

## 10. Health Risk Perceptions of Stakeholders in Irrigated Urban Vegetable Farming

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*This chapter presents a compilation of survey results on perceptions of urban vegetable farmers, traders and consumers, and of local authorities/officials on urban open-space vegetable farming in general and irrigation with polluted water sources in particular. Information presented is based on surveys conducted in 2002 to 2003 and 2005 to 2006 involving over 1,000 vegetable consumers, 150 vegetable sellers, 24 city officials and over 140 farmers in Accra, Kumasi and Tamale. Reviews from other related literature have also been included.*

### 10.1 The Importance of Stakeholder Perceptions

Unlike rural farming, which is generally perceived as the backbone of the African economy, urban agriculture in general and irrigated urban vegetable production in particular often receive mixed reactions. In contrast to recent trends in developed countries, urban farming is often perceived as an anachronism and possible hindrance to modernization (Drechsel et al. 2006). If wastewater is used for washing of vegetables or irrigation purposes, risk perceptions will increase negative attitudes. It is therefore crucial to understand the perceptions of stakeholders to support informed decision making. This is also important because the knowledge and perceptions of risks influence how risks are managed and hence final exposure to them (Stewart-Taylor and Cherries 1998). Understanding the knowledge and risk perceptions of stakeholders has been seen as the most important first step in the process of understanding attitudes towards different processes and technologies and to steer impact-oriented research (Frewer 2003). Conducting an analysis of stakeholder perceptions is particularly important as risk perceptions between experts and farmers are usually very different (Lazo et al. 2000). Moreover, in an urban setting, many more stakeholders are directly or indirectly involved in urban farming than in a rural setting, which adds to the complexity of studying urban farming and also related decision making (Campilan et al. 2001).

In a typical urban vegetable farming situation in Ghana, the core stakeholders involved are the farmers and their families, the market vegetable sellers who earn a living from the sale of the produce, the extension services, if any, the consumers who may or may not be aware of the

source of their purchases, the various local authorities/officials (land use, agriculture, sanitation, health) who are responsible for regulating the practice, especially if polluted water sources are used, the tenure holders of the occupied land and the media with the power to influence opinions. Assessing their views and perceptions is a sensitive task where many mistakes can occur. The most typical flaws observed among our students were a tendency to

1. Bias by the interviewer who might ask ‘leading questions’ which reveal his/her own perceptions, and push the interviewee in a particular direction;
2. Multiple choice answers (instead of open questions) which do not facilitate free expression of thoughts;
3. Ignorance that others had asked similar if not the same questions on the same farm previously.

**A note of caution** regarding item 3: A negative side effect of our attention to urban vegetable farming and the research we supported or stimulated over more than a decade is that the farmers continuously experienced individual and even groups of local and foreign students, resulting in part in ‘interview fatigue’ or disapproval if the research tended to increase negative public response (in view of health risks) rather than assistance in addressing any of farmers’ expressed challenges, including poor irrigation water quality.

In the following sections we have compiled typical views and perceptions which were compiled from key stakeholders in irrigated urban vegetable production. The data were derived from many IWMI-commissioned interviews and surveys or student work and have already been presented, in part, in the first edition of this book (Obuobie et al. 2006).

## 10.2 Perceptions of Urban Vegetable Farmers

### Farming Constraints

In all the cities surveyed, farmers encountered numerous constraints in producing vegetables. Typical production constraints mentioned in Kumasi, Accra, Takoradi and Tamale were:

- Marketing of produce: vegetable market women/sellers dictate produce prices at harvest;
- High cost of inputs (pesticides, farm tools, labor, fertilizer, etc.);
- Pest and disease threats to crops;
- Inadequate amounts of cheap soil inputs (compost, poultry manure, etc.);
- Lack of available land and tenure insecurity due to urban development;

- High labor input (personal or paid) for watering of vegetables;
- Dry-season access to (safe but cheap) water for irrigation;
- Poor seed quality (lettuce, cauliflower, cabbage);
- Lack of capital funding sources: farmers have to fund themselves or make an arrangement with the market women for advance payment to be settled with delivery of their produce;
- Limited support by extension services.

Farming inputs, water, crop diseases and marketing were identified as more ‘important’ by farmers in Accra and Kumasi (Table 10.1).

**TABLE 10.1.** Key constraints identified as important by farmers

Constraints	Accra (%)	Kumasi (%)
Marketing	42	35
Inputs *	82	69
Water	75	53
Crop disease	48	55

\*Seeds, fertilizer/manure, tools.

