Preventative Measures Against Water-Born Disease & 
The Role of Municipalities in Prevention

Course 1: Sewage treatment technologies

Public Health Issue

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Mrs Water Quality Management

December 16, 2007
Background

Disease Related to Water Contamination

- Water – Born Diseases
- Water – Based Diseases
- Water – Related Diseases
- Water - Washed Diseases

D / M.Alawneh/Training/HWE/ Preventive Measures
Water-borne Diseases

Diseases caused by ingestion of water contaminated by human or animal excrement, which contain pathogenic microorganisms

Include cholera, typhoid, amoebic and bacillary dysentery and other diarrheal diseases as

- Giardiasis (Protozoan)
- Cryptosporidiosis (Bacteria)
- Campylobacteriosis (Bacteria)
- Shigellosis (Bacteria)
- Viral Gastroenteritis (Virus)
- Cyclosporiasis (Parasite)

In addition, water-borne disease can be caused by the pollution of water with chemicals that have an adverse effect on health

- Arsenic
- Flouride
- Nitrates from fertilizers
- Carcinogenic pesticides (DDT)
- Lead (from pipes)
- Heavy Metals
Diseases caused by poor personal hygiene and skin and eye contact with contaminated water
These include scabies, trachoma, typhus, and other flea, lice and tick-borne diseases.

Diseases caused by parasites found in intermediate organisms living in contaminated water

Water-related diseases are caused by insect vectors, especially mosquitoes, that breed or feed near contaminated water
They are not typically associated with lack of access to clean drinking water or sanitation services
The World Health Organization (WHO) has reported that water born diseases kill more people than any other disease in the world.

- 1.1 billion people globally lack basic access to drinking water resources.

- While 2.4 billion people have inadequate sanitation facilities, which accounts for many water related acute and chronic diseases.

- Some 3.4 million people, many of them young children, die each year from water-borne diseases, such as intestinal diarrhea (cholera, typhoid fever and dysentery), caused by microbiially-contaminated water supplies that are linked to deficient or non-existent sanitation and sewage disposal facilities.

- Globally, water-borne diseases are the second leading cause of death in children below the age of five years, while childhood mortality rates from acute respiratory infections ranks first.
**Water and sanitation related diseases**

Anemia

**Arsenicosis** See also: Arsenic in drinking-water

Ascariasis

Campylobacteriosis. See other WHO related activities

Cholera. See also other WHO related activities

Cyanobacterial Toxins

Dengue and Dengue Haemorrhagic Fever. See other WHO related activities

Diarrhea. See other WHO related activities

Drowning

Fluorosis

Guinea-Worm Disease (Dracunculiasis). See other WHO related activities

Hepatitis. See other WHO related activities

Japanese Encephalitis. See other WHO related activities

Lead Poisoning. See also lead in drinking-water

Leptospirosis

Malaria. See also: WHO Activities on Malaria

Malnutrition. See also Global Database on Child Growth and Malnutrition

Methaemoglobinemia

Onchocerciasis (River Blindness). See other WHO related activities

Ringworm (Tinea)

Scabies

Schistosomiasis. See other WHO related activities

Spinal Injury

Trachoma. See other WHO related activities

Typhoid and Paratyphoid Enteric Fevers. See WHO related activities
Ascariasis

Ascariasis is found worldwide. Infection occurs with greatest frequency in tropical and subtropical regions, and in any areas with inadequate sanitation.

The disease and how it affects people

Ascariasis is an infection of the small intestine caused by Ascaris lumbricoides, a large roundworm. The eggs of the worm are found in soil contaminated by human faeces or in uncooked food contaminated by soil containing eggs of the worm.

Eating uncooked food grown in contaminated soil or irrigated with inadequately treated wastewater is another frequent avenue of infection.

Scope of the Problem

- Ascariasis is one of the most common human parasitic infections.
- Worldwide, severe Ascaris infections cause approximately 60,000 deaths per year, mainly in children.
Scabies is a contagious skin infection that spreads rapidly in crowded conditions and is found worldwide.

Personal hygiene is an important preventive measure and access to adequate water supply is important in control.

Epidemics have been linked to poverty, poor water-supply, sanitation and overcrowding.

Scope of the Problem

There are about 300 million cases of scabies in the world each year.
Malaria, the world's most important parasitic infectious disease, is transmitted by mosquitoes which breed in fresh or occasionally brackish water.

Malaria is among the five leading causes of death in under-5-year-old children in Africa.

WHO estimates 300-500 million cases of malaria, with over one million deaths each year.
Hepatitis, a broad term for inflammation of the liver, has a number of infectious and non-infectious causes.

