

**Report of the
SECOND CONSULTATIVE WORKSHOP ON THE WHO/IDRC PROJECT
“NON-TREATMENT OPTIONS FOR SAFE WASTEWATER USE IN POOR
URBAN COMMUNITIES”**



Dakar, Senegal
26-29 November 2007



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The workshop was organized jointly by the World Health Organization and the International Development Research Centre (IDRC) in collaboration with the Food and Agriculture Organization of the United Nations. Local arrangements were made by the WHO Country Office in Senegal, in consultation with the project team of ENDA-RUP.



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EXECUTIVE SUMMARY

The second consultative workshop on the WHO/IDRC project “Non-treatment options for safe wastewater use in poor urban communities” was held in Dakar, Senegal, from 26 to 29 November 2007. The workshop was attended by nine members of the four project teams (i.e. two team members each from Jordan, Ghana/Kumasi and Ghana/Tamale and three team members from Senegal), three of the four members of the project’s Scientific and Technical Advisory Committee plus one co-opted member, Secretariat members from WHO and IDRC, and a number of observers.

Following were the workshop objectives:

1. to review progress in the individual country projects. These include:
 - Ghana Kumasi: Evaluation of non-treatment options for maximizing public health benefits of WHO guidelines governing the use of wastewater in urban vegetable production in Ghana.
 - Ghana/Tamale: Minimizing health risks from using excreta and grey water by poor urban and peri-urban farmers in the Tamale municipality, Ghana.
 - Jordan: Safe use of greywater for agriculture in Jerash Refugee Camp : focus on technical, institutional and managerial aspects of non-treatment options.
 - Senegal: Proposition d’étude en vue de l’intégration et de l’application des normes de la réutilisation des eaux usées et excréta dans l’agriculture.
2. to formulate detailed protocols for the second and final phase of the country projects;
3. to agree on an institutional evaluation exercise;
4. to develop the outline of the final guidance document and to agree on a time frame for its production

The workshop reviewed the progress reports received from the four teams and discussed their contents. Topics of discussion included methodology, study design, coherence between the four country projects, boundaries in terms of scope, and the interface with activities going on in parallel. While the progress reports met with different levels of approval by the STAC members, all were judged adequate and it was recommended that they should be updated, taking on board the comments and observations made at the workshop, and formally submitted to WHO as final reports of the first phase.

A one-day field visit to the project site near Dakar (the community of Pikine) gave all participants an opportunity for direct observations of the work of the Senegal team; in addition, the marketplace, the University Cheikh Anta Diop and a sanitation project in Yoff were visited.

The country teams prepared their updated protocols for the second phase, which were discussed on the last day of the workshop. It was agreed that the protocols would be completed during the month of December 2007 and submitted to WHO for final approval early January 2008.

Final discussions focused on the expected outputs of the project, in particular the guidance document and a number of articles for the peer-reviewed literature, on the need to develop a number of fact sheets and policy briefs for specific target audiences, on the possibility to organize a seminar during World Water Week in Stockholm in August 2008 and on capacity building options through training of technicians and participation of students.

The Scientific and Technical Advisory Committee met separately, and discussed broader technical issues related to the projects, and the role of STAC members during the second phase.

The third and final workshop will be held in Amman, Jordan, in March 2009.



1. INTRODUCTION

Recognizing the challenges resulting from the introduction of the third edition of the WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater in Agriculture and Aquaculture, the International Development Research Centre (IDRC), Ottawa, Canada approached the World Health Organization in 2005 with the suggestion to test, jointly, the opportunities and constraints associated with the Guidelines' implementation by national authorities, with the ultimate goal of documenting these experiences and publishing practical guidance on their effective application.

In November 2006, just prior to the first workshop, the Food and Agriculture Organization of the United Nations joined WHO and IDRC in this initiative.

The objectives, as defined in the final WHO/FAO/IDRC project document are:

- To identify economically, technically and socially appropriate non-treatment options for health protection such as crop restriction, wastewater, excreta and grey water application techniques that reduce levels of exposure to hazards and exposure control measures such as the use of personal protective equipment, hygiene education, food safety measures etc as promoted by the WHO guidelines.
- To study the feasibility and potential effectiveness of the non-treatment health protection measures in reducing the disease burden associated with the use of wastewater, excreta and greywater.
- To increase awareness of the guidelines in the international development community and among national governments.
- To synthesize research findings into a joint WHO/IDRC document that will help low-income countries adapt the WHO guidelines for effective application in their own unique circumstances.

It was agreed to focus the research on poor urban communities in West Africa and in the Middle East/North Africa (the WHO African and Eastern Mediterranean regions), where wastewater use in agriculture is an existing and expanding practice.

A four-member Scientific and Technical Advisory Committee was established. Its Terms of Reference are presented in the report of the first consultative workshop (Accra, 4-7 December 2006). In consultation with the STAC members, a shortlist of five country proposals was prepared. Based on a final selection, using agreed criteria, four proposals were considered eligible for support, on the understanding that the one was supported by FAO (the Ghana Kumasi project) and the other three by WHO/IDRC:

- Ghana Kumasi: Evaluation of non-treatment options for maximizing public health benefits of WHO guidelines governing the use of wastewater in urban vegetable production in Ghana.
- Ghana/Tamale: Minimizing health risks from using excreta and grey water by poor urban and peri-urban farmers in the Tamale municipality, Ghana.
- Jordan: Safe use of greywater for agriculture in Jerash Refugee Camp: focus on technical, institutional and managerial aspects of non-treatment options.
- Senegal: Proposition d'étude en vue de l'intégration et de l'application des normes de la réutilisation des eaux usées et excréta dans l'agriculture.

These proposals were the main subject of discussions at the first consultative workshop, where detailed protocols were finalized and valuable exchanges took place between the teams, aimed at ensuring a harmonized and complimentary approach in the various settings.

All projects got underway in the first half of 2007, be it that for administrative reasons there were delays in their start-up. This had further repercussions for the project schedules, particularly in locations where agricultural activities using wastewater are of a seasonal nature. Heavy rainfall in Ghana in September 2007 also was a disruptive factor affecting the schedule of projects in that country.

In accordance with the agreements between IDRC, WHO and FAO a second consultative workshop of the project team members, the STAC members and the three support agencies was conceived with the following objectives:

1. to review progress in the individual country projects (Ghana (2x), Jordan, Senegal)
2. to formulate detailed protocols for the second and final phase of the country projects
3. to agree on an institutional evaluation exercise
4. to develop the outline of the final guidance document and to agree on a timeframe for its production

The expected outputs of the workshop were:

- A report of the workshop proceedings and outcomes
- Detailed protocols with a realistic schedule for the second and final phase of the projects
- A programme of evaluation activities
- An outline of the final guidance document
- A work plan for the formulation of the final guidance document



2. WORKSHOP PROCEEDINGS

The workshop was held at the N'gor Diarama Hotel in Dakar, Senegal from 26 to 29 November 2007. It was attended by nine team members of the four project teams (i.e. two team members each from Jordan, Ghana/Kumasi and Ghana/Tamale and three team members from Senegal), three of the four members of the project's Scientific and Technical Advisory Committee, plus one co-opted member, Secretariat members from WHO and IDRC, and a number of observers.

The workshop programme is presented in Annex 1 and the list of participants can be found in Annex 2.

The workshop's programme had to be adapted because the two Ghanaian teams and one of the STAC members had met with delays in their travel to Dakar and could only arrive on Monday evening. Therefore, the official opening and the STAC meeting were postponed to Tuesday, and the participants present proceeded with the review of the progress reports of the teams from Jordan and Senegal on Monday afternoon.

The revisions made in the programme are reflected in Annex 1. The structure of this report follows the agenda rather than the chronological order in which agenda items were covered.

2.1 Opening

2.1.1 Opening statements WHO and IDRC

Opening statements were made by Dr Filipe, WHO Representative in Senegal and by Dr Giles Forget, Director of the IDRC Regional Office for West and Central Africa.

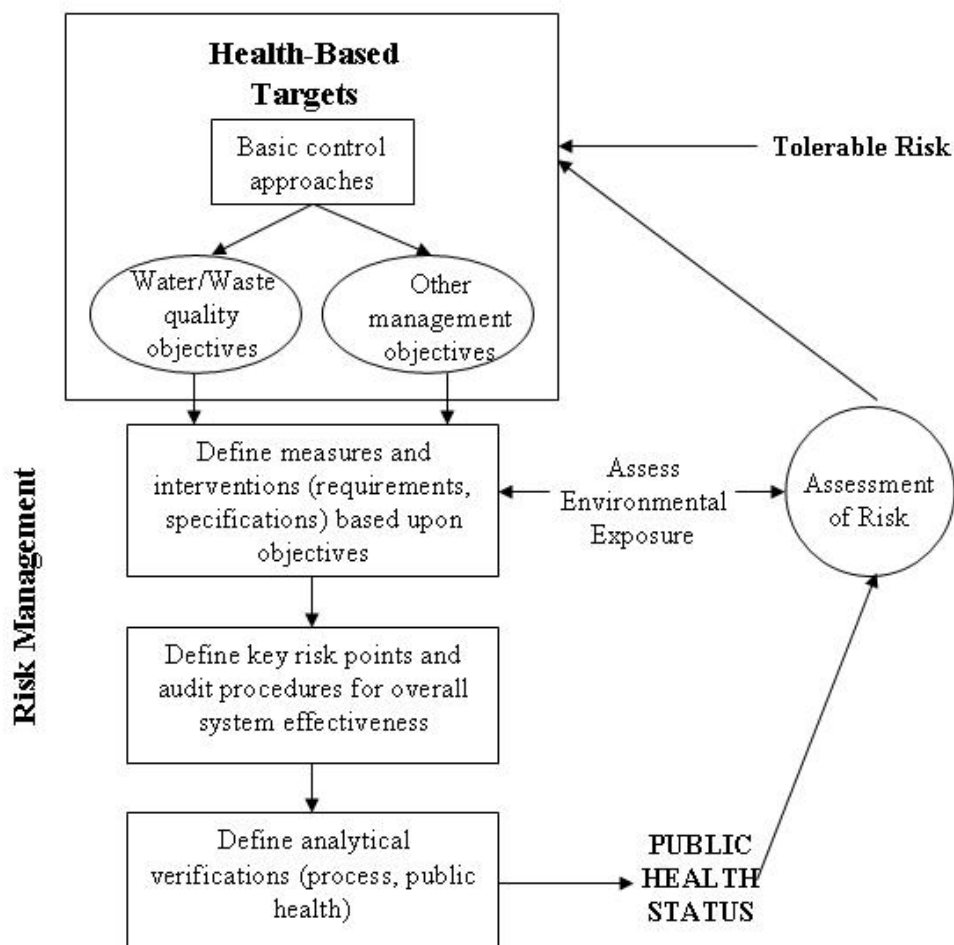
Dr Filipe referred to the six items of the agenda of the new WHO Director-General, Dr Margaret Chan. He linked the on-going research activity specifically to three of the items: Health in Development (since wastewater use in agriculture was a growing activity associated with expanding urban areas), Health Security (the WHO Guidelines' approach aims at enhancing health security for vulnerable groups in peri-urban areas) and Evidence for Health Policy (the outcome of the research will add to our knowledgebase on which the health, environmental and agriculture sectors can base improved policies, reflecting the value of wastewater as a resource and the need for an effective risk assessment/management approach to protect farmers, their family members, market retailers and consumers. He also recalled the Millennium Development Goals, in particular MDGs 1 and 7: Goal 1: Eradicate extreme poverty and hunger and Goal 7: Ensure environmental sustainability.

