $n=29$: 75% aware of health risk, 35% will buy wastewater irrigated produce, 21% aware of sources of irrigation water.
- St. Food consumers, $n=160$: 67% aware of health risk, 43% will buy wastewater irrigated produce, 30% aware of sources of irrigation water.
Factors influencing buyers and consumers to buy from vendors

(A): What street food consumers consider when buying food from one vendor and not the other

- No reason: 17.1%
- Cost (cheap): 1.4%
- Clean environment: 2.1%
- Convenience: 0.7%
- Friend: 7.1%
- Good customer care: 2.1%
- Other: 4.3%
- Stay closeby: 19.3%
- Taste: 45.7%

(B): What market customers consider when buying produce from one vendor and not the other

- Know source vegetables: 3.1%
- No reason: 10.7%
- Clean environment: 1.5%
- Fresh vegetables: 19.1%
- Friend: 27.5%
- Good price: 19.8%
- Good supply: 4.6%
- How vegetables are displayed: 1.5%
- Sell by road side/market entrance: 3.8%
- Site close to where I live: 6.9%
- Wash vegetables: 1.5%
How to reduce risk (both real and perceived) (opportunity)

• Wastewater treatment (where resources are available)

• Building upon existing practices of at-risk groups (farmers, salespersons, consumers) – good agricultural, market & kitchen handling and hygienic practices

• Support from government and financial institutions (recognition, support services, credit schemes)

• Education, enforcement of food safety bye-laws
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- Sanipath project staff
- Study participants (farmers, market vendors, street food vendors, consumers, buyers)
- Enumerators & Environmental sampling team

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