Farmers specified the nature of each constraint as shown in Table 10.2. More than half (56%) of the farmers in Accra mentioned water shortage between December and March as the main problem associated with available irrigation water sources. This was followed by water cost (24%) and quality (22%). Exceptionally for Accra, 11% of the farmers indicated that ‘public criticism’ of the sources of water they use for irrigation is the constraining factor to urban vegetable production. In Kumasi, ‘lack of adequate supply’ throughout the year and dry-season shortages were the main problems for irrigation water. Regarding inputs, between 47 and 68% of farmers in the two cities complained that cost of seeds was the main constraint, followed by quality of available seeds. In the marketing of produce context, 59% of the farmers in Kumasi specified ‘low seasonal demand’ as a significant problem while 32% of farmers in Accra identified ‘no direct market access/cheap pricing of produce’ as an obstacle. More than two-thirds of respondents in each city indicated threats from crop diseases resulting in crop damage (or failure). Farmers are actively experimenting with various known chemicals – if permitted, or not, for vegetables – such as lindane, chloropyrifos, endosulfan, etc. as well as local soap and other products, to combat pests.

**TABLE 10.2.** Specifications of ‘important constraints’ (IWMI).

Nature of constraint	Water (%)		Input (%)		Marketing (%)		Crop disease (%)	
	Accra	Kumasi	Accra	Kumasi	Accra	Kumasi	Accra	Kumasi
Lack of adequate supply	2	45						
Public criticism	11	0						
Conveyance	2	31						
Quality	22	0	20	26				
Cost	24	8	47	68				
Shortage	56	42	6	0				
Viability of seeds and chemicals			27	20				
Lack of tools and equipment			12	0				
Seasonal low demand					28	59		
No direct market access/poor returns					32	29		
Yield reduction							31	22
Crop damage					12	18	69	78

The results of the average ranking of constraints to irrigated vegetable farming and the degree of importance of each constraint to the others are presented in detail in Table 10.3. The top challenges were water, inputs (mostly seeds) and pests.

**TABLE 10.3.** Ranking of constraints to irrigated urban vegetable farming (IWMI).

Constraints	Mean ranking	
	Accra	Kumasi
Inputs	2.27	2.59
Water	2.27	2.99
Crop disease	2.87	2.80
Marketing	3.43	3.39
Credit/capital	3.80	3.61
Soil fertility	3.85	3.71
Land	3.87	4.00
Crop theft	3.90	3.84
Lack of extension services	3.97	3.39
Expired chemicals	3.97	4.00
Labor	4.00	3.76

Scale 1-4, with 1 = most important; 4 = least important.

None of the constraints was ranked on average as ‘most important’ indicating variation between the main challenges farmers face. In Accra, water and input were ranked the same (‘high importance’), while in Kumasi with easier water access in inland valleys, farmers ranked them as only ‘important’. Crop diseases and marketing were both ranked as important constraints in the two cities. Soil fertility, land, credit/capital, lack of extension services, crop theft, labor, etc., were all ranked as ‘less important’ in both cities. Regression analyses of the influence of education, experience (years cultivating), irrigation water source and type of land tenure on the mean ranking of constraints were conducted, but did not result in statistically significant ( $p < 0.05$ ) relations.

### **Reliability of Irrigation Water**

About two-thirds (65%) of the 138 farmers interviewed in Accra expressed satisfaction with the sources of water they used although only a smaller share had access to safe water. Their reasons for using such water were due to the many benefits they derived from the water. For such farmers, wastewater/urban runoff provide reliable water supply because flow is relatively continuous (mentioned by 36% of the farmers) and they do not pay for the water (32% mentioned this) as some of the other farmers who only have access to costly pipe-borne water do. Tap water in addition is often in short supply (general water supply gaps can last days, or longer, like in Tamale) thereby making it an unreliable source. Less than 5% of the farmers referred to nutrients in the water as a reason for using it; generally, farmers do not give consideration to the nutrients present in wastewater possibly because it is often diluted to different extents. Farmers use the water mainly because it is the only source and usually apply poultry manure as a (low-cost) source of crop nutrients.

### **Health Risks**

Given the importance of health in the context of wastewater use, many surveys targeted risk perceptions. Typical results are presented here. In Accra, of about 10% of the 138 farmers interviewed mentioned skin irritation/diseases and bad odor as the health risks associated with the use of their irrigation water. Most of the remaining farmers (71%) thought that there is no actual risk to themselves or to consumers. This is how many of them put it:

*Ever since I was born, my father has been doing this work [farming] and it is the same drain water [wastewater] we have been using with no health problem...*

Similarly, in Kumasi, Keraita (2002) reported that only few farmers complained of body rashes for example from the use of irrigation water. Their confidence in the low levels of risk was also attributable to no complaints from consumers (or the traders in the interface) about their products:

*There is nothing wrong with the water. Nobody has ever complained of any disease after eating our vegetables.*

The rest (19%) hold dual opinions on the health issue. They indicated that they have not encountered any actual problems themselves and believe this also applies to consumers. However, they also think that the use of 'wastewater' might potentially be associated with some diseases due to the presence of germs in the water which might manifest sickness later on. The limited risk perception has to be understood in the context of farmers' general living conditions. Like most city dwellers, they experience daily many potentially health-affecting factors such as poor sanitation, unreliable supply of potable water and malaria which are routine parts of their lives. In this context, to emphasize a single risk factor as more important than any other is difficult and actual risk perception is in fact likely to be very low.