Dr Forget told the participants of IDRC's involvement in development research in this part of Africa since the 1970s, when the Regional Office was established. This research had gone through various phases, yielding results that had contributed to improvements in the lives and livelihoods of the poor and vulnerable. In its research programmes, IDRC strived for

a balance between technical issues and social concerns. The on-going project was an excellent example of the focus on integration and intersectoral action, such as also reflected in IDRC's programme on EcoHealth. Marginal quality water was a pillar of urban farmer livelihoods, and its importance had been on the increase in a significant way. Most governments in the West-African region had banned wastewater use, but such bans had had little effect. The process of risk assessment and management, proposed by the WHO Guidelines, was the key. IDRC looked forward to the outcome of the second phase of the project.

2.1.2 Overview of events since December 2006

Robert Bos reminded the participants of the overall objectives of the project and of the specific objectives and expected outputs of this second workshop. He recalled specifically the Stockholm Framework for water quality, which had distinct parts for risk assessment and risk management, like the project.



Next, he presented an overview of progress made and events that had taken place since the December 2006 workshop. These included the following:

- The report of the Accra workshop had been published and distributed in February 2007.
- Final protocols for the first phase of the country projects had been received from the teams by mid-January and had subsequently been approved – the Jordan protocol had been slightly delayed as it awaited a consultation by Professor Stenström.

- The transfer of funds to support the first phase had been effected through the WHO Regional Offices – the African Regional Office for the Ghana Tamale and the Senegal projects, the Centre for Environmental Health Activities under the Regional Office for the Eastern Mediterranean for the Jordan project. The Jordan project had been launched formally with attendance of the event by a member of the Jordanian Royal Family.
- Volume 1 of the Guidelines had been published in April 2007, completing the set of four volumes. The Guidelines had been given wide distribution and were available as priced publications from WHO.
- A Letter of agreement with FAO had been established – the process had taken from March to October 2007.
- Additional funds had been requested from IDRC for the additional joint costs (workshop attendance by the fourth team and other elements) incurred by FAO joining the project, and for an institutional evaluation component. These funds had been obtained and would be added to the overall project budget. Rather than an evaluation component, IDRC now considered activities to further harmonization and coherence between the country activities an important target for these additional funds.
- In August 2007, Professor Robert Abaidoo (KNUST, Kumasi, Ghana) participated in the Stockholm World Water Week. He presented a paper on the Ghana experience in wastewater use in a Seminar on sanitation, and he also actively participated in the UN Water session on the International Year of Sanitation 2008.
- WHO had taken care of the preparation of the second workshop and arrangements for progress reporting. Feed back from the participants indicated that the proposed format for the progress report had been useful, but that it should have asked specifically for the methodologies applied.
- WHO had participated in the IWA Specialist Conference on wastewater recycling and re-use, Antwerp 8-12 September 2007. Together with IDRC it has presented a paper at the session organized by Professor Shuval and a discussion session on follow up to the Guidelines had also been organized.
- Financial support had been mobilized for the Guidelines' translation into French. The support was coming from IDRC, CTA (Wageningen, the Netherlands) and WHO.

2.2. Review of the progress reports

This section contains the summary progress reports that were presented at the workshop, complemented by further details taken from the full reports that were submitted by the teams two weeks prior to the workshop. These reports are available from the Water, Sanitation and health Unit in WHO Geneva or from IDRC Canada. The summaries presented here are followed by the main points made in the ensuing discussions at the workshop.

2.2.1 Ghana – Kumasi: Evaluation of non-treatment options for maximizing public health benefits of WHO guidelines governing the use of wastewater in urban vegetable production in Ghana

For the period under review, the main activities of the Ghana Kumasi team included:

- Field implementation and demonstrations
- Assessment of perceptions and adoption of key stakeholder groups
- Assessments of economic, financial, health impact, social-cultural and legal feasibilities
- Creation of a platform to effect institutional change
- Assessment of institutional capacity needs

Launch workshop

The activities had only gotten underway by mid-April 2007. A launch workshop was held at the University in Kumasi from 16-18 April 2007, where, in addition to high-level University staff, the FAO, CPWF and Ministry of Food and Agriculture had been in attendance. This had been held together with the Ghana Tamale team.



The following topics had been covered by the workshop: Dissemination and scaling issues, quantification of interventions, economic aspects, observable gaps, and monitoring and evaluation tools. At the end of the workshop detailed work plans with specific milestones had been produced.

Other suggested actions included the establishment of a Steering committee at the national level, the addition of more stakeholder organizations and the institutionalization and mainstreaming of the WHO Guidelines.

Farmer Field Schools

Production of a field Guide on “Food safety and personal hygiene” was started in the context of conducting farmer demonstrations. The process adopted consists of the following components: ground working and baseline survey, curriculum development workshop and training of facilitators, participatory planning of Farmer Field School (FFS) activities and trials, establishment of a monitoring and evaluation system, and the establishment and running of FFS for experimental learning.

The Farmer Field School approach in Ghana addresses a range of issues: the safe use of pesticides, the appropriate use of organic and inorganic fertilizer, entrepreneurship, the application of non-treatment options for the safe use of wastewater, and improved personal hygiene. For each issue an FFS module is developed in accordance with a standard format, including an introduction, learning objectives, detailed contents, supportive exercises and field activities, case studies and cross-cutting issues.

For the modules on non-treatment options for the safe use of wastewater a schedule with the following milestones has been agreed: presentation of the detailed outlines at the Dakar workshop (week of 26 November 2007), submission of draft modules (15 December 2007) and writeshop/modules review (week of 15 January 2008).

Institutional and policy review

A review of institutional arrangements and relevant policies aimed to identify constraints and opportunities with respect to safe wastewater use at the level of governance, and to assess the implications for the wide application of the third edition of the WHO Guidelines.

The review identified institutional stakeholders of relevance and guiding legislative documents, and it carried out a survey of stakeholders and legislation. The scope of this

exercise was defined by urban agriculture, water and sanitation, and farming and food safety. Ninety legislative documents were reviewed, originating from the national archives, the IWMI/RUAF library and other relevant institutions and authorities, or abstracted from literature review, institutional web pages and expert consultation.

This review found that legal provisions are scattered over several unrelated documents, and that institutional responsibilities are fragmented over different ministries and over different administrative levels (from national to local). They contain few direct references to the WHO Guidelines, but the majority link indirectly to them.

The government ministries with a stake in issues related to the Guidelines are Food and Agriculture (MoFA), Trade and Industry (MoTI), Health (MoH), Local Government, Rural Development and Environment (MoLGRDE), Tourism and Diasporean Relations (MoTDR) and Water Resources, Works and Housing (MoWRWH). Statutory and regulatory bodies with authority in relevant areas include the Ghana Food and Drugs Board, the Ghana Health Service, the Environmental Protection Agency, the Ghana Tourist Board and the Ghana Standards Board.

Of the 90 bye-laws, policies, regulations and strategy documents identified by the policy analysis, fifteen concern wastewater for agricultural production and or street food safety, and two directly address irrigation using wastewater. Recent policies progressively support the procedures and methods proposed by the WHO Guidelines, The national irrigation policy acknowledges the need to support best practice for the safe use of marginal quality water, it aims to promote access to safe groundwater or safer irrigation practices, it wants to encourage research on safe irrigation practices for irrigated urban and peri-urban agriculture and it supports the dissemination of relevant information in collaboration with the extension services.

With this review and analysis completed, next steps will include engaging national institutions and authorities towards the establishment of a national platform to (1) identify opportunities for and constraints to enhancing institutional capacity; (2) create regulatory frameworks; and, (3) incorporate reference to the third edition of the WHO Guidelines in existing regulations, policy instruments and bye laws.

Research by graduate students

Research projects by five graduate students cover several relevant research questions, as presented below:

- ◆ Measuring the effectiveness of different combinations of non-treatment options, with a focus on:
 - Contribution of various handling processes to the reduction of microbiological risks
 - Effectiveness of a combination on-farm non-treatment methods to reduce microbiological risks
 - Effectiveness of using de-contamination solutions to reduce microbiological risks
 - Assessment of the cumulative reduction of microbiological risks

- ◆ Estimating consumers' willingness to pay for safer vegetables reflecting the additional costs of safeguards and risk reduction measures:
 - Assess consumers' health concerns about vegetable consumption
 - Assess consumers' opinion about the level in the food chain where vegetables get contaminated
 - Analyse consumers' willingness to pay for safer vegetables
 - Assess the relationship between consumers WTP and the consumers' demography

- ◆ Analysing the determinants of adoption of non-treatment risk management options:
 - Analyse factors affecting the adoption of each non-treatment option
 - Assess perceptions of farmers, market traders and food vendors
 - Evaluate the financial viability of each option at farm and market level.
- ◆ Studying the links between adoption and the agro-ecological environment and social system, considering economic, demographic, educational (experience, extension visits), social (frequency of usage by other people, community awareness, societal restrictions and criticisms on the use of wastewater) and risk perception parameters.
- ◆ Studying the financial viability of the adoption of measures, using as analytical tools: net present value, internal rate of return and pay-back method and return on investment.