Two of the viruses that cause hepatitis (hepatitis A and E) can be transmitted through water and food; hygiene is therefore important in their control.

Hepatitis A and E viruses, while unrelated to one another, are both transmitted via the faecal-oral route,
• Most often through contaminated water
• From person to person.
• Via food contaminated by infected food-handlers “uncooked foods, or foods handled after cooking”
Faecal-oral routes of disease transmission

- Faeces
  - Water
  - Flies
  - Hands
- Mouth
  - Food
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How can we help prevent these diseases?

Preventive Measures???

Municipality Responsibility ???

D / M.Alawneh/Training/HWE/ Preventive Measures
Preventive Measures

Short Term Measures

Long Term Measures
1.0 Health Education

- Providing education on good sanitation and personal hygiene, especially hand-washing
  - Hand washing — this is the most vital component of personal hygiene in disease prevention. Hands should be washed with soap after defecation and after cleaning and disposing of an infant’s faeces...

- Improvement in Habitation and Changing hygiene behavior

- Higher education Training in water related issues

Infected individuals (and domestic animals) should be treated with medicine to reduce disease transmission.
At home, the water should be:
- Boiled,
- Filtered,
- OR other methods and necessary steps taken to ensure that it is free from Microorganisms.

Cistern Cleaning and disinfection.

3.0 Adequate and clean water supplies

The availability of water for use in personal hygiene:

- Increasing the quantity of water available. This allows better hygiene and can thus prevent disease transmission from contaminated hands, food, or household utensils.

Improving the quality of drinking water at source, at the tap, or in the storage vessel
4.0 Proper Waste Disposal

- Interrupting the routes of transmission of the diseases

- Disposing of organic and animal wastes properly to avoid flies

- Waste Water Collection and treatment

  Proper Disposal of Human Feaces will reduce the number of cases

  Waste Water- Vacuum Truck Control

Infected individuals (and domestic animals) should be treated with medicine to reduce disease transmission.
3.0 Ensure safe food preparation techniques.

- Good food hygiene (food is a significant breeding ground for pathogens).

- Washing food prior to cooking and Cooking food for long enough at a sufficiently high temperature are both important to kill harmful bacteria.

- Protecting food from flies interrupts the faeces-flies-food route (at a household level).
6.0 Chlorination of Water

Ensuring uninterrupted provision of safe drinking water is the most important preventive measure to be implemented, in order to reduce the risk of outbreaks of water-borne diseases.
7.0 Vaccination against Hepatitis A

- The use of hepatitis A vaccines for mass immunization is not recommended.

- Vaccination of high-risk groups, such as persons involved in the management of drinking water, waste water or sewage might be considered.

- In case of an outbreak of hepatitis A consider immunization of contacts. The use of immunoglobulins is not recommended.

- Diagnosis of acute hepatitis A is confirmed by anti-HAV IgM antibodies.

Vaccination against Hepatitis A and Other Water Disease for persons at risk, e.g. travellers visiting areas where the disease is common.
Long Term Measures

- Create Disaster-Preparedness Programmes and Early Warning Systems.

- Improve surveillance on a local, national, international and global level.

- Promote tap-water quality regulation and monitoring.

- Enforce high standards of hygiene.

Technical Issues

- Improve water treatment and sanitation.

- Keep infectious disease control programmes active and efficient.
Many Projects with regard to

- Hygiene practices
- health Education
- and water diseases

has been implemented by different NGOs, supported by many donors in the West Bank Areas
Lessons learned from the program implemented in the Area

😊 Advocacy: The importance of promoting hygiene and sanitation at the community level needs to be argued.

😊 Best practice: Organising exchange visits at a community level to good projects helps encourage people learn new behaviours.

😊 Reinforcement: Practical hygiene behaviour sessions both in the community as well as in school health promotion programmes need to be reinforced. Messages on, for example, effective hand washing or the preparation of oral re-hydration solution should be regularly repeated.

😊 More time and effort: The length of project periods sometime short, and the focus should be shifted to more intensive health and hygiene promotional activities.

😊 Intensive social marketing is needed to get across some fundamental messages about the promotion of good hygiene and sanitation practices.

😊 More attention is needed to promoting the hand washing skills and child faeces disposal practices by conducting more home visits,
1. **Drainage Water Management**

Misuse and lack of maintenance are the two main reasons why drainage structures are often associated with environmental health problems.

Due to lack of adequate domestic water supplies and sanitation facilities, drainage canals or drainage water treatment and disposal facilities are often misused for washing, drinking and uncontrolled disposal of human excreta or other waste by the poorest and, thus, most vulnerable social groups. In this way, drainage water contributes to disease transmission.