A more detailed qualitative survey gave further perspectives on farmers' perceptions on health risks (Keraita et al. 2008a). Table 10.4 shows the health hazards farmers related to vegetable farming in focus group discussions. Occupational hazards like muscular pains and headaches were perceived to have the highest health impact. These were related to physical strain and hence had higher rating by more established, older farmers. Such strain was linked to manual water fetching and irrigation with watering cans which is very arduous. The occupational health risks were rated higher in Accra than in Kumasi, which was attributed to different walking distances between water source and field. Considering that irrigation can take 40 to 75% of the time farmers spend on the farm (Drechsel et al. 2006), walking distance matters. The fact that more farmers in Accra use streams and drains which collect all types of wastes might explain the higher rating of bad odor in Accra than in Kumasi. Established farmers gave odor and skin infections less significance than new farmers. In Accra, 19% of the farmers interviewed in the survey temporarily wear protective clothing, mainly boots, when irrigating or applying manure while 14% perceived the use of protective clothing as uncomfortable. Farming in low-lying areas with high water tables in Kumasi meant that farmers' feet had more contact with water and that is probably why feet infections were rated higher in Kumasi than Accra.

**TABLE 10.4.** Health risks that vegetable farmers associated with wastewater irrigation and other practices in Accra and Kumasi (Source: Keraita et al. 2008a).

Perceived health risks	Accra		Kumasi	
	New farmers (n=16)	Established farmers (n=12)	New farmers (n=18)	Established farmers (n=14)
<b>Occupational</b>				
Skin infections	3.1 <sup>b</sup> ±0.7 <sup>c</sup>	1.9 ±0.8	2.1 ±0.9	1.4 ±1.1
Sore feet	2.1 ±1.1	1.3 ±0.8	3.2 ±0.7	2.0 ±1.0
Bad odor	4.3 ±0.7	1.1 ±0.9	1.2 ±0.9	1.1 ±0.9
Bilharzia	1.2 ±1.0	0.3 ±0.5	1.1 ±0.8	1.0 ±1.0
Muscular pains	3.4 ±0.8	3.2 ±1.0	2.9 ±1.1	3.4 ±0.9
Headaches	2.1 ±0.9	2.3 ±0.9	1.3 ±1.0	0.9 ±0.7
<b>Consumption/intake</b>				
Diarrhoea <sup>d</sup>	2.0 ±0.9	1.3 ±1.1	1.1 ±0.9	1.2 ±0.4
Abdominal pains	1.3 ±0.7	2.3 ±0.9	1.2 ±0.9	0.3 ±0.5
Cholera	0.9 ±0.8	0.8 ±0.7	0.2 ±0.4	0.4 ±0.5
Typhoid	1.2 ±0.8	1.0 ±0.6	0.4 ±0.7	0.4 ±0.6
<b>Other risks</b>				
Pesticides: Impotency	4.3 ±0.7	3.2 ±1.3	4.8 ±0.4	4.2 ±0.7
Pesticides: Skin burns	3.3 ±0.9	2.3 ±1.0	3.3 ±0.9	2.4 ±1.0
Fertilizers: Skin burns	3.4 ±0.9	2.1 ±0.8	1.2 ±0.9	0.4 ±0.5
Manure: Bad odor	1.9 ±0.9	0.9 ±0.8	3.4 ±1.2	1.9 ±0.9

<sup>a</sup> New farmers: cultivating with wastewater < 2 yrs; established farmers: > 2 yrs

<sup>b</sup> Risk range: Lowest risk = 0, Highest risk = 5

<sup>c</sup> Standard Deviation

<sup>d</sup> As mentioned by farmers, although symptoms can also refer to other diseases mentioned.

Farmers usually do not eat the exotic vegetables they produce, so the listed consumption-related risks were based on hear-say but not experience. There were very few farmers who occasionally ate their own produce and those who did indicated that they had never had any health problem. This opinion echoed the results of the survey where most of the farmers interviewed (71%) thought that there has never been any actual risk to themselves or to the consumers (see above). Similarly, in Kumasi, Keraita (2002) reported that only a few farmers complained of body rashes from the use of irrigation water, although many were aware that wastewater carries unhealthy components. It is of course difficult to distinguish if the majority of farmers did not experience any problems, or if they downplayed them to protect their business interests.

Farmers in Accra rated the possibility of consumption-related risks higher than the Kumasi farmers. Nevertheless, in both cities, consumption-related risks were perceived to be of less importance than occupational risks. However, non-wastewater -related occupational risks, especially from pesticide use, were perceived to have a much higher risk. The higher rating of pesticide risks could be attributed to the high level of awareness created by NGOs in the area advocating for Integrated Pest Management (IPM). There have also been reports from an irrigation scheme near Kumasi (Akumadan) where intensive tomato farming is practiced linking pesticide use with impotency. This might explain why, especially, the group of younger unmarried farmers perceived this as a very significant risk (cf. Obuobie et al. 2006).