Participation in international conferences

Team member J.A. Bakang participated in the IWA specialist conference on *Moving Forward Wastewater Biosolids Sustainability: Technical, Managerial and Public Synergy* (Moncton, New Brunswick, Canada, 24-27 June 2007).

Team leader Robert Abaidoo participated in the World Water Week Conference (Stockholm, 11-18 August 2007), in two specific events: a Seminar on *Sanitation and Hygiene: approaches for sustainable development*, and a Seminar on the *Preparation of a Final Action Plan for the International Year of Sanitation (IYS) 2008*.

Team member Philip Amoah attended a joint FAO/WHO initiation meeting on *Microbial Hazards in Fresh Produce* (Rome, 19-21 September 2007) where he presented an overview of recent work on microbial contamination of fresh fruits and vegetables in Ghana and the role of water as a source of contamination.

In conclusion

The analysis of constraints and unforeseen opportunities showed that the policy analysis work had created an opportunity to harmonize and update the policy and institutional framework, and to this end a platform had been created for further action and monitoring. It had also become clear that there were further opportunities for epidemiological studies and QMRAs.

Constraints had been managerial: delays in funds becoming available and an under-estimation of the financial commitment involved in the programme of activities.

A key achievement had been the increased awareness in the Ministry of Food and Agriculture, which had led to a commitment to intensify efforts to provide more boreholes in urban farm settings. Other relevant institutions and authorities had similarly been sensitized. The FFS modules will support capacity building among farmers, about concepts and principles as well as about good agricultural management practices.

Outstanding research questions will be addressed by the group of graduate students. In the process, research capacity in this area will also be strengthened.

Links were established with new partners, such as the Women in Agricultural Development Directorate, while existing links with IWMI, FOA and WHO were strengthened. The multi-disciplinarity of the project had come to expression through the enhanced project personnel capacity to package project results as tools adaptable by primary stakeholders and the institutions, through the new platform for the many institutions and statutory bodies, through the development and use of common messages for dissemination, through the improvement in interactions across project personnel and through the sharing of expertise between professionals of different disciplinary backgrounds.

2.2.2 Ghana - Tamale: Minimizing health risks from using excreta and grey water by poor urban and peri-urban farmers in the Tamale municipality, Ghana.

Tamale is the largest urban center in Northern Ghana with a population of over 300,000 with nearly 80 % living below the poverty line. Although annual rainfall is around 1000 mm, there are 7-8 dry months when farmers have to resort to wastewater for vegetable irrigation as there is no perennial stream passing through Tamale and the groundwater table is low.

About 40% of the vegetable farmers are farming all year round, 52% depend on polluted water sources. Limited water resources of the Municipality and their poor quality have been described in several studies. The total area under irrigation is about 33-40 ha in urban Tamale and 70 ha in the urban fringe. Most vegetables are produced for the market. Farmers are only consumers where indigenous vegetables are grown, as exotic vegetables are not part of their traditional diet.

Fecal sludge serves as an alternative source of nutrients to many cereal producers, as the cost of chemical fertilizer is more than they can afford. The practice of using raw fecal sludge for peri-urban crop production has been established in the study area for more than 25 years.

Application of both waste water (WW) and fecal sludge (FS) by farmers is usually carried out without any accompanying protective measures and therefore results in high contamination levels of the farm produce and also poses serious health risk to both farmers and consumers.

Project targets

The project aims to test non-treatment options for the reduction of farmers' health risks and to analyze their adoption drivers and constraints at the farm and institutional level. It also aims to increase awareness of farmers, city authorities, relevant groups and agencies, as well as other stakeholders on the necessity of such measures and its framework as provided by the third addition of the WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater (2006).

Objectives

The main objective of the study is to achieve safe, cost-effective and productive use of wastewater and fecal sludge in agriculture in urban and peri-urban areas of Tamale, through testing the new WHO Guidelines, and in view of the WHO-IDRC project objectives 1, 3 and 5:

- (1) Analyze the existing situation with respect to use of wastewater and excreta in view of associated health issues.
- (3) Identify and test economically feasible, technically sound and socially acceptable non-treatment options for health protection as proposed in the WHO guidelines, and
- (5) Explore and implement effective health promotion activities related to WHO Guidelines' procedures and explore their potential of institutionalization.

Project sites

Of the three fecal sludge project sites, Kpalisi/Dimali is considered a mixed community. The source of water for drinking/domestic use is treated water, but most farmers at Kpalisi are applying FS, whereas farmers in Dimali (control) do not apply FS on their farms. Sagnarigu/Dungu is considered a sole FS farming community since all the farmers use FS on their farms. The main source of drinking water is untreated surface water (Dugout). Mbanayilli is considered a control community since no farmer applies FS. The water source for drinking and other domestic activities is treated water.

Two of the three wastewater project sites (Gumbihini 1, water source: open drain; Sangani, water source open well) use wastewater to grow cabbage and lettuce. The third one, Gumbihini 2 serves as a control and uses treated wastewater from municipal supplies.



The composition of the population in the fecal sludge study sites is presented in the table that follows.

Community	Total Population		Number of houses/ compounds	Total number of farmers	
	Male	Female		Male	Female
Kpalisi	356	452	154	265	15
Dimali	195	357	101	110	95
Mbanaayili	1405	1613	113	1720	87
Sagnarigu Dungu	958	1158	325	958	358

Activities

- ◆ Sensitization meetings in July 2007.

Two-day on-farm sensitization meetings were organized for farmers using both waste and clean water

Purpose of the sensitization meetings was to:

- Create awareness of the farmers on the testing of WHO Guidelines on their sites and how they stand to benefit from the project.
- Solicit for their willingness to participate in the various aspect of the project (socio-economic survey, health monitoring and the on-farm testing of health reduction measures

Socio-economic survey and health monitoring (August 2007)

Community	General HH Questionnaire	Waste Water	Clean Water
Sagani	10	10	-
Gumbehini 1	10	10	-
Gumbehini 2	10	-	10
Total	30	20	10

◆ Establishment of an information base

Before setting up experiments for on-farm testing of risk reduction measures, health conditions of identified farmers using both waste water and fecal sludge were checked with respect to excreta- and wastewater-related diseases.

Data entry was completed by nine undergraduate students for over 600 FS and WW farmers and went through an editing process. The analysis of risk factors is on-going.

◆ On-farm testing of risk reduction measures (September 2007)

Options selected for wastewater irrigation risk reduction:

- Testing appropriate drip irrigation fitted with filter beds (sand and stones)
- Encouraging use of watering cans with rose covered with net to filter waste
- Avoid overhead application
- Wastewater non-treatment options
- Ten (10) farmers were selected at each of the two sites for the experiment.
- Six (6) farmers from both sites are using a locally manufactured drip irrigation system with sand and granite filter beds.
- Another six (6) farmers from both sites apply water using watering cans fitted with mosquito net for filtering water.
- The remaining eight (8) farmers from both sites apply water with watering cans without any filtration.

◆ On-farm testing of reduction measures: FS farmers (November 2007)

Due to the recent floods in Northern Ghana the fecal sludge farmers started their work relatively late, with further delays due to the month of Ramadan (most of farmers are Moslems), when no work was on-going on the farms. Waiting time was used for completion of entries into the database.

FS farmers

Selected farmers (30) have been tested for stool parasites and on-site application of non-treatment options is currently in progress. Options considered for FS spreading on farms are: use of protective clothing (booths, gloves and nose mask); avoid participation of children/women in spreading of FS on farms

Water and soil quality sampling

At Sangani, water and soil samples were taken on 6 October to analyse for bacterial contamination (*E. coli*), while on 29 October water and soil samples were collected at Gumbehini. The analyses are still in progress, but preliminary results are available.

Capacity building students and staff

Currently, there are about nine undergraduate students from agriculture as well as human nutrition working on the project from UDS as well as a post-graduate student from Norway, Mr. Razak Seidu.

Two young lecturers from UDS are developing their research capacity through work on the health and agricultural aspects of the project, while Mr F. Dittoh from IT unit, UDS, also participated in the development of the database.

Staff of IWMI, (especially Mr. P. Amoah and Ms. T Shuetz) are also actively involved in the activities of the project and have participated in site selection and development of protocols, M&E framework development etc., to date. Staff of Ministry of Food and Agriculture, Tamale Metropolis has participated in every activity carried out so far.

The Ministry of Health is also engaged in the project work, through testing of the stool samples and sensitisation of the participating farmers, while Environmental Health Unit of the MLGRDE is responsible for water analysis.

Farmers

All farmers encompassed by the project are poor and have but a few resources at their disposal, hence their interest in use of WW and FS. Through regular meetings project has made a great progress towards recognition of the groups of marginalised farmers, such as WW and FS users by the Govt. agencies of MoFA, EPA (MLGRDE), as well as other relevant bodies in the Municipality.

Work on the sites has also been combined with sensitization workshops, where problems are shared and discussed, leading to capacity building. Further work will entail open-days on the field to demonstrate to other farmers potentials of the newly introduced methods, as well as dangers from non-safe practices. MoFA in Tamale has already prepared budgets as well as an implementation schedule. It will be a major player in organisation of these events.

Multidisciplinarity

Very diverse stakeholders are involved in the project, originating from Govt. Ministries (MoFA, MLGRDE), different Faculties (SMHS, FoA, University of Norway) Research institutions (IWMI), as well as different groups of farmers (WW, FS). They all have been able to work successfully together on relevant project activities due to mutual interest in improving conditions under which WW and FS are used in the municipality.

This variety of stakeholders will be even wider in the next period, when NGO networks such as URBANET are to come on board and share project experiences and findings among other interested farmers within their network. Multidisciplinarity is viewed as one of the greatest assets of the project.