2. **Effective Solid Waste Management and Control**

3. **Mosquito Control**
Proper use and maintenance of water supply and sanitation systems. For example, sanitation facilities that are not properly maintained discourage the use of toilets and will allow pathogens back into the environment through leakage.

Proper maintenance of pumps and wells.

Pipes and taps should always be kept clean.

Regular check for the water pipes for leaks and cracks.
Control individual household piped water supplies or sewerage connections, and rainwater (stormwater) run-off control for new housing developments, or forbid open surface wells.

Standardize Surveillance of Water born diseases outbreaks

Guidelines must be established for the investigating and Reporting water born disease

Proper Management of Water Recourses
3- Chlorination at the Water Resources

- Solid Chlorine
- Liquid Chlorine
- Gas Chlorine
Gas Chlorine System
Solid Chlorine System
Liquid Chlorine
Sodium and Calcium Hypochlorite

Relatively Cheap

Available in the Market

USE chlorine in the Right Dose

Buy it According to Specifications

"physical & Chemical"
Important: Residual Chlorine Measurements

Drinking Water: 0.2-0.8 mg/l

D / M.Alawneh/Training/HWE/ Preventive Measures
6. Set A Policy for the use of tankered Water

- Potable Water Tanker Specifications
- License of the Tankers
- Monitoring of the Tankered Water
7- Water Quality Monitoring

Define Health Parameter:
Total Coliform, Faecal Coliform
Turbidity, pH, Residual Chlorine, EC,

Prepare a testing lab

Design Municipal monitoring program
Include

- Water source,
- Main Reservoir
- Network
- Monitor the hot spots in the network
Some Municipal Staff Was Trained on Performing Water Testing
LOCAL GOVERNMENT DECLARATION ON WATER

On the occasion of the Fourth World Water Forum, Mexico, 21 March 2006
Proposed by the UCLG Committee on the Local Management of Water and Sanitation
• We, Mayors and local elected representatives from around the world, gathered together on the occasion of the Fourth World Water Forum in Mexico on 16-22 March 2006, mindful of the responsibilities and powers of local authorities in relation to drinking water and sanitation, recall the following principles:\(^1\):

  – 1.1. Freshwater is a scarce and endangered resource that is essential to life, development and the environment, and is a common good belonging to the whole of humankind;

  – 1.2. All human beings have the right to water in the quantity and the quality required to meet their essential needs, as well as to sanitation, a key factor in human health and the preservation of ecosystems;

  – 1.3. Each individual’s right to water, and their usage of it, should be exercised with respect for the needs of present and future generations;

  – 1.4. Women play a pivotal role in development, and particularly in the supply, management and conservation of water.
and we note that:

1.5. The quantity and quality of water have declined significantly due to individual and collective behaviour that is detrimental to the sustainable management of this natural resource;

1.6. One in four people do not have access to water in sufficient quantity or of an adequate quality, and one in two do not have an adequate sanitation system. Water-borne diseases are the greatest cause of infant mortality around the world;

1.7. Increases in urbanisation, unhealthy living environments and desertification, and more frequent droughts, floods and cyclones due to climate change, have an impact on the quantity and quality of water resources.
• We, Mayors and local elected representatives, recognize that:

  – **2.1.** The United Nation’s Millennium Development Goals (MDG’s), which propose to reduce by half the proportion of people without sustainable access to safe drinking water by 2015, are of direct concern to all local governments;

  – **2.2.** Local authorities play a fundamental role in the management of water resources and in the organization of public water and sanitation services. Their role should be recognized and strengthened. Local authorities should be able to freely choose between various management models;

  – **2.3.** The equitable management of water resources requires an integrated approach and shared responsibilities between the different levels of governance, and should be founded on the principle of territorial management based on water basins;

  – **2.4.** The utilization and management of water should be participative and involve users, planners and decision-makers at all levels, local leaders to ensure the close link with the citizen, and actors at each level.
• **We, Mayors and local elected representatives, undertake to make every effort to:**

  – **3.1.** Implement policies to achieve the Millennium Development Goal to reduce by half the proportion of people without sustainable access to safe drinking water by 2015;

  – **3.2.** Manage water and sanitation services in our areas, and within the remit of our powers, in such a way as to facilitate universal access to water and sanitation in sufficient quantity, quality and continuity, and at an affordable and equitable price;

  – **3.3.** Manage water resources in a planned, sustainable and integrated manner in order to prevent water pollution;

  – **3.4.** Implement campaigns to raise awareness amongst citizens and users of local and global issues relating to water management, and promote proactive citizen involvement in defining water policies at the local level in a democratic and inclusive manner;
– **3.5.** Promote co-operation between local authorities and networks of towns and cities, with the support of the world organisation *United Cities and Local Governments*, as well as national governments, international organisations, NGOs, professional associations, trade unions and the private sector, and put our technical skills and financial resources towards providing access to safe drinking water and sanitation for all and respect for water by everyone;