Another follow-up study in Accra that compared perceptions on disease infections among farmers using wastewater and those using pipe water, found no significant differences between the two groups (Gbewonyo 2007). Similar findings were reported from Ouagadougou, Burkina Faso, that involved 750 households in two groups; one engaged in irrigated urban agriculture and the other in non-agricultural control activities (Gerstl 2001). A follow-up perception study in Ouagadougou showed that farmers did not see any possible link between irrigation water quality and health (Ouedraogo 2002). They argued that there was no basis for irrigation water to be labelled as a source of diseases. In their opinion diseases were attributable to other factors that ‘scientists blame on wastewater irrigation’. They qualified this with a proverb, *when an abscess is on a camel’s back, do not pierce the donkey’s back*. In another study in Hanoi, wastewater was perceived to be the main cause of skin problems such as rashes but was not viewed as harmful as bad odor which ‘enters’ the body (Knudsen et al. 2008).

Keraita et al. (2008a) noted that farmers’ risk perceptions have to be taken seriously in any risk awareness program, especially if farmers:

- Have no education about invisible risk factors like pathogens and how they can affect human health;
- Usually do not eat exotic vegetables and, therefore, have no experience of a possible impact;
- Live in poor suburbs that lack good sanitation and improved water supply, which could in fact be more associated with these risks than vegetable farming;
- Could have adopted defensive strategies to show that their farming is safe as a response to pressure from the public and media.



It should also be stressed that so far no detailed epidemiological study has been carried out and the health risk estimates like those presented in chapter 9, are only based on ex-ante risk modelling (Quantitative Microbial Risk Assessment) using dose-response functions from other parts of the world with other actors and partial immunities.

### **Sources of Health Risks**

From a participatory cause-effect analysis, farmers in both cities identified contaminated soils, inappropriate use of pesticides and polluted irrigation water as possible sources of health risks (Keraita et al. 2008a). In view of water quality, some farmers in Accra noticed increasing levels of pollution as perceived from its foul smell, solid waste in the water and its dark color. They attributed the pollution mainly to the failure of the local authority to properly collect, treat and dispose of wastewater. But they also acknowledged the common (irresponsible) local behavior, where solid waste, including faeces in polythene bags ('flying toilets') is dumped into drains and waterbodies. Similar reasons for water pollution were given by vegetable farmers in Kumasi who use urban streams for irrigation. However, more than 80% of farmers in Kumasi use shallow groundwater and on-farm ponds as sources of irrigation water. Although farmers considered the ponds to be less contaminated than the streams, they observed that when it rains, the shallow wells and ponds collect storm water from upstream villages and farms causing pollution, as the dugouts are not protected against inflow. In general, farmers easily associated wastewater irrigation with health risks in farming sites where polluted urban streams, household effluents and drains were used for irrigation. This awareness appeared, however, to be influenced by previous related interviews as well as media reports on the subject of pollution and food safety.

Soils were considered another health risk factor. Farmers in both cities observed that some soils were 'contaminated' naturally while other soils were affected by inputs that farmers use. In Accra, farmers closer to the sea said that their soils were increasingly tasting salty and hence becoming less productive. This was associated with natural salt intrusion from the sea. Contamination from poultry manure, which is extensively used as fertilizers in urban farms especially in Kumasi, was considered possible, and linked to chemicals that are used to sanitize poultry (farms) and not to microorganisms in the manure itself.

The perceptions of farmers differed to some extent by farmers' age, education and gender (Owusu et al. 2012).

**Farmers’ Knowledge of Measures to Reduce Health Risks**

To move towards risk mitigation, understanding farmers’ knowledge and perceptions on risk-reduction measures, particularly the factors they use to assess whether technologies are appropriate for them, is very important. This assessment of whether a measure is appropriate does not necessarily consist of an absolute ‘yes’ or ‘no’ answer. It usually consists of a ranking of the measures from more to less appropriate. Knowing how to elicit these perceptions, translate them into criteria for evaluating a risk-reduction measure and use them to rank alternative measures is crucial for working with farmers to jointly develop and assess risk-reduction measures with the potential for acceptance and adoption.

In a related participatory study, farmers were encouraged to identify suitable risk-reduction measures from their perspectives (Keraita et al. 2008a). Measures identified are presented in Table 10.5.