A joint workshop was held in Kumasi (March 2007) in collaboration with a project implemented by the team from KNUST-FAO and led by Professor Abaidoo. A press release was prepared to announce the start of the work and sensitize stakeholders for both projects, while a detailed plan for national policy review and institutionalization was also developed and incorporated into the Milestone plans, which are currently being implemented.

A further opportunity for updating of these plans was used during recent meetings (4-6 October) between the two projects and stakeholders from the Environmental Protection Agency, Irrigation Development Authority, Local Government and farmers. These meetings/workshops were used to: work on the FFS manual preparation training for sister

project based in Kumasi, as well as develop plan for M&E for both projects and collaborative pathways for linking with KS Pilot Project, phase II implemented by IWMI.

Outlook for the next period

The next study period will be crucial, as the first experimental results, coupled with preliminary risk assessment (IWMI) are expected shortly. This is also the period when open-days and outreach activities as well as wider awareness creation are to be carried out by project partners such as MoFA, URBANET, etc., locally, while further links with the sister project in Kumasi are also envisaged.

Monitoring and evaluation will also be emphasized in the forthcoming period, as the results of the next six- month period will probably determine the final decisions on implementation of risk reduction measures and possible modifying of the remaining activities of the project.

Information obtained during wide surveys carried out in 2007, as well as data collected during the on-going on farm implementation of risk reduction measures both for WW and FS will serve as the valuable materials for the peer-reviewed publications in the next period, which is one of the expected project outcomes, while work on the production of video materials by IWMI is also on course. Partners such as MoFA, MLGRDE as well as URBANET are also well prepared to provide support for wider information dissemination on the selected risk reductions measures and promotion of WHO Guidelines in general in 2008.

2.2.3 Jordan: Safe use of greywater in the Jerash Refugee Camp, with a focus on technical, institutional and managerial aspects of non-treatment options.

Objective and target groups

The objective of this project is to investigate optimal modalities for application of the third edition of the World Health Organization Guidelines on the Safe Use of Greywater in Agriculture, in the specific context of the Jerash refugee camp and the nearby farms. The target groups in this context are found at the farm level: (farmers) and at the household level (children).

The risk assessment component of the project is based on observational checklists and structured interviews, the risk management component focused on non-treatment health protection measures, including, for example, proper greywater handling at the farm level, and human exposure control and hygiene education in the households. Here, progress is reported in two areas:

- assessing the current status of greywater use in agriculture and describing the associated health issues in Jerash refugee camp
- reviewing existing policies and institutional frameworks regulating the use of greywater with special emphasis on impacts on public health

Activities

◆ Community involvement

At the start of the project, formal and informal informative meetings were held to initiate dialogue and introduce to the stakeholders project objectives, activities and anticipated outcomes.

The local stakeholders included:

- Local people,
- Farmers,
- NGOs, CBOs,
- Health inspectors,
- Doctors from public and private health centers,
- School directors and teachers,
- Camp Development Committee,
- UNRWA officers in the camp,
- Officers of Department of Palestinian Affairs.



◆ Risk assessment

The risk assessment used information gained from qualitative participatory methods including observational checklists (OC) and structured interviews (SI). These methods followed the risk assessment paradigms of third edition of the WHO guidelines, with special reference to hazard identification, hazard characterization, exposure assessment, and risk characterization. Components of OC and SI were family information, exposure information, epidemiological information, hygiene behaviors and risk perceptions

◆ The hypothesis of risk assessment

At the household level: children playing near greywater canals and lack of hygienic practices result in a higher incidence of grey wastewater-related disease (diarrhoea)

At the farm level: contact between humans and greywater during **irrigation** and during **harvest** is more likely than contact related to **crops**. This contact result in wastewater-related diseases

Health risks are not due to the greywater itself, but due to fecal contamination from other sources. Confounding factors that might affect the results of assessment have to be addressed in the questionnaires to avoid bias. Confounding factors include drinking-water pollution, leakage from sanitation facilities such as cesspools, sources of vegetables, pollution of vegetables, animal husbandry and management of animal manure and solid waste.

Below and on the following pages, questionnaire examples are presented that have been used for risk assessment on farms and in households.

Examples of questions used for risk assessment at farms:

On hazard identification and characterization

- What are the sources of irrigation water: rainwater? tankers? canal water? mixed?
- Do you use fertilizers/ manure to enhance soil fertility? Y/N
- What types of fertilizers: animal manure? chemical fertilizers?
- If animal manure, how much do apply? (.....) Kg/ donum
- How long before cropping do you apply the manure: 1 day? 1 week? 1 month? 2 months?
- How do you apply manure: manually? mechanically?
- During working hours where do take your meals (breakfast and lunch): at home? on farm?
- Do you mainly eat vegetables from your own farm? Y/N
- Have there been cases of diarrhoea among farmers the last 15 days? Y/N
- If yes: how many cases? How frequent has the diarrhoea been?
- What is the duration of diarrhoea?
- Is it: watery? bloody?
- Do symptoms of illness include: fever? shivers? cramps? vomiting?
- Has there been: a diagnosis by a doctor? medication? stool analysis? What are the analysis results: *Giardia*? *Cryptosporidium*? *Amoeba*? *Other*?
- What is the origin of the infection: drinking water? food? canal water transmission? other?
- Did you have diarrhoea while harvesting the crop? Y/N
- Are there cases of hepatitis among farmers? Y/N

On exposure assessment

- What types of crops does the farmer plant: vegetables (identify.....)? olives? others (.....)?
- What irrigation techniques does the farmer use?
- How does the farmer transfer greywater from the canal to his plot?
- Are there pools/ tanks for greywater?
- How long does the farmer work in the farm: 08:00-13:00? 08:00-17:00?
- How much water does the farmer apply for irrigation:M³/d/donum? bucket(s)/donum/day?
- For how long does the farmer irrigate during the dry season: 1 month? 2 months? 3 months? > 3 months?
- For how long does the farmer irrigate the crops?: 1 month? 2 months? 3 months? >3 months?
- What is the period between irrigation cessation and harvest: 1 day? 1 week? 2 weeks? 3 weeks? 4 weeks?
- How many farmers/workers work in the farm?
- How many children work in the farm?
- What is the harvesting time and duration?

Examples of questions used for risk assessment for households:

On hazard identification and characterization

- Where does the mother change babies' diapers?
- While playing outside, where do the children normally defecate/urinate?
- Do children defecate near ditches/canals?
- What are the sources of greywater?
- Are there traces of wastewater leakage/flooding from the septic tank?
- Where is the cesspool/ septic tank located?
- Are there animal feces near the canal?
- What are their sources of drinking water?
- Where do they urinate? Defecate?
- Where from do you plant/buy vegetables?
- Do you wash vegetables before cooking?
- Have you ever suffered from diarrhoea after eating vegetables?
- Have there been diarrhoea cases in children in the house the last 15 days? Y/N
- If yes, how many cases?
- How frequent is diarrhoea? What is the duration of diarrhoea?
- Is it watery? Or Bloody? Is there fever? Shiver? Cramps? Vomiting?
- Has there been: a diagnosis by a doctor? medication? stool analysis?
- What are the analysis results: *Giardia*? *Cryptosporidium*? *Amoeba*? *Other*?
- What is the origin of the infection:
drinking water? food? canal water transmission? other?

On exposure assessment

- Where does the family dispose the greywater?
- Where do children play? Do they play nearby greywater canals?
- How many children play?
- How long do they play near canals: in the summer? in the winter?
- Where do they wash their hands?
- Greywater Generation Rates: what is average consumption rate of water? How often do they use toilet? How much water do they use to flush toilets?
- Who cleans greywater canals?

In both cases the exercise is completed by integrating the information obtained through all the questions, in the contextual setting of the household or farm.

◆ Design of Study Sample

The following design criteria were applied for the household sample

- Type of sample: random sample
- 95% Confidence Interval: 1.96
- Statistical significance: 0.5
- Marginal Error: 2%
- Non responding %: 8%
- Size of study sample = $Z^2 [P(1-P)]N \div [[Z^2 (P(1-P))]- (N-1)ME^2]$
- Total Population of 28000 people
- Estimated Sample Size (401 households)
- Actual Sample Size (399)

The following design criteria were applied for the farm sample

- Farming community is open (not limited by the boundaries of the farms)
- Community size varies according to the intensity of agricultural activities
- No specific criteria were used to define the sample size

◆ Field Work & Data Collection

The field teams consisted of one observer and one interviewer, and 399 households and 13 farms were visited. The visited households were marked by sticker. Household correspondents were the resident housewife, while the correspondent on the farm was the farmer. In the subsequent dataanalysis, EpiInfo software was used to construct the database.

Trends in the national Policy / Institutional Framework for the Safe Use of Wastewater

◆ The following laws, regulation were collected for review:

- Wastewater Management Policy issued in 1998.
- The General Health Law No. 54 / 2002.
- Agriculture Law / 2002.
- Water Authority Law / 1988.
- Environment Protection Law No. 52 / 2006.
- Reclaimed Domestic Wastewater Standard (JS-893/2006).
- Laws and Regulations of the Higher Medical Council No. 9 / 1999.
- Laws and Regulations of the Public Organization for Pharmaceutical and Nutrition No. 31/2003.
- Regulations and Conditions for the Reuse of Wastewater in Agriculture No. 4 / 2004.
- Quality Control Regulations of Agricultural Products No. 44 / 2002.
- Guidelines for Greywater Management on Household Level in the Small Communities in North-eastern Badia of Jordan / 2007.

It is planned that an *ad hoc* committee will be formed to work with the project team to recommend appropriate changes in existing policies, regulations and standards, and to include items on the safe use of greywater in agriculture. The *ad hoc* committee will consist of representatives from the Ministry of Agriculture, the Ministry of Water and Irrigation, the Ministry of Environment, the Ministry of Health, the Refugee Camp Development Committee, the United Nations Relief and Work Agency, the Royal Scientific Society, the Palestinian Affairs Department.