– **3.6.** Raise, where possible, financial resources including from water charges, to fund decentralised cooperation activities that are equitable, transparent, long-lasting, in order to reduce urban poverty and the exclusion of rural areas;

– **3.7.** Improve and foster exchanges related to data gathering, skills acquisition, technology, methods and tools for proper water management, and support in particular the efforts made by international bodies to establish a system to measure the progress made in achieving the Millennium Development Goals.
• We, Mayors and local elected representatives, call on national governments, regional and international organisations and the United Nations to:

– 4.1. Recognise the fundamental role played by local authorities in the protection and sustainable management of water, and in the organisation of equitable and transparent public drinking water and sanitation services;

– 4.2. Encourage decentralisation and devolution, and actively implement subsidiarity, to ensure service delivery close to the citizen based on close cooperation between all levels of government;

• 4.3. Increase financing for local water and sanitation infrastructure to address the needs of poor populations that do not have access to water and sanitation;

• 4.4. Ensure the systematic and real involvement of local authorities in strategic decisions regarding the management of water and their role in achieving the Millennium Development Goals;
– **4.5.** Contribute to local government capacity building to improve effective water supply and sanitation services;

– **4.6.** Support international co-operation between local authorities to build their technical, human and financial capacity, in particular in developing countries, and to foster the exchange of experience and best practice;

– **4.7.** Ensure the integrated, sustainable and equitable management of cross-border water resources, in partnership with local governments;

– **4.8.** Allow the local and regional authorities that wish to do so to allocate part of the revenues raised from users of water and sanitation services to undertake co-operation projects with partners in developing countries;

– **4.9.** Speed up the implementation of commitments made on access to water and sanitation and the fight against poverty, and increase the level of national and international public aid for development in order to achieve the objectives set out in the Johannesburg Plan of Action and the Millennium Development Goals;

– **4.10.** Maintain key ecological balances, notably through the specific commitments made by States on the implementation of the Convention on Climate Change.
Role of the Physician and Other Health Professionals

The implementation of many of the preventive intervention at the personal, household, and community levels recommended and will require their integration into community-based health programmer.

Although not a direct intervention, the training and re-orientation of health professionals, especially physicians, are seen as critical adjuncts to successful implementation.

Efforts to re-orient the physician and other health professionals through training courses, seminars, and wider dissemination of current research results should be considered an essential component of fostering the proposed preventive measures.
The Ministry of Health should work closely with the Ministry of Education
• To develop a health education (health communication) component targeted at school children,
• and Devise and communicate appropriate health messages.

Health education models can be jointly developed, tested, implemented and evaluated for various age groups.

Research programmes in universities and colleges can be encouraged to include components that produce information of direct importance (e.g. vector biology and control, case management) or indirect importance (e.g. improved water supply, educational inter-ventions to promote community sanitation, waste characterization studies)…..
Role of the Ministry of Environment

The Ministry of Environment can help the Ministry of Health

Collect data and information on ecosystems and habitats in or around cities at high risk of dengue.

Data and information on local geology and climate, land usages, forest cover, surface waters, and human populations are useful in planning control measures for specific ecosystems and habitats.

Be helpful in determining the beneficial and adverse impacts of various Ae. aegypti control tactics (chemical, environmental and biological).
Role of the Information, communication and media

Information directed at the community at large is best achieved through the mass media, such as television, radio and newspapers.

Therefore, the body responsible for information, communication and the mass media should be approached to coordinate the release of messages on the prevention and control of dengue developed by public health specialists.
Role Of nongovernmental organization (NGOs)

NGOs can play an important role in promoting community participation and implementing environmental management for water diseases.

This will most often involve health education, source reduction, and housing improvement related to vector control.

Community NGOs may be informal neighbourhood groups or formal private voluntary organizations, service clubs, churches or other religious groups, or environmental and social action groups.
- Conduct baseline surveys on community health and sanitation situations

- Train Health Motivators, who run health education programmes at a community level

- Select and train sanitation workers

- Trains Community Health Volunteers

- Demonstrate and conduct practical sessions on the preparation of jeevanjal, simple eye and wound care, and the dangers of dehydration in cases of diarrhea and methods of treating it (demonstrated using a doll) etc.

- Raise awareness of the importance of clean water and good sanitation through video shows, puppet shows, street theatre, health songs etc

- Provide demonstrations of training in latrine construction/latrine installation and use
Thank You

Wish You Eid Mubarak