**TABLE 10.5.** Measures identified by farmers to reduce health risks in wastewater irrigation

Primary measures <sup>a</sup>	Secondary measures <sup>b</sup>
<ul style="list-style-type: none"> <li>· Provision of safer irrigation water like shallow groundwater</li> <li>· Protection of water sources</li> <li>· Treating water with chemicals</li> <li>· Filtration of irrigation water</li> <li>· Using boots when stepping in water sources</li> <li>· Treating soils</li> </ul>	<ul style="list-style-type: none"> <li>· Leaving water in irrigation sources to settle and not stepping inside</li> <li>· Applying water to roots, not on leaves</li> <li>· Using correct amounts of water</li> <li>· Stopping irrigation days before harvesting</li> <li>· Reducing soil splash on vegetables</li> <li>· Better timing of manure application and using the correct amounts</li> <li>· Using well-composted manure</li> <li>· Using gloves when applying manure</li> </ul>

<sup>a</sup> Measures initially identified by farmers only

<sup>b</sup> Measures identified following discussions with scientists

Source: Keraita et al (2008a)

These measures are very different from measures suggested by scientists, such as in WHO guidelines, like crop restrictions, conducting health programs and human exposure control. Scientists seemed to propose measures based only on their effectiveness to reduce levels of pathogens (WHO 2006), while farmers looked at the larger picture considering loss of yields, level of investment needed, loss of income and land tenure before they could propose measures. Generally, and maybe not surprisingly, farmers considered slight changes in their current practices and those, which required low investments, as most suitable for implementation. Similar findings have been reported in other studies done in resource-poor communities (Marenya and Barrett 2007; Avila and Jabbar 1992). The findings support the psychometric approach which suggests that lay people perceive risks multi-dimensionally,

which also affects risk management measures they put in place (Slovic 1987). Scientists thus need to start thinking multi-dimensionally and work much closer with farmers to develop appropriate and adoptable risk management measures.

Observations made from an anthropological study conducted among wastewater farmers in Hanoi showed that the use of protective clothing was gender-dependent (Knudsen et al. 2008). Women consistently wore more protective gloves and boots compared to men. The differences were mainly attributed to farming activities which were different between both genders, with men walking around the farms much more than women, and in larger need of light gear, if any, to reduce sweating. In fact, both groups felt that protective clothing constrained their work. These observations have also been made in studies conducted in Ghana among farmers dealing with wastewater and human excreta (Keraita et al. 2010; Seidu et al. 2009). In the Ghana study, which involved 138 vegetable farmers in Accra using wastewater, only 19% wore protective clothing, mainly boots and gloves, while irrigating (Keraita et al. 2010). In some cases, farmers wore protective clothing not because of health risks, but to protect them from cold and physical injuries (Knudsen et al. 2008).

### **10.3 Perceptions of Urban Vegetable Sellers**

#### **Knowledge About the Origin of Vegetables**

Sellers have different mechanisms for sourcing their produce. Some of them, especially urban traders, select their crops on the field and even harvest themselves, while others buy at distribution points where the source may not be known. In general, over 85% of the traders of exotic vegetables interviewed in Accra, Kumasi and Tamale were aware that their vegetables are produced from within the cities they live in.

#### **Benefits and Problems of Urban Vegetable Farming**

Over two-thirds of the 50 vegetable sellers in each city mentioned the following as benefits of urban open-space vegetable farming (in no particular order):

- Employment for farmers and sellers;
- Easy access to fresh vegetables;
- Reduced cost and time of transportation for sellers;
- Usually lower prices of vegetables (as transport costs are lower);
- Increased supply of vegetables on city markets (because of easy access);
- High profit through high turnover; and
- Ability to supplement family food intake (for traditional vegetables).

Owing to these advantages, sellers were supportive of agriculture within cities, and mentioned that city authorities should give it more attention. Half of the sellers interviewed in Accra<sup>1</sup> but only 8 to 10% in Tamale and Kumasi were aware of possible health risks associated with irrigated urban vegetable farming. When they were asked to specify the nature of any perceived risks, nearly all sellers in Accra but only half of those in Tamale identified irrigation with polluted drain water as the main hazard. They also mentioned that this could infect consumers with diseases (through vegetable consumption) but they were unable to specify what type of disease.

### **Perceptions of Vegetable Sellers on the Quality of Vegetables**

All sellers in Accra, Kumasi and Tamale are highly concerned about the physical appearance of their produce, which determines its 'quality'. Consumers buy only what looks 'proper' and anything short of this will mean loss of /income for the sellers. Thus, quality of vegetables was in this context associated with visible characteristics but not contamination levels. Vegetable sellers in all of the three cities have common criteria for evaluating the quality of vegetables which are size, shape, freshness of leaves, color, firmness of leaves (particularly with cabbage) and presence of spots, dirt, holes, etc. Buyers use the same criteria (see below).

Observations revealed that vegetable traders who buy on farm also wash these vegetables, mostly lettuce, in the local irrigation water (Hope et al. 2008). The main reasons given by vegetable sellers for washing vegetables on farm was to remove soil particles, insects and earthworms that are attached to leaves and roots. They said that this makes the lettuce more attractive and reduces its weight, which is important when the lettuce has to be carried to markets. Washing also helps to keep vegetables fresh, especially when kept overnight before selling. Lettuce intended for long distance transportation however was not washed because washing makes it 'soft' (flaccid) and induces rot faster during the long hours of transportation in intense heat, as it is not refrigerated.