◆ Research findings

Risk assessment at household level

Relevant general information about the camp is as follows: it has 2001 permanent building units, an under-structured water supply network, the main sanitary facility is made up of underground cesspools, uncontrolled solid waste disposal is practiced in the camp, and the greywater from kitchens, showers and washing machines is drained in small pipes through the house wall to small ditches that run along the roads between the houses. Some vital data are given in the following table:

	No. Records	Total	Mean	Variance	Std Dev
Family Size (person/household)	381	2581	6.77	10.19	3.19
Water Consumption Rate (m³/w)	379	842	2.22	1.15	1.07
Greywater Generation Rate (l/d)	280	70057	250.20	22802.13	151.00

Hazard identification and characterization

The fecal contamination in GW is from types of sources: indoor activities (changing babies' diapers in hand-basins; illegal dumping of wastewater from cesspools to greywater ditches; and, chemical detergents), fecal contamination from animals and humans (traces of human feces were observed in street corners and near-by canals; exposed babies' diapers were observed in the canals and animal waste was observed in the roads and canals) and solid waste (household solid waste gets mixed with the greywater). The results of the observations made are condensed in the following table:

Sources of Fecal Contamination	Yes	Total	Confidence Limits "Yes"	
Solid Waste	322	382	80.20%	80.20%
Chemical Detergents	241	382	58.00%	67.90%
Animal Manure	315	382	78.30%	86.10%
Wastewater	268	382	65.30%	74.70%

The main impact of unsafe use of greywater is diarrhea. Over the period 9 August to 9 September 2007 in incidence of 9.8% was recorded. Of a total of 204 cases, 155 were watery diarrhea and 48 were bloody diarrhea. Additional symptoms included fever, cramps and vomiting.

◆ Confounding factors tested

Statistical analysis showed that there was no relation between the diarrhea cases and:

- Drinking water supplied by the public network
- Livestock raising in households
- Animal waste (manure) around houses
- Source of vegetables (market)
- Washing vegetables before eating and cooking
- Sanitation facility: presence of cesspools in the households, and nearby canals
- Quantity of greywater generated at home

A significant relation was found, however, between the diarrhoea cases and the following factors: playing nearby greywater canals for three hours or more, and hygiene behavior (hand washing after playing and hand washing before eating).

Exposure assessment

An exposure analysis brought to light the following factors:

- direct playing of children in the canal water and accidental contact with greywater (falling of balls, toys and coins in canal while playing in the street),
- indirect exposure while playing at home through inhalation of air,
- cleaning of the greywater ditches within the camp area.

Risk assessment at farm level

Greywater generated at the households in the camp runs along the earthen canal and flows downstream to the agricultural fields. It is either stored in concrete reservoirs or earthen pools or transferred directly to the fields. It is distributed to the agricultural fields either by manual means (buckets), surface irrigation using movable pipes or by drip irrigation.

The crops grow in these fields are mainly tree crops (olive, citrus, figs and almond), cactuses; vegetable crops (mainly: zucchini, okra, beans, maize, and capsicum) and ornamental trees.

Hazard identification & characterization

Sources of fecal contamination include the same sources from the camp, uncontrolled solid waste with organic matter and pathogens from dead animals, from animal waste, and from exposed diapers.

The main health impacts: infections of bloody diarrhoea and hepatitis. Two cases (out of 67) of bloody diarrhoea were recorded during the harvesting time of olive trees and five cases (out of 67) of hepatitis were recorded in single farm where greywater is directly used for the irrigation of trees and vegetables.

Exposure analysis

The hypothesis in assessing risk at farm level was that contact during irrigation and during harvest is more likely than contact related to crops. Exposure routes included:

- During pumping activities from the canal to the pool and During the pumping/ transfer of GW from pool to fields.
- During direct distribution of greywater from canal to the fields during irrigation.
- During harvest of olives especially in the fields along the canal.

Recommendations for interventions

- Household Level: It is recommended to focus on implementing public education and awareness programmes on hygiene behaviour and sanitation among the community as a tool to manage the risk associated with the exposure to greywater in the camp.
- As for risk management at farm level, it is recommended to focus on measures that control/ reduce the contact between farmers and greywater during irrigation and harvesting. Such means may include the use of mulch and drip irrigation (for farms who already use surface irrigation), and the use of boots, masks, and gloves.

2.2.4 Senegal: *Application of standards of the WHO for the re-use of wastewater and excreta in agriculture.*

The results presented here have been achieved since the end of June 2007 by a multidisciplinary team. The period from the end of June until November 2007 represents essentially the start-up phase of the project and includes:

- The project launch
- The *ex-ante* diagnosis of the situation in order to guide the choice of best practice and design messages to address the target groups (farmers, vendors and consumers)
- The dissemination of best irrigation practice.

Objectives

The project's general objective, as agreed in Accra, is to contribute to improving the health of farmers, vendors and households in communities of the Pikine community in Senegal.

The specific objectives, as they relate to the overall objectives of the IDRC/FAO/WHO project, are:

- Estimate the prevalence of intestinal parasitoses related to wastewater use in urban agriculture, including in farmers in surrounding communities, vendors and consumers (cf. objective 2 of the IDRC/FAO/WHO Project);
- Evaluate the quality of wastewater used by urban farmers, of produce from farms with respect to microbiological et parasitological indicators in terms (*Escherichia coli* and helminth eggs) (cf. objective 2 of the IDRC/FAO/WHO Project);
- Identify and disseminate best practices in cropping and food preparation to enable a reduction in sanitary risks linked to irrigation with wastewater and consumption of products grown using wastewater (cf. objective 1 of the IDRC/FAO/WHO Project);
- Implement an advocacy program targeted at local authorities, in order to adopt safe options for use of non-treated wastewater in agriculture (cf. objectives 1 and 2 of the IDRC/FAO/WHO project);
- Disseminate results from the project to different stakeholders (farmers, vendors/buyers, households, local authorities, national and international institutions) (cf. objectives 3 and 4 of the IDRC/FAO/WHO project).

Activities and outputs report

◆ Launch

A workshop marking the official launch of the project launch was held on 24 July 2007 at the city hall of Pikine North Commune in the presence of Director Public Hygiene, the Mayor of Pikine North, a representative of WHO in Dakar, the Head of Farmers Union of the Niayes, representatives of Environment and Agriculture departments and others high-level invitees.

◆ Ex-ante diagnosis

The methodology included a socio-economic assessment based on questionnaires. The questionnaires were prepared on 21 and 22 June 2007, subsequently researchers were trained in their use and the questionnaires were pre-tested. The assessment was carried out between 13 and 26 July 2007.

Twelve wastewater samples were taken and examined for their microbiological contamination. Five types of agricultural products were also microbiologically tested: tomatoes, sweet peppers, lettuce, cucumber and eggplant. These vegetables were tested after harvesting and also after washing in the household.

In order to establish the prevalence rates of intestinal parasite infections in the farmer communities, stools were collected and tested for helminth eggs.

The results showed that:

- More than 68% of the farmers use the technique of sprinkling with a watering can to irrigate their crops, which implies a high level of contamination risk.
- More than 63% of the farmers expose themselves during more than three hours a day to contamination risks, and as the only measure of protection, they clean their hands with bleach.

The wastewater analysis demonstrated the presence of hookworm larvae and *Ascaris* eggs. Tomatoes had the most diverse range of microbiological contamination: larvae of hookworm, eggs of *Ascaris* and *Oxyuris*, cysts of *Entamoeba histolytica* and trophozoites of

Trichomonas intestinalis. Contamination of lettuce consisted of hookworm larvae, *Ascaris* eggs and *Trichomonas* trophozoites, while contamination of cucumber and sweet pepper was limited to hookworm larvae, and the bitter eggplant (diakhatoo, a local variety which is eaten cooked) had no microbiological contamination at all.



In 19% of the households *E. coli* was found on lettuce after washing.

Out of 21 farmers tested, 18 had intestinal parasite infections, with *Ascaris* most prevalent, followed by *Trichocephalus*, *Entamoeba coli* and *Giardia intestinalis*. Parasite loads were considerable, judging by the egg load in the stools.

For the purpose of capacity building among the local farmers, different modes of irrigation have been designed –furrow, pocket and surge irrigation- which are applied in demonstration plots for farmers to test.

2.2.5 Discussion

With respect to the **Senegal** presentation it was observed that the presentation actually was a good complement to the progress report. Clarifications were asked about the methodology: was there a control group for the 21 farmers tested and did the Pikine municipality have relevant health datasets that could complete the picture. Also it was unclear how the three target groups considered had been dealt with, as the presentation only referred to the farmers. Also the exposure routes were insufficiently elaborated, certainly those beyond the agro-ecosystem itself. The STAC members could assist in improving the design, segregation of datasets and stratification of risks. Yet it was also pointed out that wastewater-based agriculture had been going on in Pikine for a long time and that it would be difficult to observe change – rather the study made a snapshot of a basically stable situation.

In its response the Senegal team firstly pointed out that a lot of the analytical work was still in progress, because of the initial delays in the transfer of funds. A final progress report would be submitted once the analyses had been completed. Because of the steady-state situation in Pikine the research model was not one of comparing those at risk with a control group not at risk; rather the focus had been on a cross-sectional sample with elucidation of exposure routes. Relevant information from the Pikine municipality would be collected and added to the datasets. Also, the outcomes of previous studies will be condensed as a further evidence base for interventions. Institutionally, this is the first time that the Institute for Health and Development of the University is involved in this type of studies and this provides an opportunity to

influence the national sanitation policy. For the team, the critical new feature of this study lies in promoting best practice, and the datasets are merely the evidence base to make rational decisions on selecting best practice.

In a second round of questions the nature of the parameters in the socio-economic studies was questioned, and how these related to the WHO guidelines. There were questions in particular about the different kinds of irrigation and the frequency in harvesting the produce. The team was also asked to speculate on the reason why there were high parasite levels on lettuce and tomatoes, and not on eggplant. The Senegal team referred to eggplant as a “high” vegetable, i.e. the eggplants would not touch the soil, unlike tomatoes and lettuce. This related to agricultural practices for different crops. It was observed that also with respect to crop contamination, sample sizes were too small, and it was strongly recommended to improve this.