### **Perceptions on Sources of Water and Influence on Purchasing**

Over 70% of the sellers interviewed in each city were aware of the various sources of water being used by farmers cultivating vegetables in the cities. However, sellers were not specific

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<sup>1</sup> This awareness might be a reaction to the fact that only in Accra did the media target wastewater use followed by attempts by the authorities to prosecute farmers using polluted water for irrigation (see Obuobie et al. 2006).

about the quality of the various sources of water mentioned except for holding the general notion that pipe-borne water has the best quality because it is treated.

Between 20% and 50% of the sellers in the three cities said that they enquire about the geographical source (farm area) of the crop. This was particularly so in Accra where 88% of the sellers indicated that sometimes consumers ask about the source of vegetables or the water used.<sup>2</sup> In Kumasi and Tamale, the situation is rather different with less than 20% of the sellers being sometimes asked about the source. Asking about the 'source' is, however, not a direct indicator of risk awareness but can also be related to belief or experience that, for instance, carrots from Togo are better than those produced in Ghana without actually knowing the reason. In response to a direct question about what sellers think of vegetable production with wastewater, nearly all the sellers in the three cities replied (as expected) with negative opinions, indicating that consumers could catch disease from the produce. Nearly 30% of sellers in Accra and Kumasi thought that farmers involved in such practices should be stopped without any compromise.

When asked if they would offer higher prices for vegetables produced with 'good' quality irrigation water (like piped water), 76% of the respondents in Accra answered 'Yes', while only 14% and 28% in Kumasi and Tamale respectively, answered similarly. This answer showed again that the higher degree of public awareness in Accra can influence perceptions. However, sellers who were not willing to offer higher prices for vegetables grown with good quality water indicated that in practice this would result in selling vegetables at higher prices without having a corresponding demand as the normal customer is only interested in visual produce quality. This reply appears to be more insightful (see also Danso et al. 2002b).

#### **10.4 Perceptions of Urban Vegetable Consumers**

##### **Knowledge About Vegetable Sources**

The survey results showed that 60 to 94% of the consumers were aware that urban agriculture was the main source of their vegetables (94% in Tamale, 80% in Accra and under 60% in Kumasi). Awareness was higher in Accra and Tamale than in Kumasi because in Accra and Tamale vegetable farming is done mostly in the core areas of the city, close to urban dwellings while in Kumasi many of the vegetable farms are located at the fringe around the local university. However, it is impossible for customers to distinguish between vegetables

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<sup>2</sup> However, no seller would reveal that her source might be an inner-urban place with questionable water quality.

grown on different farms or with different water sources as in wholesale and retail markets the products from different farms become mixed.

### **Benefits and Problems of Urban Vegetable Farming**

Like vegetable sellers, consumers had a similar perception of benefits and potential problems of urban vegetable farming in Ghana, including possible risks from polluted water. Consumers also mentioned that some urban farmers use agrochemicals incorrectly, which could also have health implications. On the question of how urban agriculture could be better organized, given the benefits mentioned, some of the consumers suggested that parts of government land should be allocated specifically for vegetable farming in the cities. They further mentioned that additional land could be acquired in peri-urban areas through negotiations with traditional authorities and farmers could pay a token fee to landowners.

### **Perceptions of Consumers on the Quality of Vegetables**

Most of the consumers interviewed in each of the three cities are concerned about the quality of the food. Consumers use similar quality characteristics as vegetable traders, such as color (greenish leaves represent good quality and yellowish represent bad quality), shape, cleanliness, freshness, having no spots and so forth. The standard discussion held with sellers concerned the price, not the origin of the produce or possible contamination. Anyway, it would be difficult to distinguish between likely contaminated and uncontaminated crops, and it is very unlikely that any seller would reveal a questionable vegetable source which could reduce the market value of the crop.

### **Perceptions on Sources of Water and Influence on Purchasing**

Though consumers' criteria for determining crop 'quality' do not include pathogen contamination, many consumers (45% in Accra, 40% in Kumasi and 58% in Tamale) – if directly asked – thought it important to know where the vegetables were produced in order to avoid contaminated produce. When asked if they would buy wastewater-irrigated vegetables if they had a choice, 75 to 96% answered negatively. Like sellers, consumers mentioned the risk of contracting diseases as the reason why they would not buy wastewater-irrigated vegetables. Others, however, thought that wastewater-irrigated vegetables could be cleaned adequately to remove any disease-causing organism. Consumers' reactions as to what they would do in a scenario where all vegetables on urban markets were grown with wastewater were analyzed too. Nearly 40% of the respondents in Tamale said they would clean

vegetables adequately and use them instead of avoiding them. At least 30% would either cultivate vegetables themselves or buy from rural areas. Between 60 and 80% of the respondents in Accra and Kumasi pointed out that they would prefer to stop buying vegetables from the market, though they could not say where they would go for safer produce. About 20 to 40% mentioned that they would adequately clean such vegetables.

However, these answers have to be taken with caution as knowledge about a problem does not automatically translate into a change of behavior. So far risk awareness is more ‘dormant’ and the crop quality criteria discussed between traders and customers only concern crop size, weight and clean (neat) appearance.

### Cleaning of Vegetables

Cleaning vegetables at home and in street food kitchens is common. In a survey reported by Amoah et al. (2007a) over 90% of the consumers in Kumasi, Tamale and Accra said that they washed purchased vegetables at home, using a variety of methods (Table 10.4). However, tests in the laboratory showed that the common washing practices are not very effective in view of microbiological threats and require adjustments (see chapter 14).

**TABLE 10.4.** Common methods used by consumers to clean vegetables (Amoah et al. 2007a).

Cleaning method	% Respondents		
	Accra	Kumasi	Tamale
Washing with warm water in a bowl	55	53	51
Washing with salty water in a bowl	34	34	14
Washing with salty water and vinegar or potassium permanganate in a bowl	6	11	10
Washing with water and vinegar in a bowl	4	1	2
Washing twice with tap water or with water in a bowl	1	1	23

### 10.5 Perceptions of City Officials

Generally, the existence of agriculture in Ghanaian cities is recognized as there are bylaws regulating the types and number of crops and animals that can be cultivated or raised (AMA 1995, pp. 171-202). Though the bylaws do not specifically promote urban farming, they do recognize (the possibility of) its existence and seek to control it in order to maintain good sanitary conditions in the city (see chapter 15). Moreover, both the national and local

governments (district assemblies) have shown their recognition of urban open-space farming in two ways:

- Under the decentralization policy of the Ministry of Food and Agriculture, a Food and Agriculture Directorate for Accra District was established, which is responsible for agriculture and marketing within the city boundaries. The Directorate has its own extension staff responsible for open-space farming.
- Throughout the country, top district, regional and national farmers are annually rewarded (Figure 10.1), including those at the metropolitan level labelled as the ‘Best Urban Farmer’ or ‘Best Metro Farmer’ (Annang and Drechsel 2005).

However, as the following chapter and many other studies have pointed out for West Africa, and Ghana in particular, official recognition of urban agriculture is not reflected in city planning and development (Obosu-Mensah 1999; Drechsel et al. 2006). The planning of many Ghanaian cities is based on a master plan concept dating back to colonial administrators, which does not consider the category of urban farming, although the practice of inner-urban vegetable production probably started with the construction of the first European forts and castles in the sixteenth century (Anyane 1963).



Figure 10.1: Martin Kumah of Ghana during the award ceremony on National Farmers’ Day, 2004. In 1998, Martin Kumah was the Best Urban Farmer (Kumasi), in 1999, the Best Regional Aquaculture Farmer (Ashanti Region) and in 2002, the Best National Aquaculture Farmer. In 2004, he received the award for the first runner up in the most prestigious ‘Best National Farmer’ contest (Annang and Drechsel 2005; photo: courtesy M. Kumah).



As one of the Resource Centres on Urban Agriculture and Food Security (RUAF), for many years IWMI has facilitated (with the support of local and national partners) a policy dialogue<sup>3</sup> on urban agriculture in Accra (Amerasinghe et al. 2013). The work showed that officials interviewed in all major cities in Ghana usually acknowledge the importance of urban agriculture in providing food and jobs for unemployed urban dwellers or its contribution to preventing encroachment (housing, trade) on both government and private lands. Authorities also believe that vegetable production in and around Ghanaian cities contributes to the supply of vegetables, which improves the nutritional level of urban diets. However, in all cities, concerns were expressed that without proper monitoring open-space vegetable farming in particular can compromise the health of city dwellers. Most officials complained about possible crop contamination from two sources: untreated wastewater and inappropriate use of agrochemicals. Thus, although urban farming is increasingly recognized as an activity, it is not without questions, and also not among priority urban issues such as water supply, sanitation and waste management.

### 10.6 Perceptions of the Government

In Ghana and Nigeria, urban [back yard] gardening was indirectly encouraged in the 1970s through programs like ‘Operation Feed Yourself’ and ‘Feed the Nation’, launched by respective governments. Despite several projects funded in the meantime, for example, by the Food and Agriculture Organization of the United Nations (FAO), the Department for International Development (DfID, UK), The Directorate General for International Cooperation of the Netherlands (DGIS) and The International Development Research Centre (IDRC) on urban food supply, the peri-urban interface and so forth, urban farming did not receive much political attention. A noteworthy milestone was the national policy seminar on ‘Urban and Peri-urban Agriculture’ organized in 2005 by RUAF as a follow up to a corresponding Multi-stakeholders Forum. The policy seminar was co-organized by the Ministry of Food and Agriculture (MoFA), the Science and Technology Policy Research Institute of the Council for Scientific and Industrial Research (STEPRI-CSIR), FAO and IWMI. The Honorable Clement Eledi, Deputy Minister of Food and Agriculture at that time, commented during the seminar that urban and peri-urban agriculture is a reality that has come to stay contributing to household income and poverty reduction. However, it also requires

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<sup>3</sup> A challenge is that after any election with a change of the leading political party and its public sector representatives, the dialogue has to start again unless the topic is acknowledged in long-term plans and strategies.

strong leadership at both the local and national levels. The Minister promised that MoFA will ensure the provision of safe water for urban farmers and from 2006 on, MoFA would give an award to the *national* best urban and peri-urban farmer during the annual 'Farmers Day' celebrations. The seminar closed with a joint statement on urban and peri-urban agriculture, reproduced in Box 10.2.