The first question to the team from **Jordan** concerned a clarification to what extent outcomes were based on the questionnaires and to what extent on observations. Also, the scoping criteria used for the study of the farmers was questioned – how far downstream was the impact checked? And how was the cleanliness of canals assessed to serve as a basis for the link to the incidence of diarrhea? The team was commended for the structuring of its study and the way it linked to the guidelines. Following this same approach, the team could perhaps differentiate better the different sources of greywater contamination in a quantitative way, taking into consideration that greywater itself contained thermotolerant coliforms. Yet it was recognized that effluent quality really was the only unreliable component in the full equation.

The Jordanian team indicated that making observations was embedded in the application of the questionnaires and that those dealing with the surveys had been given instructions so as to harmonize the observational process. Datasets had not been segregated for gender, but this could be done in the next phase. The scope of the farmer studies was set by the boundary of where all greywater ended flowing in the dry season. The relative importance of the sources of contamination had been identified and considering these sources had led to the question: what is greywater? As Professor Stenström had pointed out, definitions were all a matter of dilution. The potential for coliform re-growth should be considered in water quality studies, but was irrelevant to the actual risks posed by greywater.

Questions were also raised with respect to the methodology of focus group discussions on feasible non-treatment options and on the monitoring of behavioural change. Mapping should be a critical component in this connection and CEHA offered its help to provide HealthMapper. There was also a question about the details of the transmission pathway linked to olive harvesting.

In a further response, the Jordanian team indicated the integrated nature of the focus group discussions, health education and monitoring activities. There had been hygiene behaviour questions in the questionnaire and these would be repeated in the follow-up survey. The stakeholder committee set up within the community had been involved in the questionnaire design, adding and deleting questions. The further education efforts would be targeted at the actors involved in causing the risks: mothers who don't dispose properly of diapers, and farmers using the greywater. The transmission related to olive harvesting had to do with contamination through olives that were picked from the soil.

In reaction to the presentation by the **Ghana – Kumasi** team, it was noted that there had been a great emphasis on curriculum development for Farmer Field Schools. It was also noted that the project had been successful in carrying out a systematic review of policy and legislative documents, and that it had engaged a number of students in the implementation of specific project components. Studying the use of wastewater had been complicated by the fact that the Ministry of Food and Agriculture had drilled a number of boreholes to complement wastewater with ground water.

Questions were raised on the actually risk assessment methodologies followed, in particular exposure risks related to hygiene behaviour, the rationale for the strong emphasis on FFS, and the lack of clear scoping of the project, so that exposure assessment can be carried out within clear boundaries (rather than the more non-specific mathematical QMRA approach that seems to have been followed). With the volume of research already done previous to this project, the information from that research should also be reflected in the reporting and decision-making on non-treatment options.

In his response, Professor Abaidoo pointed out that the FFS-focus was something particularly promoted by FAO. The work on risk assessment was still ongoing, but the core concept of the project was that of testing new interventions. Since in the Guidelines QMRA is central to risk assessment, exposure assessment was not really given prominence in the project. The measure of ultimate success of non-treatment options is closely linked to personal hygiene, and recontamination of agricultural produce is a critical issue. This is therefore also emphasized in the FFS modules.

Comments on the **Ghana – Tamale** project included the need to have a more specific look at the pathogens, perhaps through more sensitive approaches such as PCR (although it was hard to link this to a test for viability), and also on the issue of sample size. Surprise was expressed about the finding that 29 farmers were free of helminth infections. It was recognized that there was insufficient laboratory capacity to carry out clinical sampling, even though this was considered to be essential. The level of pathogen reduction by environmental conditions should not be underestimated.

These were all considered valid comments by the team and options to strengthen laboratory support should be investigated. Different irrigation techniques also played a role in the diversity of infection rates, and in some cases, where groundwater was mixed with wastewater, one might ask whether this still met the criteria of non-treatment. The development of an epidemiological toolbox linked to the Guidelines was considered a good idea, and the team would look into the sampling (cohort; focus on children).

2.3 Draft protocols for the second phase

2.3.1 Ghana – Kumasi: Evaluation of non-treatment options for maximizing public health benefits of WHO guidelines governing the use of wastewater in urban vegetable production in Ghana

Workplan for KNUST-WHO-FAO-IDRC project

Milestone plan for second project phase

Type of milestone	Description	Deadline	Means of verification
Activity 0	Compile background information of previous research activities relating to research locations and boundaries, risk assessment of wastewater use; emphasizing on identification of risk factors and their characterizations, exposure analysis (including populations, gender, risk behaviour), management options previously tested and their effectiveness etc.	31.03.08	Compilation report
Output 1	Effectiveness of selected options for health risk reduction assessed	30.08.08	Summary efficacy report
Activity 1.1	To verify risk reduction potential of two newly identified options at farm level in Kumasi	30.07.08	Log reduction of microbiological risk factors
Activity 1.2	To verify risk reduction potential of pre-identified options at market level in Kumasi	30.08.08	Log reduction of microbiological risk factors
Activity 1.3	To verify risk reduction potential of so far untested options at caterer level in Kumasi	30.08.08	Log reduction of microbiological risk factors
Output 2	Adoption factors (social, economic, physical, policy, institutional) of non- treatment risk reduction options identified at various levels and demonstration of non-treatment options at farm, market and food vendor levels.	30.10.08	Summary report)
Activity 2.1	To establish an information base on wastewater irrigation in Accra and Kumasi and possibly related disease incidents	30.10.08	Report
Activity 2.1.2	To summarize key social, economic and biophysical factors affecting the adoption of non-treatment interventions per target group of the multiple-barrier approach	30.10.08	Report
Activity 2.1.4	To verify the adoption factors with the target groups (interviews: perceptions, ranking) in Accra and Kumasi	30.10.08	Field report

Type of milestone	Description	Deadline	Means of verification
Activity 2.2 Farm level			
Activity 2.2.1	To train trainers (e.g. scientists, students, KMA, CRI, etc.) in FFS approach and establish FFS schools in Kumasi	30.06.08	20 trainers max.; 2 FFS max. for field trials
Activity 2.2.2.	To sensitize farmers on health issues related to the use of wastewater	30.12.07	
Activity 2.2.3	To demonstrate all pre-tested non-treatment options and fill log reduction gaps	30.10.08	Report
Activity 2.2.4	To demonstrate technical package for lettuce, spring onions and cabbage	31.12.08	Report
Activity 2.2.5	Adapt trials based on farmers' feedback and assess financial viability	31 12 08	Adoption assessment
Activity 2.2.6	To monitor results of field trials (FFS) and assess adoption potential	31 12 08	AESA reports
Activity 2.2.7	To conduct field days for a larger farmer group in Kumasi where demonstration trials are held	31.12 08	Field visit report;
Activity 2.3 Market level			
Activity 2.3.1	To document the perceptions of market traders on risk reduction options and their suggested alternative options in Kumasi	30.10.08	Perception report
Activity 2.3.2	To quantify the adoption potential of possible health risk reducing options and their viability	30.10.08	Efficacy and Viability report
Activity 2.3.3	To carry out knowledge sharing workshops on hygienic handling (including washing methods) of vegetables with selected market women groups in Kumasi, with market visits	31.12.08	Perception report
Activity 2.4 Caterer level			
Activity 2.4.1	To document the perceptions of caterers on non-treatment options	30.10.08	Perception report
Activity 2.4.2	To quantify the adoption potential of possible health risk reducing options and their viability in Kumasi	30.10.08	Efficacy and Viability report
Activity 2.4.3	To carry out knowledge sharing workshops on hygienic handling (including washing methods) of vegetables with selected caterer groups in Kumasi at a catering venue	31.12.08	Perception report

Type of milestone	Description	Deadline	Means of verification
Consumer level			
Activity 2.5			
Activity 2.5.1	Conduct assessment of WTP for safer food in different consumer groups in Accra and Kumasi	30.10.08	
Activity 2.6	Human (graduate student) capacity building in WHO guidelines and implications for wastewater irrigation in Ghana	30.10.08	Literature reviews
Activity 2.6.1	To train undergraduate and graduate students on identifying effective combinations measuring the effectiveness and financial viability of individual and combined non-treatment options	30.10.08	Student theses
Output 3	Increased awareness in government institutions and local authorities concerned with food safety on the application of WHO guidelines in the Ghanaian context	31.12.08	Policy dialogue documents
Activity 3.1	To brief national and city authorities on WHO-FAO wastewater guidelines and the project & gather perceptions on institutional constraints and opportunities towards implementation of the non-treatment options for health risk reduction	31.12.08	Briefing material; perception report
Activity 3.2	To identify an institutional apex for mainstreaming and institutionalizing the non-treatment options	31.12.08	Minutes of the National CODEX committee meeting
Activity 3.3	To assist the apex to mainstream options for the implementation of the WHO-FAO Guidelines	31.12.08	CODEX committee report
Activity 3.4	To advocate for Guideline adoption through preparation of policy briefs for incorporating non-treatment options in the national and district policies and regulations	31.12.08	Workshop reports and policy briefs
Output 4	Recommendations for revised policies, by-laws and regulations	31.12.08	Revised texts, check-lists and curricula
Activity 4.1	To develop with FDB, MoFA, MoH and MoT improved check lists, curricula and regulations for traders and caterers	31.10.08	Revised texts, check-lists and curricula for traders, caterers and schools

Type of milestone	Description	Deadline	Means of verification
Activity 4.2	To analyse the viability of recommended changes in policies, by-laws and regulations	31.12.08	Analysis report
Activity 4.3	To conduct one KS workshop with all beneficiary groups, municipality authorities and other relevant institutions in Accra	31.10.08	Workshop report
Output 5	Capacity building of inspectors, extension workers of relevant departments of KMA, AMA, MoFA, FDB, etc	31.12.08	
Activity 5.1	To carry out a write-shop for FFS curriculum development on non-treatment options in Kumasi	30.06.08	FFS field guide
Activity 5.2	To identify simple operational and verification monitoring parameters for routine checks of markets and restaurants/caterers and train inspectors in their use	30.09.08	Check lists Training protocol
Activity 6.3	To carry out final workshop in either in Accra; (including special session with decision makers)	30.02.09	Workshop reports
Activity 6.4	To share project results with other WHO-project member at international workshops	30.04.09	Final Project Report

2.3.2 Ghana - Tamale: Minimizing health risks from using excreta and grey water by poor urban and peri-urban farmers in the Tamale municipality, Ghana.

The Ghana-Tamale team presented an updated version of their overall milestone Excell sheet for the project, and the list that follows takes out the components that will be implemented during 2008, in total seven areas of activity. *Activity 1*, sensitization of stakeholders, had been successfully completed in 2007.

Activity 2: Farm household surveys

Fieldwork has been completed to a large extent, analysis of collected data is in progress

- Activity expanded to give more prominence to the faecal sludge studies and support from partners from University of Norway (PhD student with his supervisor) in the forthcoming period expected to add value and quality especially to risk assessment studies.

Time frame: December 2007– May 2008

Activity 3: On-farm testing of risk reduction measures, feedback and sampling

- Simple but effective risk-reduction practices for safer application of waste water and excreta tested on-farm. Effectiveness of the “best practices” directly monitored on-farm (farmers’ continuous feedback on their perceptions, financial implications etc.). This is accompanied by health monitoring of “best practice” farmers versus control group.

Time frame: Activity in progress and expected to be completed by the end of May 2008

- Assistance from Centre Suisse de Recherche Scientifique in Abidjan is sought in training of two technical staff for detailed parasitological analysis

Time frame: Institutional arrangements and training to be carried out December 2007-January 2008

Activity 4: Knowledge sharing with farmers and authorities

- This is an on-going activity whose main goal is to facilitate a free exchange of information between farmers, researchers and authorities to understand and address (without delay) possible bottlenecks on the practicability, adoption potential, required support and institutional acceptability of best (safer) wastewater/excreta use practices. This activity links to CP 38 project and KS pilot phase II projects of KNUST and IWMI are exploited here in development of information materials as well as radio –programme.

Time frame: Activity in progress and expected to be completed by the end of project life (early 2009).

Activity 5: Monitoring and evaluation

- This will be periodic activity throughout the project life in order to ensure that activities are carried out as planned, finances in order and results in line with the project objectives.

Time frame: on-going till the end of the project life

Activity 6: Final workshop

- This will serve to share results and lessons learnt with all relevant parties locally and nationally/ internationally

Time frame: March 2009

Activity 7. Production of video, peer-reviewed publications and other materials for dissemination

Time Frame: Activity in progress and continues to the end of project life

2.3.3 Jordan: *Safe use of greywater in the Jerash Refugee Camp, with a focus on technical, institutional and managerial aspects of non-treatment options.*

Phase 2 of the Jordan project will see the following activities

- ◆ Risk assessment
 - Mobilization and community involvement
 - Assessment of current status in terms of current greywater practices and community health status
 - Mapping of greywater risk sources.
 - Assessment of capacity building needs for farmers and farm workers in the field of health protection measures
 - Review of the relevant existing policies, standards, norms and laws
- ◆ Health-based targets
 - Healthy behavior for women and children.
 - Healthy greywater handling for farmers.
- ◆ Risk management
 - Application of non-treatment measures, including proper greywater handling and application and human exposure control and hygiene education
 - Promotion of health-oriented behavior and personal hygiene among the target groups
 - Developing personal skills concerning greywater use and conducting awareness campaigns
 - System monitoring, evaluation and verification, including the percentage of the target group adopting recommended practice.

- Developments in the national safe wastewater use policy/ institutional framework, including a link to a higher intersectoral body to facilitate policy reformulation.

The risk management methodology in the application of non-treatment options will include (1) among farmers – proper greywater handling and application, such as the use of protective clothes, boots, mulch, drip irrigation and sub-surface irrigation at demonstration sites; and (2) among households - human exposure control and hygiene education, such as awareness lectures, posters, brochures, drama contests and drawing competitions.

The verification of the effectiveness of proposed non-treatment measures will be done through post-intervention observations and structured interviews. Operational system monitoring will be achieved through observational programmes and periodic monitoring. For the development of a national policy framework with institutional arrangements a Steering Committee will be established consisting of member drawn from the MoH, MoE, MoW, MoA, UNWRA, CEHA and JASM.

The outputs will be: a contribution to the guiding Document on WHO Guidelines. data and statistical information on greywater use practice and its associated health issues, positive behavioral changes and adoption of non-treatment health protection measures in a real-life setting, photographic materials on the safe use of greywater to be used in promotional and educational publications, scientific articles reporting on research findings, and recommendations for policies on grey water safe use.

Activity	Dec 2007	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	July 2008	Aug 2008
Review of relevant policy and institutional framework									
Training on Health mapping/CEHA									
Quantification of faecal contamination and Risk Characterization									
Application of Non-treatment health protection measures:									
- Farmers									
- Households									
Assessment of effectiveness of health protection measures:									
- Farmers									
- Household									
Monitoring & Evaluation									
Reporting & Follow up workshop in Amman									

Activity	Sept 2008	Oct 2008	Nov 2008	Dec 2008	Jan 2009	Feb 2009	Mar 2009	Apr 2009
Review of relevant policy and institutional framework								
Training on Health mapping/CEHA								
Quantification of faecal contamination and Risk Characterization								
Application of Non-treatment health protection measures:								
- Farmers								
- Households								
Assessment of effectiveness of health protection measures:								
- Farmers								
- Household								
Monitoring & Evaluation								
Reporting & Follow up workshop in Amman								

2.3.4 Senegal: *Application of standards of the WHO for the re-use of wastewater and excreta in agriculture.*

The work plan of the Senegalese team for the second phase of the project consisted of the following components:

◆ Round-up first phase

- Final data analysis and publication of results
- Organization of workshops for farmers, researchers and policy/decision makers

Time frame: December 2007

◆ Design of measures for farmer protection

- Treatment of farmers
- Complete demonstration of non-treatment risk management measures
- Identification and promotion of efficient protection measures

Time frame: from December onwards

◆ Continue demonstration projects and extension of non-treatment options

- Continue the implementation of alternative irrigation methods
- Monitoring of the options adopted by farmers, including training of 42 farmers
- Best practice implementation at the household level
- Produce dissemination tools (videos, policy briefs)

Time frame: between January and October

◆ Evaluation

- Mid-term evaluation in July 2008 (through studies and workshops)
- Final evaluation in January 2009 (reports)

2.4 STAC meeting

The STAC meeting could not take place as originally planned on Monday morning, because of the delayed arrival of two STAC members. The preliminary discussion on Monday morning adjusted the workshop programme and touched on a number of issues that were later taken up in the full STAC, including a more active role for STAC members, the need for country project structure to follow the Guidelines structure more clearly, and the delays in transfer of funds. Technical issues that had come up reading the progress reports included sample sizes, methodology and statistical analysis.

The complementarity of the different country projects was also noted, and this was considered to be in line with the objective to have a generic guidance document on implementation of the Guidelines as a major output. Yet there was some debate as to whether the next step towards interventions was premature as judged by the progress reports. The issue of multi-disciplinarity should also be clearly reflected in all projects. It was clear that the STAC members present were more concerned about the projects' structure than about the individual datasets.

It was decided to review the progress reports from Senegal and Jordan first, and the STAC meeting was deferred to Tuesday 27 November when all STAC member were expected to be present. The minutes of this meeting are presented in Annex 3.

2.5 Other issues

Field trip – on Wednesday 28 November the participants visited the Pikine area near Dakar, where they saw wastewater-fed horticulture in action, including small-scale experiments on non-treatment options for safe use. The field visit also included a stop at the University where research on water treatment approaches is going on, and a neighbourhood where alternative sanitation facilities have been introduced.

Health mapper and other tools – the country teams were looking for tools to support their work, and were particularly interested in software to collect and analyse geo-referenced datasets. Health mapper would be provided to the teams through the WHO Regional Offices. Dr Tschannen provided information about relevant databases on scientific literature in this area.

3 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

The second consultative workshop on the IDRC/WHO/FAO project in Dakar, Senegal reviewed the progress reports received from the country teams, based on the protocols agreed at the Accra workshop in December 2006. All progress reports were accepted in principle, some with comments to be taken into consideration in the next project phase. The country teams had satisfactorily concluded the risk assessment phase, in spite of management constraints caused by delays in the transfer of funds. In view of this reality, it was agreed that the final workshop would not be held late 2008, but rather at the end of the first quarter of 2009.

The role of the STAC was also reviewed and it was concluded that inputs from individual STAC members had added considerable value during this first phase; this approach needed to be strengthened during the second phase, including some capacity building for technical staff.

The important point that was highlighted was that of the complementarity between the different projects, as a basis to arrive at generic guidance for the implementation of the WHO Guidelines.

The field visit brought to light issues of scale, boundaries and diversity relating wastewater use in horticulture, and the need to reconcile the economic driving forces behind wastewater use and alternative approaches to make such use safer.

Some of the work under this project had been highlighted at international events, but it was agreed that, as preliminary results were becoming available, opportunities to call attention to these issues at conference, workshops and fora would have to be pursued more rigorously.

It was clear, from reactions of targeted user groups, that the third edition of the WHO Guidelines were considered to be very challenging, and this indicated the need to prepare fact sheets and policy briefs for various user groups highlighting items from the Guidelines of particular interest to them.

A first draft outline for the final guidance document was agreed.

The protocols for the second phase, prepared at the workshop, were reviewed and commented on, and it was agreed that final versions would be submitted to WHO by January 2008.

3.2 Recommendations

- (1) All teams to submit their final progress reports to WHO before the end of 2007, including the comments made by the Dakar workshop including by the members of the STAC.
- (2) All teams to submit to WHO an updated version of the protocols prepared in Dakar for the second phase of the project, no later than 31 January 2008.
- (3) The third and final workshop is scheduled to take place late March 2009 in Amman, Jordan
- (4) Opportunities for technical capacity building to be identified and communicated to WHO for possible support in the context of the project.
- (5) Any manuscripts prepared for publication in the peer reviewed literature based on the work carried out under this project are to be submitted first to the STAC.
- (6) WHO and IDRC to elaborate, jointly, the detailed outline and contents for the guidance document on the implementation of the WHO Guidelines.
- (7) WHO, FAO, IDRC and IWMI to co-convene a special seminar during the Stockholm World Water Week in August 2008.
- (8) WHO, FAO and IDRC to produce an information folder with fact sheets and policy briefs, to be launched at the Stockholm World Water Week in August 2008, under the umbrella of the International Year of Sanitation.
- (9) WHO to produce a detailed report of the Dakar workshop for wide distribution.