**BOX 10.1. Statements of the Vision on Urban and Peri-urban Agriculture (UPA) in Accra**

- UPA plays an important complementary role to rural agriculture in contributing to food security, employment and income generation, especially for the urban poor.
- While contributing to livelihoods and food security, it is recognized that UPA faces numerous challenges and constraints such as limited availability of land, access to safe water and other production resources, and market constraints.
- There is the need to overcome current and emerging challenges facing UPA by coordinating all stakeholders, streamlining its operations and creating an enabling environment for its sustainability
- As urban population soars, the role of UPA in supplying perishable food to cities of Africa becomes increasingly important and needs a supportive policy and legislative framework.
- Overcoming the challenge calls for the recognition of UPA in the sector ministries and agencies and for policies to effectively integrate UPA in urban planning and development.

**Statement of Consensus**

We call for the promotion of a shared vision on UPA that takes into account the specific needs and conditions in the country and urge Policy makers, in partnership with Development Partners, to develop gender sensitive policies and appropriate instruments that will create an enabling environment for integrating and supporting UPA into our economies.

Endorsed on 13. 12. 2005 by the participants in the presence of Honourable Clement Eledi, Deputy Minister of Food and Agriculture.

A prominent example of the recognition of irrigated urban agriculture is Ghana's National Irrigation Policy which covers also the informal irrigation sector, including irrigated urban and peri-urban agriculture (see chapter 15). The importance of the informal irrigation sector is highlighted by the case of peri-urban Kumasi with about 12,000 hectares (ha) are under informal dry-season vegetable production which is twice the area under formal irrigation in the whole of Ghana (Cornish and Lawrence 2001).

## 10.7 Perceptions and Role of the Media

Like in other low-income countries, public services in Ghana are constrained by a variety of factors and remain far behind targets. In this situation, some media feel the obligation to point at problems the authorities should address. These 'appeals' are powerful instruments as they

steer public perceptions of problems. Consequently, authorities give them, whenever possible, priority attention. Sanitation and waste are ‘hot’ issues in Ghana, like other African countries, and are an easy target for the media. Due to the use of polluted drain water, irrigated urban vegetable production is frequently featured on TV and in the printed media (Figure 10.2).



FIGURE 10.2. Irrigated urban agriculture in the press in 2002 to 2005 (Ghana’s Daily Graphic).

Figure 10.2 shows the tension under which urban farmers have to operate in Accra and the pressure on the authorities. Although some journalists and media focus solely on problems, others looking for constructive solutions are on the rise. They could become crucial stakeholders in sustaining risk-reduction programs. They could assist authorities and consumers in giving public attention to, for example, farmers using safer irrigation practices while putting pressure on those not using them.

## 10.8 Conclusions

Urban irrigated vegetable farming in open spaces in Ghana is confronted with numerous constraints such as marketing, lack of input, low-quality water, limited credit/capital access, crop disease, low soil fertility and crop theft. Of these constraints, farmers identified and ranked lack of input, water access, crop disease and marketing, as the most important.

Farmers mentioned the importance of their water sources for continuous irrigation and income, but they do not wish to be openly associated with low water quality, owing to the media and some public criticisms, out of fear that such an association may possibly influence the sale of their produce and livelihoods. They do not seem unduly concerned about water contact-related health consequences and also do not appear to believe in other problems, given that according to many of them, they have rarely received complaints about the quality of vegetables they produce. In fact, although vegetable sellers and consumers are generally concerned about the quality of the food they sell or buy, their criteria of quality do not include invisible risks like pathogen contamination.

City officials generally recognized urban farming, but remain concerned about the irrigation water quality. Ghana's media nurtures these concerns. Though authorities oppose the use of unsafe water, alternatives are missing and to date they tolerate the practice, while expecting that one day the activity will be a planned and regulated so as not to compromise the health and well-being of city dwellers. Efforts to provide safer well water remained in many cases unsuccessful due to water salinity, the costs of drilling or tenure issues.

The levels of risk awareness shown by various stakeholders indicate that there is some degree of reflection about the practice, likely supported by media and also research attention. This is encouraging as educational campaigns could build on the interest of consumers, for example, to clean vegetables at home. However, large parts of the population lack an appropriate education to understand the risk and its pathways. The risk awareness of those with better education is probably 'dormant' and thus does not (yet) affect their decision making during vegetable purchase, probably for two reasons:

- The specific risk factor might not have priority (as other risk factors take attention, or as it is believed that the risk is under control);
- Health is in general a neglected incentive, as consumption habits generally show.

However, at least farmers appear to be increasingly interested in practical innovations for risk reduction and are ready to invest in them, but more to avoid pressure from the authorities and the media than based on risk perception.