Annex 1
**SECOND CONSULTATIVE WORKSHOP ON THE WHO/FAO/IDRC PROJECT
“NON-TREATMENT OPTIONS FOR SAFE WASTEWATER USE IN POOR
URBAN COMMUNITIES”**

Dakar, Senegal 26-29 November 2007

Revised Workshop Programme

Monday 26 November 2007

Monday morning

10:00-12:00 Meeting to review the programme of the workshop

Adaptation of the programme due to late arrival participants
General comments on progress by STAC members present

12:00 lunch

Monday afternoon

13:30-17:00 Review Senegal and Jordan projects

13:30 Brief introduction and explanation for Senegalese and
Jordanian participants

13:45-15:00 Senegal Project :
Progress report presentation and Q&A

15:00 refreshments

15:30-16:45 Jordan Project :
Progress report presentation and Q&A

16:45 Re-capitulation of day 1

Tuesday 27 November 2007

Tuesday morning

08:30 Opening

Round of introductions workshop participants

Brief opening statements on behalf of WHO, FAO and IDRC

Objectives and expected outputs of the workshop

Workshop arrangements

Review of major events since the first consultative workshop, Robert Bos WHO
Q&A

Tuesday 27 November 2007

Tuesday morning (continued)

09:15 Brief account of the previous day's review Senegal and Jordan progress reports

09:30-12:30 Review Ghanaian projects

09:30-10:45 Ghana Kumasi Project :
Progress report presentation and Q&A

10:45 refreshments

11:15-12:30 Ghana Tamale Project :
Progress report presentation and Q&A

12:30 lunch

Tuesday afternoon

In parallel:

13:30-14:30 STAC meeting

13:30-14:30 Teams consolidate the comments received in plenary sessions

14:30 STAC presents its views and recommendations, followed by discussion

15:00 refreshments

15:15 Preparation of the detailed work plans for the second project period: introduction
Robert Bos, WHO

15:30-17:30 Group work: preparation of the detailed work plans for the second
project period

Group 1: the two Ghanaian teams combined

Group 2: the team from Jordan

Group 3: the team from Senegal

Wednesday 28 November 2007

08:00-15:00 Field visit – Dakar municipality sites including fields with urban
agriculture, opportunities to meet with farmers, the market and
project sites

15:30 Reflection on the observations made during the field trip.

Thursday 28 November 2007

Thursday morning

08:30-10:00 Group work (continued)

10:00 refreshments

10:30-12:30 Presentation group work day 2/3 and discussion

10:30-11:15 proposed protocol and work plan Ghana Kumasi

11:15-12:00 proposed protocol and work plan Ghana Tamale

12:00-12:30 proposed protocol and work plan Jordan

12:30 lunch

Thursday afternoon

13:30-14:15 Presentation group work day 2/3 and discussion (continued)

13:30-14:15 proposed protocol and work plan Senegal

14:15-16:30 Management issues:

Role of STAC members

Outline for the guidance document

Other documents (fact sheets, policy briefs)

Stockholm seminar

Complementarity and cohesion

Capacity building options

Issues arising with discussion, including logistics, administrative arrangements, information flow and exchange, date of the next and final workshop in Amman.

16:30 Any other business

16:45 Closure of the workshop

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Annex 2

List of participants

Project team members

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Dr Siméon Kenfack, CREPA, Ouagadougou, Burkina Faso

Annex 3

Second Consultative Workshop
WHO/FAO/IDRC Project Non-treatment Options for the Safe Use of Wastewater in
Poor Urban Communities

Dakar, 26-29 November 2007

**Minutes of the meeting of the Scientific and Technical Advisory Committee
27 November 2007**

The STAC met in Dakar on 27 November 2007 to discuss issues related to the progress reports submitted by the country teams, and other relevant issues, including an outlook towards the second phase.

In attendance were:

Robert Bos, World Health Organization, Geneva, Switzerland

Pay Drechsel, International Water Management Institute, Regional Office for Africa, Accra, Ghana

Seydou Niang, Université Cheikh Anta Diop, Dakar, Senegal

Mark Redwood, International Development Research Centre, Ottawa, Canada

Thor-Axel Stenström, University of Life Sciences, As, Norway

Andres Tschannen, Centre Suisse de Recherche Scientifique, Abidjan, Côte d'Ivoire

Unable to attend :

Siméon Kenfack, Crepa, Ouagadougou, Burkina Faso

Robert Bos opened the meeting with a reference to the Terms of Reference established for the STAC. He then gave a brief update about the Senegal and Jordan progress reports that has been presented the previous day when not all STAC members were in attendance yet.

Pay Drechsel asked whether there was any evidence presented in the Jordanian progress report about effects on the farmer community, as this had not yet been included in the report that had been circulated. It was explained that the updated report now available contained information about the farmer community, but that this related to exposure assessment, not to effects of measures. The interventions would only follow in the second phase, currently the focus was on risk assessment.

Thor-Axel Stenström raised the general issue of sample sizes as this had been an issue in all reports. Clearly, the teams were dealing with limited numbers of people and statistically there was insufficient power of resolution. It was likely that confounding factors would overshadow the actual risks.

The questionnaire-based approach provided a middle road – it included a sampling of farmer perceptions but also baseline info about disease outcomes (diarrhoea) - sampling for pathogens in stools would not be clear-cut if the sampling strategy was inadequate.

Perceptions and behaviours could be assessed through observations and questionnaires, but, in the end, what counted was to have a basis for the reduction of risks, and this would be achieved through a combination of specific types of interventions

Andres Tschannen pointed out that in agriculture there had been a transition from strong evidence based actions to putting farmers in the centre and consider their perceptions. This was coming through very clearly in the Farmer Field School approach of Kumasi

In response to that point it was suggested that a balance was needed between assessing perceptions, observing behaviours and collecting hard data, and that with respect to the latter it should be remembered that in Senegal and Ghana already a lot of data had been collected in previous studies. It would be important to bring this information out in the final reports, to demonstrate the evidence base for tested interventions.

The STAC noted that the Ghana Kumasi team had followed a different track, with the review of policy/legislation and the focus on developing modules for FFS. This was clearly driven by the FAO as the donor for this project, and as such fell outside of the original scope of the IDRC/WHO project. Yet, it was recognized by the STAC that Farmer Field Schools were an important mechanism for the dissemination of new agricultural and marketing practices that farmers should adopt, and therefore this component in the Kumasi project should be assessed for its value in the context of the other projects.

The review of policies and regulations fell within the original scope and the Kumasi work clearly showed the value of such a review and the recommendations that it had produced aimed at national and local authorities concerning the adoption of the 3rd edition of the WHO Guidelines into legislation and regulation.

Thor Axel Stenström argued that part of the discussion went down to the identity of the target groups in the different projects. Where institutional levels were targeted, the nature of the information required referred mainly to the evidence base. Where farmers were the target group, independent observations and the farmer perceptions would be the main basis. Definition of the target groups is the basis for the definition of information needed, and hence, of the methodology applied.

In conclusion, it was clear that there were three boundary issues:

- the boundary between existing information from previous projects and newly generated information emerging from the current project. This boundary was fuzzy but it was critical that in the final reporting, the information from previous projects, identified as such, was added in a condensed form to support the conclusions obtained.
- the boundary set by the scope of the WHO/IDRC project and later additions from the FAO side: it was recognized that the Farmer Field School approach added a valid and valuable dimension to the dissemination of the research outcomes, and the modules produced by Kumasi should be made available to the other teams.
- The boundary between what is related to the core of the WHO guidelines and what are ancillary issues. It was felt that the teams should ensure that divergence was limited and that an effort should be made to ensure optimal harmonization between the projects, so that the outcome, as foreseen, would be of greater generic value than just the sum of the individual projects. Some of the divergence had its origin in definitions, and it was WHO's role to clarify issues of definition. The projects wanted to highlight the different aspects of the guidelines in different settings. But they also needed to achieve a level of complementarity in the framework of the guidelines. The harmonization of methodology harmonization should focus especially on risk assessment among target groups

The discussion then shifted to the concrete expected outputs of the overall project.

Mark Redwood indicated that he had drafted an outline for the guidance book – the format needed to be sorted out. A number of ideas had come up on the first day, of documents for different target audiences, including information for regulators, information for WHO Offices through fact sheets. The general conclusion was that a package of advocacy, awareness creation and technical information materials was required. It was agreed that the rapid development of such a package could be conceived as a concrete contribution to the International Year of Sanitation 2008.

The afore-mentioned complementarity needed to be reflected in the documents coming out of the project. Different pieces should be selected from the four cases, highlighting different parts of the guidelines: risk management, risk reduction strategies, institutional framework, cost benefit analysis.

This would be discussed with the group on the last day of the workshop.

Finally, direct STAC member support to the teams was discussed, again with an emphasis on promoting focus rather than divergence in the project implementation.

The STAC agreed that such support should be presented in a collective fashion rather than individual STAC members “adopting” specific projects. Also, the assistance to the

projects should be demand driven, to ensure that STAC member inputs responded to the needs of the teams.

The role of STAC members should be presented realistically, as they all had full agendas. So, there should be a clear argument for the projects that need additional backstopping now. Virtual support would not work. The support should also reflect the different areas of expertise the STAC members have to offer.

Thor-Axel Stenström called attention to the clause in the STAC TOR indicating its members' role in the review of papers coming out of the projects. This would be raised in the plenary workshop discussions.

The discussion came back to issues of harmonization of the four projects and it was proposed to establish a matrix of the various parameters and indicators. It was pointed out that this matrix had been developed at the Accra workshop, and this again raised the issue that the development of the second phase should build on the protocol and plans developed prior to and at the Accra workshop.

The option was left open for a further STAC meeting during the week should further issues arise. With this the meeting was closed.

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